

New Forms of Green for Mega-Cities: Peri- and Inter-urban Agricultural Space.

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Abstract: In Australia, the crisis of unbridled development as continuous linear coastal conurbations, predominantly residential, has resulted in alarming losses of productive rural land. Urban crises, however, can also provide opportunities. Originally explored in the Netherlands as 'reflexive modernization', there has been interest in the instrumentality of design and its enabling function. Netherlands designers' confronting representations of the 'endgame' of unrestrained housing developments prompted government-sponsored design competitions, resulting in visionary designs for urbanism, landscape and infrastructure. This paper argues that an important component has been left out of new infrastructure-rich, enabling cities, namely new forms of 'green' as peri-inter/urban rural space. New typologies for such lands require new landscape vocabularies with key drivers being state-of-the-art Information Technology and mapping techniques. Equally important and inextricably linked, are economic dilemmas, including development pressures, current farmers' need for retirement incomes and rationalised agricultural economics. 'New Green' requires new land-tenure models and innovative forms of agriculture that synthesize agriculture, nature conservation, infrastructure and communities. As a result, new forms of LGA planning are needed. Landscape design in this context, needs to transcend Late Capitalism consumerism and instead employ design as an inventive enabling agent. The paper sets the scene for ways that landscape design can engage with new design and planning tools to sustain productive lands as a new form of urban and peri-urban 'green'.

Keywords: *new forms of green, peri-urban rural land, enabling design.*

Introduction

What role does landscape play in Mega-cities of 21st century? When Deyan Sudjic wrote his seminal book of 1993, *The Hundred-Mile City*, describing the forces that shaped cities in the late 20th century (particularly Western Cities), landscape design was predominantly a consumer item, in the main furnishing expensively detailed parks and gardens for urban renewal areas, for example London Docklands.

By 1999, Sudjic's writings included the mega-cities on the Pacific Rim, particularly those rapidly emerging in Asia, and he suggested that these Pacific Rim cities are at the edge of a *new urban invention* (Sudjic,1999). What role is landscape design playing in this context? Again, in the main, landscape design, despite some innovative approaches to water management, is a consumer item for the massive high-rise housing developments or water-front playgrounds in both Australian and Asian cities or creating 'soft location factors' for tourism (Hoddenstedt,2003).

New urban inventions are occasionally evident in Australian cities in sustainable designs for developments on former industrial land in the inner city, creating population densities which can support public infrastructure. Despite this, the urban/rural edge is being consumed by the least appropriate form of development; namely low density green-field master-planned communities of 'Mc Mansions'(SMH, 2003) and rural residential subdivisions, both alienating good quality agricultural land in environmentally unwise ways.

This paper argues that Australian cities could lead the way in *new urban inventions* by both holding existing and creating new areas of green productive land within and between large urban conurbations. Such lands are important for sustainable regional planning and the well-being of urban dwellers. The paper proposes that, by a multi-pronged design and planning approach, there are opportunities for new forms of 'green' that both hold existing rural peri-urban land while also developing new landscapes within cities integrating landscape, infrastructure, and architecture as forms of productive land.

The paper begins by describing the crisis related to productive lands in (market gardens) and around (rural edge activities) 21st century cities and the particular role that landscape design can play. It briefly describes new planning tools being developed to hold the productive land on the edge of cities and goes on to suggest that as well, new landscapes are needed within the urban fabric. The paper argues that landscape design approaches need to shift from those predominantly servicing consumerism to ones which can enable new forms of productive and sustainable lands around and within cities. This involves engaging with the challenging possibilities for new landscapes generated by IT design tools, explored in such inventive ways by architects and engineers.

Holding the Urban/Rural Edge

The growing crisis in peri-urban landscapes has been the focus of much attention in United States, the Netherlands, and parts of Europe (Armstrong & Allison,2003, Musacchio et al, 2003, Oliver & Jenkins,2003). The crisis, already of concern, assumed a high profile in the 1990s when the architect, Rem Koolhaas, pointed out that in the Ransstad area of the Netherlands, there was a risk that the entire landscape would be covered by low-rise residential and commercial development where the only 'open space' would be the motorway.

In the Netherlands, unease about the growth of low-rise, car-dependent urbanism was such that young Dutch architects felt that rather than addressing the design of the built environment there was a pressing need for completely new designs for the countryside and a redefinition of the relationship between city and country (Grafe &Speaks,2000). Although the landscape scale in the Netherlands is different to other countries, nevertheless the Dutch debate has been a catalyst for those concerned with similar issues and publications such as *Aftersprawl* (de Geyter,2002) prompted Bart Lootsma to suggest that landscape architects world-wide, need to join in the debate about urban growth.

