

Park-City Edge Effect: mapping the social and environmental ecotones of three Sydney parklands

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ABSTRACT

This paper will use a metaphor based on the ecological definition of the “ecotone” to examine the transition zones that occur around the edges of three of Sydney’s major parklands – Centennial Parklands (CP), the Sydney Olympic Parklands (SOP) and the Western Sydney Parklands (WSP). All three parklands are experiencing to a greater or lesser degree, change in the surrounding human habitat zones. In all three cases, the parklands under consideration experience edge effects related to abrupt boundary definition by major roadways. In the case of the WSP a major new roadway (the M7) will in fact dissect it. The paper explores how, for example, have edge conditions affected access to these parklands, use patterns and physical evolution over the years. The authors take the view that there is significance in conceiving of a park-city “edge effect” and that it should be given more consideration in planning our cities and suburbs.

INTRODUCTION

This paper presents three of Sydney’s major urban parklands as examples of critical green infrastructure of the city, meaning that they contribute as open space islands in the built up fabric of the city to the essential connections between people and nature. We are particularly interested in the zones where the edges of these parklands meet the city, for these are unique areas where contrasting ecosystems butt up against each other to create a third system, known in ecology as an “ecotone” and which typically contain elements of both adjacent areas. Michael Hough points out that Patrick Geddes, in his Garden City concepts, conceived of regional landscapes and urban form as “an urban hole in a rural doughnut.” However, today the natural resources of the regional landscape must form the center; and so we end up with “rural holes in an urban doughnut.” (Hough 2004, p.219)

When we examine the landscape at the city/metropolitan scale, as Geddes and Hough did, we are operating at the conceptual level where planners and developers speculate and create the urban fabric on which many people build their homes and lives. However, the inclination and capacity of politicians, professionals and laypeople to conceptualize the landscape as a vital, catalytic element of urban and suburban planning and development proposals is not evident in the public discourse. For example, the recent uproar in NSW over the apparently ill-considered designation of “green zones” in the soon to be Southwest Release Area, variably known as Bringelly or Leppington is a good example of many people’s poor conceptualization of how landscape systems can and should be the basis for projecting future urban metropolitan form. In the spring of 2005, and in uncharacteristically retreat mode, NSW Minister for Planning Frank Sartor, was forced to withdraw his Department’s proposals for an overlay of green-zoned lands as it was revealed that this colour had been rather indiscriminately overlain on the future development lands. The primary concern was that the inherent value of this land to be redeveloped for residential uses, the “highest and best” use, would be neutralized by this proposed zoning (Davies 2005; Goodsir 2005).

In this scenario, landscape is the commodity and its potential can only be realized if it can be built upon for residential or commercial land uses. Its value as the essential natural infrastructure that mitigates environmental issues like stormwater runoff, absorption of air pollution, reduction of the urban heat island effect, provision of habitat – not to mention the social and cultural benefits it affords to local and regional users of recreation facilities—is overlooked.

When we define planning areas, like the Southwest Release area in NSW, and gazette new metropolitan parklands such as the Millennium Parklands at Homebush or the Western Sydney Parklands, or seek to manage in perpetuity the legacy of urban planning of the late 18th century known to and loved by many – the parklands comprising Centennial, Queens and Moore Parks – we tend to draw a line around them and focus our attention on what’s happening within those boundaries. There is a security in this demarcation; a definition of things that are inside or outside the line. But we forget that these lines are often imaginary markings that can be surveyed onto the Earth’s surface, by which in reality Nature largely ignores, unless, as is rarely the case, these boundary lines coincide with some naturally occurring edge or boundary, such as a creekline or river, or ridgeline. And this is where landscape and an understanding of ecological principles comes into play as we re-examine, re-map parklands—the rural holes—from an ecological perspective and apply some of the concepts of ecology to the artificially derived edges and engineered boundaries between urban ecosystems.

This paper employs ecotone as a metaphor to examine the transition zones that occur around the edges of three of Sydney’s major parklands – Centennial Parklands (CP), the Sydney Olympic Parklands (SOP) and the Western Sydney Parklands (WSP). We review the context and historic development of these three landscape precincts of the metropolitan fabric to reveal the patterns that have evolved as a result of their surrounding geographic, ecologic and cultural influences.

