The city as nature – new visions and logics for creating the climate adaptive, bio-cities of the Anthropocene

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The 21 Century is the urban century with humans the dominant force shaping the planet. Radical transformations in production and habitation systems are needed to address Anthropocene challenges including adapting to climate change. These need to be based on new logics and new visions of the city as nature and the nature of the city. Fundamental reconceptualisation of human-nature relations will enable transformations that can be supported by technical and social innovations, including ecological design.

The world’s cities are forming a global megacity linked by gargantuan flows of information, goods and people. To satisfy its rapacious appetites this megacity’s draws resources from its vast global hinterlands, threatening planetary boundaries with its consumption and waste. But the city is also a place of social production, engendering the cultural and technological innovations needed for adapting to changing circumstances. This production is evidenced by thousands of climate responsive, biophilic communities utilising multiple strategies for decarbonising and re-naturing their cities and degraded hinterlands.

Cities are evolving assemblages of intertwined cultural, material and ecological elements, spawning novel ecosystems in and beyond traditional urban boundaries. These are human created in at least three ways. Firstly, all nature exists within inherently politicised, cultural environments. Secondly, novel combinations of biotic and non-biotic elements are forming. Finally, the Anthropocene breaks down simplistic definitional boundaries of ‘human’ and ‘natural’.

This paper argues that new visions of the city as nature are needed. These require logics based on recognising the novel co-produced nature of ecosystems. These logics enable forward-looking planning objectives instead of attempting to derive strategic goals based on idealised past ‘natural’ states.

Keywords – ecological design, novel ecosystems, designer ecology, megacities, Anthropocene

INTRODUCTION

Climate responses impose new constraints on human production and habitation systems. During the 21st century transformation in the forms and functions of cities will be required in order to meet the needs of 9 billion people for food, housing, materials and energy without catastrophically breaching critical thresholds referred to as planetary boundaries (Rockström et al 2009; Steffen et al 2007). Awareness of the planetary scale of these challenges is motivating a suite of creative responses but to achieve the responses at scale, ecological knowledge needs to be applied systemically and comprehensively in modifying the human forces shaping the planet and its life support systems (Rockström et al 2009; Mathew et al 2014). Transformation of production and habitation systems requires new logics, new perspectives and new visions of the city as nature and fundamentally reimagining the nature of the city. It is not enough to deem nature to be a mere provider of ecosystem services, no matter how valuable these are calculated to be, because this conceptualisation of decision models is not adequately informing policy decisions (Laurans and Mermet 2014) and maybe resulting an extreme financialisation of nature (Sullivan 2013).

This paper calls for the adoption of scalable solutions through greater application of ecologically informed planning and design that incorporates these logics and realises these visions. It is based on research on water, climate change adaptation and living infrastructure undertaken for Canberra Urban and Regional Futures that emphasised the need for specifying future objectives for living infrastructure and the renaturing of urban areas (see Alexandra et al 2017 for a full project report, including the literature and consultative methods used). This research identified a number of profound integration and governance challenges for climate adaptation in Australia's national capital that is also the largest city in the Murray Darling Basin (Alexandra 2017a). The evolving nature of Canberra's urban water governance is a case study for PhD research on the changing nature of Australia’s water governance under a changing climate that is focused on the Murray Darling Basin (Alexandra 2017a&b; Alexandra 2018). The PhD research is investigating the
changing nature of nature in the Anthropocene, and the ways in which nature and culture are blurring, as refractions and reflections of their continuous becoming (Castree 2014a).