In Australia, the urban crisis is associated with continuous linear coastal development with occasional breaks of nature conservation and recreation areas, but with a damaging loss of rural lands. Sadly, this is occurring in areas of fertile soils and reliable water supplies, a serious loss for a relatively infertile, dry country. The particular plight of peri-urban rural lands in Australia has been highlighted in Victorian work on 'Future Agricultural Landscapes' (Barr,2003) and in discussions about the importance of the rural lands in Greater Sydney (Sinclair et al, 2003). The crisis has prompted some strategic responses, in particular the Green Wedges Policy introduced in the Melbourne 2030 Strategic Plan (Delahunty,2003). In South East Queensland (SEQ), the Cultural Landscape Research Unit, Queensland University of Technology, has prepared a 'Toolkit' to assist farmers to hold their rural enterprises against the increasing pressure for suburban development. The 'Toolkit' explores farmland easements, innovative forms of land tenure, and incentives to encourage new farmers (Armstrong et al,2004).

The 'Toolkit' is a planning device, however, there is a specific role for landscape design in developing new forms of productive green space. Building on the work on landscape urbanism, initially promoted by Corner's essays in *Recovering Landscape* (1999) and taken further with new mapping technologies (Mostafavi & Najle, 2003), there are opportunities to design for new partnerships between economics, infrastructure and new forms of crop production using new design technologies.

In Germany this challenge has been raised by the committee for the 2003 German Landscape Architectural Prize. They asked how can landscapes be designed to connect environmentally-friendly agriculture with regional marketing, including newly emerging wilderness so that green space can be an attractive, ecologically valuable '*urbanized cultural landscape*' (Dettmar,2003:39). This paper asks similar questions.

The Enabling Role of Design

The discourse about the demise of rural landscapes in Germany focuses on the '*perforated city*', described as '*a settlement carpet with lots of holes in it*' in which landscape, in its generally understood sense, has become an endangered species (Schröder,2003:80). This paper does not explore the different concepts

of 'landscape' and 'nature'. Instead it suggests there can be new forms of 'green' which retain and create anew those large tracts of green space, known as the peri-urban landscapes, within the '*perforated city*'.

In the 1990s, the urban theorists, Beck and Lootsma, considered that the crisis of urban development could provide opportunities as much as it caused problems. Beck called this '*reflexive modernisation*' where through reflection and self-confrontation new answers to urban problems can be found (Beck,1994:5, Lootsma,1999:251).

Lootsma discussed this in *Recovering Landscape* in 1999 and again in *Topos 40* in 2002. He brought out how such concepts have been explored in the Netherlands by design and urban planning offices where Dutch designers and planners '*have turned Beck's notion of self-confrontation into a [design] method*'(Lootsma,1999:252). This method involves designers continually confronting communities and policy planners with the extreme consequences of their respective desires; the intention being that showing the so-called 'endgame' can act as a catalyst for discussion and negotiation by the wider public.

In the 90s, designers such as Winy Maas of MVRDV, Rem Koolhaas of OMA, and Adrian Geuze of West 8 produced controversial proposals in order to trigger off wider discussions about urban development issues. As a result, the Dutch government funded design and planning competitions to explore new ideas for dealing with the situation. Lootsma (1999:257) pointed out '*This has led to a situation in which the Dutch debate about urbanism, landscape and planning... is less about philosophy, theory, and aesthetics and more about how the visionary and pragmatic may be combined in creative and paradoxical ways.*' Today Lootsma is less optimistic about turning around the destructive effects of Late Capitalism on contemporary cities (Lootsma, pers.comm, 2003).

Despite this, new ways of approaching design have already made significant contributions to finding answers to 21st century cities. For the last ten years, there has been a major focus on new hybrid urban forms that conflate landscape, infrastructure and architecture. Post-industrial cities have undergone massive urban change where large former industrial tracts have become new high density housing, linked with new road and/or rail infrastructure and new areas of parkland open space. In the process of exploring new urban forms, there has been a renewed interest in '*the instrumentality of design and its enabling function*' (Wall,1999:233).

When Wall(1999:233) described the new urban landscape, he likened it to a '*dynamic agricultural field, assuming different functions, geometries, distribution arrangements, and appearances as changing circumstances demand.*' I would argue that this can equally apply to peri-urban land. Rather than continuing to lose peri-urban agricultural land, new agricultural land penetrating the city could reclaim land in a similarly dynamic way, however with new partnerships and

relationships with infrastructure. Although, West 8's design for Schiphol Airport landscape went somewhat towards incorporating a new agriculture, it was more metaphoric than a new form of sustainable agriculture.