All three parklands are experiencing to a greater or lesser degree, change in the surrounding human habitat zones. At CP the change is most directly happening at its western edges with the redevelopment of the Green Square urban precinct. At Homebush, the residential development patterns initiated prior to the 2000 Olympics at Newington and Liberty Grove are fairly well established and the newly redeveloped Rhodes peninsula contributes to this on-going urbanization at its edges. The WSP will be significantly impacted by the development in the southwest sector of the Bringelly land release and more land in the northwest sector as thousands of new residents move into this area over the next 10-20 years.

In all three cases, the parklands under consideration experience edge effects related to abrupt boundary definition by major roadways. In the case of the WSP a major new roadway (the M7) will in fact dissect it. How, for example, has this edge condition affected access to the parklands, use patterns and physical evolution over the years?

REVISING LANDSCAPE ECOLOGY

Richard Forman, professor of landscape ecology at Harvard University pioneered the application of landscape ecological principles to landscape planning (Forman 1995, Dramstaad et al 1998) in the United States. His work provides a useful series of concepts that we revisited in using this idea metaphorically; admittedly giving priority to human species in the systems under discussion. Terms such as ‘edge’, ‘boundary’ and ‘ecotone’ are particularly helpful to inform landscape planning and design at the metropolitan scale and build a picture of the human-nature zones of interaction.

edge – portion of the ecosystem near the perimeter, where the influences of the surrounding prevent development of interior environmental conditions

boundary – zone composed of the edges of adjacent ecosystems

ecotone – a transition area between two adjacent ecological communities. It may appear on the ground as a gradual bleeding of the two communities across a broad area, or it may manifest itself as a sharp boundary line (Forman 1995, p. 38).

Each of these concepts relies on the human inclination to survey, demarcate and organize our surroundings. However, the ‘lines’ defining ecosystems are not static; they change over time, eg. fire ecologies cause boundary shifts following many years of burning and regrowth. Management regimes of parklands can also cause a shifting of boundaries, as has happened at both Centennial Parklands and Millenium Parklands. WSP anticipates future changes by defining an ecological CORE in the precinct plan with transitions outward toward the edge of the parklands.

If we accept that humans are the dominant species, at least in metropolitan areas, we can look at their activities across a spectrum, i.e. from those areas where they and their built elements dominate the ecosystem to areas where natural systems dominate. Within the built-up environment, species are characterized by high numbers, low spatial definition (that is, they go anywhere and are adaptable to various environments) and are highly diverse, e.g. multicultural. At the other end of the spectrum in nature dominated systems, human species are low in numbers, have high spatial definition (that is, they are limited to areas in which they move around), and there is lower diversity, i.e. relatively small proportion of humans are using these areas. Diagrammatically, between the zones of human dominated and nature dominated ecosystems, there occurs an overlap that creates a third zone – the ecotone. In ecological systems, the ecotone is typically the richest area of species diversity and interaction. As the diagram indicates, the boundaries of these systems can be sharp, or comprise a gradual bleeding or blending.

We might conceptualise how the human species, like some animals, prefer the edges, particularly the edges of ecotones. Members of the species that don’t move very much and prefer “passive” recreation versus people on bikes or walking; individuals that prefer to traverse and move around in the system. Not everyone needs to get to the ‘core’ of the parklands to experience it in a ‘natural’ sense. This is parallel to the “edge effect”, an ecological principle referring to a condition of high population density and diversity of species in the outer portion or edge of a patch (of forest for example) or other spatial element (a road corridor) (Forman 1995, p. 85) . More edge to an ecosystem is considered to be advantageous because of the richness and diversity of species that interact there. This is an aspect of “edge” that is worth keeping in mind as we compare park-city edge conditions.

The edge structure and function are also important considerations, for as Forman notes, ‘Clearly, humans play overriding roles in maintaining some edges (Forman 1995, p.92). Human created or “induced” boundaries in many areas are numerous, diverse and often differ structurally from natural (or inherent) boundaries.’ The structural distinction of boundaries can also play a valuable role in the planning, management and design of open spaces. For instance, and again as Forman points out, boundaries can filter and protect discrete areas while opening up others, ‘concentrating human activity on the edge to protect the interior’ (Forman 1995, pp. 93, 101).

Scale plays an important function in these considerations, as well. These ideas must be considered at a variety of scales. At the metropolitan strategy planning scale, where plans are drawn at 1:250,000, there are necessarily very broad views, mapping systems, looking for landscape patterns, mosaics, patches and corridors – more of Forman’s landscape ecology concepts. There are site specific landscapes within the greater region, and also significant adjacencies that occur between ecosystems.