After this introduction, the paper begins by articulating the concept that all modern cities are forming a single global megacity – named Anthropocenia - linked together by gargantuan flows of information, goods and people. This megacity satisfies its rapacious appetites by drawing resources from a vast global hinterland. But the city is also a place of cultural production where the ferment of new ideas engenders the social and technological innovations needed for adapting to changing circumstances. Thousands of climate responsive and biophilic communities are in active exploration, ushering in transformations, utilising multiple strategies for decarbonising and re-naturing the city and its degraded hinterlands. In order to articulate the nature of the planetary dilemmas, section 2 explores the idea of a single interconnected global megacity (Beaverstock et al 2000) named Anthropocenia. With it incessant metabolism and plundering, extractive appetites, many see the city as the primary source of environmental degradation. However, it is also productive in terms of material and cultural transformations. This cultural productivity is evidenced by the many urban and regional communities actively exploring ways for redirecting their environmentally destructive trajectories, including biodiversity loss (ICLEI 2017) and the huge global program of experimentation in climate responsiveness (Broto and Bulkeley 2013). Drawing from these examples, some ideas on reconceiving cities’ relationships to nature are sketched out in section 3. Accepting the scale of the challenges of reforming relationship to their environment and the planet section 4 draws inspiration from the emerging bio-cities movement, and initiatives like urban forestry, renaturing cities, living infrastructure and urban agriculture that are redefining the nature of cities (James et al 2009; Andersson et al 2014; Alexandra et al 2017).

Despite all these activities there are key underpinning conceptual challenges about how planning and conservation goals are set. By definition cities are novel ecosystems. Novelty is further enhanced by global anthropogenic impacts including climate change that are shifting the historic ranges of dynamic ecosystems making static conservation paradigms redundant (Alexandra 2012). Most ecosystems can now be defined as novel anthroscape or anthromes because more than three quarters of the world’s terrestrial landscape have been reshaped by humans, forming huge areas of anthropogenic biomes (anthromes) including and the agricultural and settled landscapes with their highly modified and novel ecosystems (Ellis 2013).

Anthropogenic changes makes idealised pre-development benchmarks of ecosystems increasingly redundant, so instead we need to work towards achieving socially defined forward looking objectives for how we integrate human activities, ecosystem restoration and biodiversity conservation. Ecosystem restoration as either an explicit or implicit goal can tend to drive backward looking approaches. By definition restore implies looking to a past state as the ideal. Thus ecological restoration towards a static or idealised past state is not a useful way of setting objectives, yet is often used as the default in regional and conservation planning. An alternative is to focus on using a design driven approach that uses ecological science to support creative endeavours. This can be defined as ecologically informed design – or designer ecology - that by definition requires the adoption of explicit future orientated objectives, including the capacity to adapt to changing climates. Section 5 questions the emphasis on ecological restoration and begins to explore the logic of further developing the discipline and practice of designer ecology.

Ecology and ecological ways of thinking will be more usefully applied to reforming and restructuring human dominated urban and rural systems if they are integrated within the disciplines and practices of the planning and design professions. Prospects for applied ecology forming a design science are explored in section 6. Developing applied ecological design suited to working within the limits of the planet has a long intellectual lineage but these deserve to be more critically assessed (Ferguson and Lovell 2014) in the interests of developing the discipline of ecological design (Mathew et al 2014). There are many opportunities for using the ecological sciences to inform ecological re-engineering of human dominated landscapes including cities and their peri-urban regions (Andersson et al 2014; Alexandra et al 2017). The paper concludes by calling for a greater focus on creative, adaptive and disciplined ecological design as the basis for developing and testing principles and practices suited to the challenges of the Anthropocene including climate adaptation.

2. THE DESIGN BRIEF FOR THE WORLD MEGA CITY - ANTHROPOCENIA

In the urban century a fundamental question facing humanity is how to sustain 8 to 9 billion humans along with other species (biodiversity). This challenge extends globally, affecting planetary scale systems because the modern world operates as one vast interconnected system relentlessly exploiting natural resources beyond the boundaries of any specific city, region or nation state (Steffen et al 2007).

To comprehend this interconnected system we can conceive of all cities joining to form a single global megacity – Anthropocenia - linked by gigantic flows of information, goods and people. The modern world of this giant global city is an unprecedented empire of consumption unparalleled in human history. The city appropriates a vast global hinterland for supplies of energy, food, fibre, water and raw materials and the eco-
system services needed for its survival (Ellis 2013). Flotillas of ships, innumerable trains, squadrons of planes and billions of motor vehicles deliver the people and materials needed to sustain the megacity’s commerce and its institutions of state. In the ceaseless quest for production armies of machines reshape the earth – building, mining, farming etc – while millions of pumps and cascades of dams remodel the world’s rivers, catchments and aquifers. Fleets of trawlers plunder the oceans to supply the city's insatiable desire for seafood. Wastes are disposed carelessly into the global commons of the atmosphere and the aqua-sphere. These pressures will continue with urban areas are expected to double in the next 20 years.