In Australia, Local Government zones 'landscape' either as open space (recreational and/or nature conservation), or scenic amenity or rural lands. Nature conservation areas have achieved some buffers between urban development, but they are increasingly small in scale, meanwhile rural land faces a constant battle with rural residential zoning (Sinclair et al,2003). Zoning acts against new hybrid forms, including the innovative tenures and incentives explored in the 'Protecting Rural Lands Toolkit' (Armstrong et al,2004).

In the Local Government context, landscape design, apart from some water management designs, continues to be seen as '*passive ameliorant*'. Instead, it could take up Wall's concept of '*active accelerant, staging and setting up new conditions*' for innovations associated with rural lands within and between urban conurbations (Wall,1999:233).

New Forms of 'Green' for the Contemporary Metropolis

As stated and reinforced by a number of urbanists (DeKlerk,1999, Lootsma,1999, 2002, Sudjic,1999), contemporary cities are now characterised by polycentric weblike sprawls where infrastructure and material flows are more significant than static political and spatial boundaries. In these urban conurbations, the emphasis is now on processes that facilitate networks across regional and global space. These new cities, while dispersed and diffuse, are at the same time '*infinitely enabling*' (Wall,1999:234). However an important component has been left out of these new infrastructure-rich and enabling cities, namely new forms of rural/urban space that synthesise agriculture, nature conservation, infrastructure and communities.

If the physical and programmatic functions of new urban form are resulting in designs that are rebuilding and intensifying the city, how then do we similarly reconfigure rural space –'new green' - in and around our cities? What shape can the new forms of 'green' space take? Can landscape designers apply similar principles and strategies suggested for cities, for example, 'thickening', 'folding', 'non-programmatic use', and 'impermanence' (Wall, 1999:244)? The conceptual groundwork was explored in some of the installations for the Hanover Expo 2000, in particular MVRDV Architecten Rotterdam - a form of 'stacked nature'. Such new approaches rely on new computer tools.

New Scapes: Territories of Complexity

Paola Gregory, in her publication '*New Scapes: Territories of Complexity*' (2003), provides numerous examples of how computer algorithms can enable designers to generate answers to complex programs. Architects and engineers have seized this opportunity, generating innovative environmentally-sensitive buildings. They see new ways of designing and inhabiting space though

complex systems of connections and interchanges which are constantly open, flexible and modifiable (Gregory,2003:5).

Central to these investigations is the notion of 'landscape', both as nature and metaphor. Designers working with IT paradigms see that in the electronic and post-industrial era, people can *'re-settle their account with nature'* where compensation can occur through integrating 'nature' and structures within new high density built areas (Gregory,2003:6). In these urban forms, we are no longer dealing with protected ecosystems forming counterpoints to urbanisation. Instead new parts of the city can be created that exist beside a *'powerful presence of nature'*(2003:6). Rather than zoning and compartmentalisation to plan cities, 'New scapes' suggest multi-functionality and integration as the necessities for the 'information city'.

Lootsma (2002), however, is wary of the way architects, urban designers, and landscape urbanists describe this concept of landscape. He suggests the ecosystem analogy is more about design processes than the resulting urban form. Concepts of nature in the new paradigm are complex, drawing from fractals, topological geometries and other formalisms associated with contemporary science, where nature is an analogy rather than a reality. Sawyer in his discussion about the 'Topological Twist in Landscape Architecture' (2000) has made similar observations.

Despite or because of this, it is time for landscape designers to engage with the 'New scapes' and the particular way IT can play key roles in new designs for 'green' space. I see four major roles. First, IT can supply the mathematical models to investigate scientific complexity of landscape, nature and methods of agricultural production. Second, IT can supply mechanisms to achieve the construction/realisation of projects. Third, IT can provide reactive systems capable of simulating behaviour in nature. Finally, the Information Age provides a different model of city and landscape which is mixed in uses, laminar in its flows, and where nature and artifice can be structurally interwoven into leisure, residential activities, environmental management, and I suggest, productive agricultural activities. (Gregory,2003:7).