COMPARING PARK-CITY EDGE CONDITIONS

Central Park, New York City

As a starting point, it is always valuable to revisit Central Park in New York City. Designed by Frederick Law Olmsted and Albert Vaux in 1860, is still regarded by many as the quintessential urban parklands and the referent for many favourite urban parks. The borders of this pastoral/picturesque landscape were defined by the 19th century surveyors who had laid out the future urban form of the city, that would eventually surround the edges of the park. Today, the park seems neatly and effortlessly spliced into the grid of Manhattan, bound by straight streets, edged by consistent building types and land uses. Within the park is a series of ecosystems that range from human-dominated to more natural, and the city is filtered out of the park through a variety of design strategies. For instance, the edges of the park were densely planted, as a woodland, with trees and shrubs. Although many of the shrubs have been removed for safety concerns, the trees continue to screen the surrounding urban context from the park. Vehicular access along the length of the park is limited to two main routes, the East and West Drives, and four sunken transverse roads—precursors of subways--carry vehicles across the park below grade (Cedar Miller 2003, p. 23). Pedestrian entry is well defined by numerous named gates which punctuate a continuous granite wall.

It is interesting to note that in his park designs, Olmsted, who was the landscape architect of numerous 19th century American city parks and park systems, generally reserved areas at the periphery of the parks for what he called “gregarious” activities. Gregarious activities were where people ‘mingled in large groups for relaxed recreation’ (Beveridge and Rocheleau 1995, p.49). These activities were generally regarded as somewhat common, or low-brow; offering ‘little intellectual gratification’. Nevertheless, Olmsted was adamant that there was a distinctive human longing for this kind of interaction and that suitable spaces in public parks should provide for such gregarious social activities. His observations of public park use in Europe and England further convinced him of the value of this kind of open space to provide space for large crowds to gather and enjoy themselves. The rationale for locating these activities at the periphery was that they would not intrude on the pleasure of feeling isolated from the city and from other park users, and of complete ‘immersion in scenery’ which could be best experienced in the interiors of the parklands (Beveridge and Rocheleau 1995, p.49).

Centennial Parklands

Located in the Eastern suburbs of Sydney, Centennial Parklands constitutes one of the city’s oldest and largest parklands; Sydney’s Central Park, in many regards. Until 1998, the parkland consisted of three adjacent but separately managed parks: Centennial Park, Moore Park and Queens Park. All three are late 19th century parks, carved out of existing public land known as the Second Sydney Common (established in 1802).

Following the establishment of the Centennial Park Trust /Moore Park Trust in 1998 and the subsequent integration of Moore Park, Queens Park and Centennial Park into Centennial Parklands, issues of connectivity between the parks and the between the parks and the community became significant. One catalyst for this was the construction of the Eastern Distributor which encroached on and transformed the western and northwestern edges of Moore Park. Another was quite simply an awareness of the importance of strengthening the visual, physical and social connections between the parklands and its urban context. These issues persist today with the increasing pressure of use from the area to the west, Green Square and Victoria Park, where there is medium density residential occurring in the redevelopment of inner city industrial lands.

These concerns for connectivity have focused attention on the edges of the parklands, and indeed they have a great amount of edge area, with a diversity of activities at the boundaries. The most

visually distinctive edges are the tree-lined avenues: Anzac Parade, Dacey Avenue, Parkes Avenue and Grand Avenue. Lined with primarily with figs, these corridors define and protect the park, and connect the city and to the parks. The corridors can also be read as ecotones—a zone with elements of both the park and the city.

Ecologically, the Centennial Parklands is a highly significant area of the city. Centennial Park, the heart of the parklands, served as the Sydney's second fresh water supply from 1820-1887, and continues to serve as an important component of the urban stormwater system. The water supply is a geological gift, for the upper edge of the park traces the geological transition from Sydney Sandstone to Botany Sands. Like the tree planted avenues, this geological transition zone presents an opportunity for re-interpreting the edge effects within the parklands. In this case, the sandstone ridge, some 20 meters above most of the park, was incised with reservoirs in the late 19th and early 20th centuries. The tops of these reservoirs now serve platforms for organized sport and viewing, and along with the wooded slopes just below them create a place to experience the park without actually being in it: a place between the city and the park.