Humans have become the world’s dominant evolutionary force. Technology, consumption patterns and growth in population have delivered unprecedented rates of change to global systems jeopardising the safe operating space for humanity (Rockström et al 2009). Across and around the megacity a global climate and biodiversity extinction crisis is unfolding due to the cumulative impacts of the megacities’ relentless appetites, waste production and its crude technological systems. Climate chaos could accelerate this crisis with intensifying droughts in the mid latitudes and devastating monsoonal floods in the tropics (IPCC 2012). A lack of adaptive frameworks and capacity is hindering adoption of suitable responses.

The citizens of the Anthropocenia are recognizing the nature of their new challenges and new responsibilities. They are aware that they need to find creative ways of looking after both human needs and their planetary life support systems (Castree 2014b). They are seeking to learn how to "garden" their planet, including by redesigning their cities and agriculture based on the emerging discipline of design ecology. A core challenge includes applying ‘gardening’ methods that align human interest with the goals of sustaining nature. The design parameters for this transformational process are that the “global city” must continue to function and thrive while transitioning to systems that:

- Actively conserves and enhances biodiversity and sustains capacity for critical ecosystem services (Bolund and Hunhammar 1999; M.E. Assessment, 2003) whilst also suppling 9 billion people's food, materials and energy needs without breaching planetary boundaries (Rockström et al 2009);
- Decarbonises reducing emissions and increasing sequestration (Broto and Bulkeley 2013);
- Can adapt to chaotic climatic conditions unprecedented since the birth of agriculture (IPCC 2012).

After much democratic debate the citizens of Anthropocenia commit to reformulating their city – the social and physical polis - in the following directions:

- Reconceiving of their global city as nature, celebrating and incorporating biodiversity as a priority into the physical, economic and cultural fabric of the polis;
- Mobilising resources towards biophilic, biodiverse cities, within urban precincts and hinterlands;
- Reforming all supply chains through the certification of food, fish, forestry and other products;
- Accelerating the disciplines underpinning the design sciences and use of designer ecology to develop and test scalable solutions for use in construction, urban planning, water and energy infrastructure, farming, building and manufacturing and landscape repair;
- Supporting bio-industries and urban food gardens and peri-urban farming that is diverse and uses a design based approach to maximising synergistic benefits drawing on permaculture theory;
- Innovating R&D and innovation systems - unleashing human creativity - especially in design ecology and sustainability sciences reshaping the form and functions of the city’s eco-material relationships;
- Unleashing a global program of land restoration and large scale reforestation particularly of degraded regions like in Sub-Saharan Africa (World Agroforestry 2017)

3 RECONCEIVING CITIES AS NATURE AND THE NATURE OF THE CITY

Meeting the challenges of climate change requires accelerated processes of social learning (Pahl Wostl 2002&2007; Pahl Wostl et al 2008; Alexandra 2012). This learning to adapt to changing circumstances occurs in cities because they are assemblages of interconnected cultural, material and ecological elements with multiple relationships and networks operating at multiple scales (DeLanda 2006; Grimm et al 2008; Anderson and McFarlane 2011; Dittmer 2014). As coevolving socio-ecological systems (Folke et al 2002; Gual and Norgaard 2010) they have embedded socio-technological regimes and slowly evolving institutionalised logics (Sarewitz 2004; Miller et al 2014; Alexandra 2018). Despite constraints of institutional path dependence (Marshall and Alexandra 2016) and the conservative nature of most governance institutions, cities are influential beyond urban boundaries due to their political, cultural and mercantile functions that engender the cultural and institutional capabilities for adapting to changing circumstances (DeLanda 2006; Attali 2009).