During the 1980s, a number of architects, such as Koolhaas and Tschumi, explored a design language which shattered the logic of causality replacing it with an aleatoric logic of chance, always allowing possible unusual connections. Landscapes emerged not from the organisation of spaces and volumes but from collections of fragments in fluid fields of change, a dynamic web of interconnections realised through layers and links (actual and virtual). Two decades later, the IT context has taken landscapes further into the paradigm of complexity. Charles Jencks has explored some of this metaphorically in his *Garden of Cosmic Speculations* (2003), but there are opportunities to apply the concepts at a larger scale in designs for new forms of green space within and on the edge of cities.

The new IT technologies have produced a radical change in the design process. Relinquishing form as the prime driver, there is a new poetics of interrelation. In this context, landscape and architectural relations go beyond historico-environmental themes, beyond planning cities using natural elements, and beyond simulating shapes of the earth with architectural works.

The new information 'scapes' are not merely derived from a technology developed through the computer, they indicate a new way of designing and inhabiting space. Architectural designs reflecting the new paradigm are more open, fluid, ambiguous, stratified and unstable, hence the analogy with 'landscape'. Landscape designers are familiar with these states but it is only in the field of landscape urbanism, that we see broad scale design engagement with this new IT-driven paradigm (Mostafavi & Najle,2003).

In terms of urban green space, it is the instability of figure-ground relationships and the search for hybrids expressing tensions and forces that can provide the opportunity for new forms linking landscape, architecture, and infrastructure. New productive landscapes could certainly invade Ben van Berkel & Caroline Bos of UN-Studio's projects where design methods are capable of generating dynamic and interactive organisations that allow for any scale of project and multiple possibilities for realisation (Gregory, 2003:21). Likewise Reiser + Umemoto's 'West Side Convergence, NY (1990) provides a flexible surface of huge scale awaiting potential invasion by new landscapes.

IT tools have enabled forms to fold, surfaces to warp and even morph from one form into another, giving physicality to the 'space-in-between', already foreshadowed conceptually by Meyer as early as 1994 (Meyer,1997). This space is the symbol of every potentiality but what shape can it take?

The Fold

The fold is one of the ways for space to reflect the 'in-between'. New technologies such as vectoral geometries can help complex concepts of space-time take form. Vectors are able to show continuous deformation where Euclidean geometry is replaced by. As Gregory (2003:35) states the design form reflects diagrams of relationships, sometimes as maps – coextensive horizontal layering – which retain the multiple series of traces of the figurative process. In this form the figure-ground relationship is dissolved. Moussavi and Zaerapolo's proposal for the International Port Terminal, Yokohama (1994-present) shows just one example of its potential application to peri-urban or urban agricultural land.

Design forms such as folds, continuous torsions, curves, deformations, and distortions, are born of the digital world. One can see wrinkled surfaces and juxtapositions of facets that dig, cut and distort forms, often absorbed into the ground from which endogenous structures emerge. In some cases this is a soft

integration with imperceptible borders between natural and artificial (Gregory,2003:35). For large scale landscape design, these present exciting opportunities.

Eco-scapes

New designs are often based on cyclical models of information flows typical of living systems, including human subjectivity. Drawing from 'Deep Ecology' and the parallels of integrated electronic systems and living systems, new IT design methods search for animate forms – 'ecoscapes'- that are '*self-organising and self-producing morphogenetic processes*' (Gregory,203:49). These new forms create the basis for a new intermediate nature between the genetic code of biology and the digital code of technology.

I argue, there is the potential for new landscapes to morph and fuse with infrastructure and architecture to create new productive systems. They can be fluid, variable and endless, but also self-regulating. Gregory(2003:49) describes them as eco-scapes - '*capable of reacting to external stimuli, changing, mutating, renovating,*' and yet sustaining an '*internal coherence*'. James Wines of the SITE group has explored the ecological paradigm as forms which connect building, landscape, information flows, and the environmental context. Reiser and Umemoto developed a method defined as urban '*infrastructuralism*', including the design for a new urban form as an organisational continuity between architecture, transportation, and communication networks, exemplifying the '*temporality of incompleteness*' (Gregory,2003:54). The structure combined buildings, infrastructure, and parks as a dynamic system capable of acting like a '*spatial sponge*'. This is well worth exploring in terms of new forms of urban agricultural space. The early 'Vertical Landscapes' of West 8 can also now be seen in Columbia University's speculations on 'Vertical Farms'.

The Cyborg

The synergy between IT and biological science, combining biosphere, socio-sphere, and techno-sphere is resulting in built environment designs for people that are dynamic. They are cyborgs, often light and translucent, soft and organic, as architecture, they become '*living passages*' in which metabolic and ecological mechanisms interweave the constructed form with a fourth dimension, (Gregory,2003:66). The fourth dimension is familiar to landscape architects who have long seen it as 'time' and 'organic growth' however, advanced landscape students at QUT have explored landscape cyborgs as intriguing fusions between living and technological forms.