A similar recreational transition zone occurs at the lower, southern edge of the park which is dominated by water and sand. Here, the ponds and stormwater system along Alison Road hold and release water, and a bus way holds and releases traffic. Both the ponds and the bus ways in fact integrate the park into the broader urban context, and express the park's civic role as green infrastructure.

Finally, the residential edges of Centennial Park have what we might call a 'rim effect'. Along Darley, Martin and Lang Roads, the slope of sandstone here is steep and/or narrow enough to discourage gatherings/group activities. Instead the sloped and lightly wooded rim encloses the park, and creates a buffer zone between residential areas and the park. Along Lang Road and Martin Road the elevation of the rim also provides views into and across the park. This residential wedge, between Centennial Park and Moore Park, was originally meant to be within the park, and today it reads visually as part of the park—an ecotone that shares views and trees with the park—but also traffic/parking.

Millennium Parklands, Homebush

The Sydney Olympic Park Authority Act of 2001 established what has become the true environmental legacy of those Games – the Parklands of the Sydney Olympic Park. This 432 ha parklands includes remnant native woodlands, saltmarshes and mangrove stands along with historic naval munitions storage structures and evidence of significant Aboriginal heritage. It is advantageously located at the geographic heart of the Sydney metropolitan region, Homebush Bay has been the focus of planning and design attention, and the largest site remediation project in Australia for over a decade, long before the city was announced the successful bidder for the 2000 Olympic Games.

The 2002 Plan of Management for the Parklands 'identifies the desired character for the Parklands as the major conservation and passive recreational resource of Sydney Olympic Park' and notes that 'the Parklands will play an important role in defining the edge of the urban areas and in providing a major educational and recreational resource for the future residents, workers and visitors to the Sydney Olympic Park area' (Grant 2002, p.15). So rather than the infrastructure of the city or urban development defining its edge, the Parklands are conceived as defining the edge of the city.

In the tradition of Olmsted's parkways, Bicentennial Parkway is lined with dense plantings of casuarinas, one of the most distinctive roadway landscapes in Sydney, behind which lies the mangrove ecosystem of Homebush Bay. When viewed from the Rhodes peninsula across Homebush Bay, the parklands are well buffered on some edges by a mangrove mantel, but fully

exposed to the waters edge in filled areas where residential apartment blocks have been developed. This fusion of designed parklands accommodating a full program of recreation/open space planning for human use but within an ecological framework, demonstrates an emerging understanding of the potential for urban parklands to function as part of a greater system of urban infrastructure.

The Western Sydney Parklands

The County of Cumberland Plan of 1951 envisioned a future for metropolitan Sydney that targeted metropolitan growth in the outer areas of the county. This plan included extensive areas designated as greenbelt in a 20-kilometre radius of the city's centre, which was to set the periphery of the urban development and 'to bring fresh air and unspoiled countryside within reach of as many urban dwellers as possible' (Winston 1957). Now, 50-plus years later, in western Sydney, several decades of metropolitan planning policies have seen lands progressively acquired to consolidate a corridor situated at what used to be the western edge of Sydney's urban development. In 2004, this land-holding was gazetted as the Western Sydney Parklands (WSP). About two-thirds of the lands consolidated in the WSP lie immediately west of what was originally designated 'greenbelt' in the County's planning scheme of 1951 (Winston 1957).

During the 1970s there was an active acquisition program and local planning schemes overlain on these lands (URS 2004, p. 13). The corridors were imagined as a traditional 'greenbelt' and set aside for:

- lands for quality open space
- a visual and physical break between existing and future areas of development
- maintenance of natural systems for environmental protection
- linear space for present and foreseeable major public utilities and other special uses (URS 2004, p.13).

In total, the WSP comprise 5500 hectares of public open space in western Sydney. Viewed in the context of the Sydney Metropolitan region, this is a highly significant land holding, extending some 26 km north to south and situated about 35-40 km west of the Sydney CBD, with a total edge length of 100 km. Reversing Geddes' metaphor, the WSP could be conceived of as a big floating island, a *rural* hole in the *urban* doughnut.

Within the WSP, a number of recreation facilities pre-exist such as the Olympic sporting venues – equestrian and shooting centres and the baseball facilities; Fairfield City Farm; Prospect Reservoir, the main source of Sydney's water supply; the Western Sydney Regional Park, managed by NSW National Parks and Wildlife; and more intensively developed recreation venues, such as the Eastern Creek Raceway and the Eastern Creek Dragway. In addition to these developed recreation-based activities, there are also areas of remnant Cumberland Plain vegetation, land under cultivation and grazing, as well as large-lot rural residential.