Because the development of a possible mega-city from Noosa to Tweed Heads is such a pressing issue, a number of hypothetical scenarios have been developed for the canefields as preliminary studies of what possibilities exist to address the problem of green space in mega-cities. Five scenarios as 'new forms of green' were explored.

The first, '*Sustainability within 21st Century Socio-economics*', considered current theories on natural capitalism and triple bottom line outcomes. The particular issues of designing sustainable organic systems that integrate innovative poly-cultural crops, new hydrological techniques, new land tenure, and community governance were clearly shown to be feasible options.

The second scenario, '*New Forms of Green for the Smart State*', considered the potential for innovative partnerships with high tech industries and university agricultural research centres. Cyborgian scenarios explored productive lands as machines for urban waste management.

The third scenario, '*New Forms of Green as Learning Communities*', explored the concept of 'learning landscapes' where urban agricultural lands become sites of new learning and knowledge transfer. The possibility of 'Innovative & Excellence Centres' in environmental management, biotechnology, food production, aquatics, and creative industries were explored, linking the specific attributes of this area of SEQ with intriguing partnerships in the wider region such as the burgeoning film industry and the proliferation of university campuses in the Gold Coast.

The fourth scenario, '*New Forms of Green as Sacred Space*', looked at what forms of sacredness lay in this landscape that could lead to new landscapes for the peri-urban, integrating nature and culture with all its layered complexity in the case of Australia and yet moving beyond Tacey's concepts of 'sacred'.

The fifth scenario, '*New forms of Green as Spaces for Hope and Negotiation*', looked at new ways peri-urban productive land can act as temporary havens for refugees and asylum seekers as an alternative to detention centres. Humanitarian issues, knowledge exchange and the particular healing effect of working in productive landscapes add further dimensions to peri-urban lands and along with the other scenarios showed that there were many possibilities for peri-urban land to remain green and productive and contribute to the well-being of people in cities.

But why engage with these ideas? It is worth reminding ourselves of Christopher Alexander's *Pattern Language* (1977) and his 'agricultural fingers' still remain important components of our cities. An effective way to hold these green fingers is to push back into the city and reclaim the land that has been so recently lost using IT tools to create new landscapes as a form of urban agriculture.

Urban Agriculture.

Holding existing productive lands on the edge of cities poses one set of problems, but penetrating back into the city as urban agriculture brings into play the important enabling role of design. Green roofs are well-established designs in Germany and Switzerland, but not in Australia and not as economic crops.

Equally, there are strong city farms, but new urban agricultural ventures need to be economically viable and environmentally sensitive.

These were the issues explored at the UrbanAg Conference in Brisbane in July 2004. There are challenging heat island and light intensity implications if plants are integrated into urban infrastructure. Despite this, Singapore has achieved significant advances in crop production on the roofs of large city buildings. The Conference speakers indicated that there was international interest in establishing crops within the urban fabric that make use of urban waste, addressing many of the difficulties through high-tech hydroponics and low-tech vermiculture in intriguing ways. Clearly the next step calls for designers with an understanding of both the needs of plants and the potential for new urban landscapes that are as exploratory and innovative as the new architectural forms.

Conclusion

I have argued in this paper that peri-urban agriculture land should be a vital part of mega-cities of 21st century. The current loss of this aspect of green space in and around cities can only be stemmed by a multifaceted approach that involves planning innovations and a pro-active role for landscape design.

Planning includes incentives for farmers to continue farming peri-urban land, new forms of land titling to address speculative development on farmland, changes in Local Government zoning, and new partnerships/cooperatives for innovative poly-cropping, explained in detail in the 'Rural Lands Protection Toolkit'.

Design includes both broadscale approaches to existing peri-urban rural lands and their relationship to urban environmental flows as well as detailed and complex designs that integrate agriculture with built environment infrastructure. The potential to realise truly new forms of 'green' can be facilitated with the new IT paradigms that allow for algorithms that can simulate nature, fold landform, and generate models for cyborgs between landscape, people, plants and people.

It is important that landscape architecture becomes a highly active voice in the urban discourse, arguing for a broad range of diverse landscapes in and around cities. It is also important that landscape design engage with the constantly evolving IT paradigms so that the values of landscape can be one of the many vectors considered. Landscape in the IT world needs to go beyond analogies of nature and instead be realised as significant contributions to the wellbeing of cities of the future.

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