If we continue to think of the WSP as a green island amongst the development of suburban sprawl, we're continuing to think of park/nature as very separate from our daily lives. On the other hand, is it preferable to have there be quite a distinctive 'edge', a la Central Park in Manhattan? Can we imagine a scenario of urban development crowding the edges of the corridor, as Manhattan crowds the edges of Central Park? Is that a desirable outcome, or a feasible one for the way Sydney residents aspire to live? What would be the ramifications of this?

As Michael Hough reminds us in *Cities and Natural Process*:

...the primary consequence of human development on the natural environment is fragmentation, which converts extensive or continuous areas of forest, wetlands, meadows and other types of habitat into isolated islands. Typically, human activities disrupt ecological functioning and inhibit interactions between the systems, nutrient and

gene flows among habitats. The fragmentation of biological communities, in fact, is recognized as one of the most crucial environmental issues affecting urbanizing regions and ecologically diverse protected areas and parks beyond the city (Hough 2004, p.228).

The planning vision, principles and objectives outlined for the Western Sydney Parklands (URS 2004) seeks to stem the fragmentation of the WSP corridor. It has been based on a close evaluation of the landscape character and ecosystem relationships within the corridor with the goal of increasing the connectivity and congruence of these areas. A central tenet of the WSP Structure Plan is the creation of an ecological corridor network to protect and enhance biodiversity values. To enforce this, proposed uses within or adjacent to the network must be consistent with this function. The Plan maintains key access points and associated opportunities for developing structured facilities on the edge of the Parklands. Proposals for new facilities are encouraged to 'incorporate facilities that connect human health and well being to the health of diverse ecosystems both within the Parklands and through linkages to surrounding areas' (URS 2004, p.43). With active and vigilant implementation of this structure plan into the future, WSP has the potential to influence the urban development that occurs at its boundaries. In turn, at these edges, a new ecotone relationships will evolve.

CONCLUSIONS

The three parks we have discussed in this paper represent three stages of urban parkland development in Sydney. Centennial Park/Moore Park is the oldest; Millennium Parklands is the most recently realized urban parklands, which includes Bicentennial Park which was developed at the time of the Bicentennial in 1988; and finally, Western Sydney Parklands, established in and around suburbanisation that has been happening apace without reference to the parklands as an identifiable entity.

Centennial Parklands reflects the original idea of park as reconstructed nature, in the tradition of the 19th century English park designers. The Millennium Parklands builds on the philosophical origins of CMP, ie picturesque landscape scenes, but is a re-made landscape, constructed on a landfill. It represents a new vision of the metropolitan park, what Cranz has labelled the "sustainable park", ie a park that contributes to the 'project of helping cities become more ecologically sustainable' (Cranz and Boland 2004, p. 102). WSP is a hybrid of all these forms. started to develop a new language of metro parklands; the eco-revelatory 'design' phase; legacy of different utilitarian landuses, eg agriculture, waste disposal, brick making, etc.

Around the world the vision of parklands as evolving landscapes and as "emergent systems" is gaining currency. They are demonstrating the capability of sustaining habitat for vegetation, animals, birds and insects, as well as human activities. In describing Baldwin Hills, an evolving parklands in Los Angeles, one writer has described this area as 'a hopeful, imaginative opportunity for a twenty-first century park', a 'park of a very different nature':

The great urban parks of the nineteenth century exoticised nature, bringing the Adirondacks to New York City and American bison to San Francisco, Central Park and Golden Gate Park provided (and still do provide) an antidote to the ills of city life...but in a contrived, constructed manner that made nature picturesque and strollable. In contrast, a driving force behind the design of the Baldwin Hills Park is to preserve and leave undisturbed species and habitats native to the Baldwin Hills. The park will be not so much landscaped and designed as it will naturally evolve over time. (Kelly 2005, cited at www.laforum.org/issues/, 6 Nov 2005).

Sydney's 21st Century parklands will connect human and animal species with open space and ecological networks. They must be conceived as part of the entire fabric of the metropolitan area – as the city's "green infrastructure". They are essential for the health of the city and all its inhabitants, and so should be buffered from the surrounding urban development with boulevards of trees and vegetation, but permeable for the necessary movement of people and animals, into and within the ecotones.

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