Cities also generate novel ecosystems both in and beyond urban areas, driven by changes in fundamental processes that change nutrient, material, genetics, energy and water flows (Schaefer 2009). These new natures are co-produced by humans in at least four ways. Firstly, all conceptualisations of nature are cultural constructs (Castree2014a). Secondly, urban and rural natures exist in materially and socially complex
systems that are inherently socialised and politicized environments (Heynen et al 2006). Thirdly, new biotic and non-biotic combinations are forming as human move species around deliberately or unwittingly or change conditions result in the decline or increase of some species (Low 2002; Ellis 2013). Finally, with the changing climates of the Anthropocene simplistic definitional boundaries of what is human or ‘natural’ are breaking down (Castree 2014b) because the whole planet is under varying degrees of human influence.

This fundamental blurring of stereotypical nature-culture binaries enables powerful new visions of the city as nature to emerge. It allows us to see cities as full of, built in and embedded in regions of nature. Further this acceptance enhances our capacity to more actively envisage the transformation of cities toward biophilic living cities. Actively re-imagining the future and developing transformative approaches requires imaginatively mapping possibilities (Alexandra and Riddington 2007; Castree 2014b) and engaging people in processes that disrupt and challenge fixed conceptualisations of what is desirable, feasible or likely in the future (Vervoort et al 2015). But new visions in themselves are not sufficient. Successful social innovations are typically produced by broad partnerships building constituencies for reform through discourse coalitions that refashion debates (Hajer 2005). Thus debates about reshaping futures are inherently political (Swyngedouw 2011; Fuller 2013; Appaduri 2013) but are also inevitably constrained by preconceived ways of thinking embedded in normative frames and institutionalised logics (Sarewitz 2004; Miller et al 2014; Rickards et al 2014; Alexandra 2018). Breaking these constraints down are necessary to allow holistic visions and embodied expressions of nature and human natures to emerge and may contribute to greater empathy with traditional cultures whose landscape relationships are concurrently material and spiritual (DeLanda 2006; Gammage 2011). Given that we do not know the full range of possibilities for eco-cities both expert and participatory planning approaches need to focus on open ended scenarios and the setting of forward-looking objectives rather than rely on limits imposed by fixed conceptualisations of how cities function or on idealised pre-development benchmarks for conservation (Alexandra et al 207). These benchmarks tend to lock in traditional perspectives about a divided duality of culture and nature that limit options for conceptual and practical explorations.

4. THE GLOBAL BIODIVERSE CITIES MOVEMENT

Cities are productive places of material and cultural transformations. Many urban communities are actively exploring ways of re-directing their city, reconceiving of their relationships in order to reconnect then to the biosphere (Andersson et al 2014). They are responding to environmental imperatives like climate change in what can be considered a massive global experiment (Broto and Bulkeley 2013) including through major programs of eco-restoration, reafforestation and urban forestry (ICLEI 2017; Alexandra et al 2017). Ecological awareness and the ecological sciences are contributing to designing and redesigning of our cities with urban renaturing, with ecological restoration and re-wilding initiatives giving expression to an emerging global movement (Dierm et al 2003; Jepson 2016). This movement is sometimes referred to as the Biophilic cities movement (Beatley 2011; Ignatieva and Ahmé 2013) or the biodiverse cities movement (ICLEI 2017). This burgeoning eco-cities movement has expanding programs of urban greening, water sensitive design and living infrastructure demonstrating the potential for transforming the forms and functions of cities (Alexandra et al 2017). Useful examples include cities:

- working on major biodiversity conservation initiatives (Navarro and Pereira 2012; Goddard et al 2010);
- redesigning the practical, technical and governance of urban water systems for climate resilience (Wong 2006; Ferguson et al 2013; Alexandra 2017a);
- planting for living carbon and urban cooling through street trees, urban forests, gardens, green walls and planted roofs (Li et al 2005; Jim & Chen 2009).

Urbanisation is one of the dominant factors influencing the survival of many species with various strategies aiming to enhance biodiversity being adopted (Navarro and Pereira 2012; Standish et al 2013; Garrand et al 2017). While increasing the formal conservation estate has been one of the primary foci of many national conservation strategies, it is increasingly acknowledged that management across all tenures is required if conservation goals are to be achieved. Furthermore, highly modified landscapes, including cities and urban areas, have a range of conversation values, contributing to biodiversity conservation (Chapin et al 2009; Standish et al 2013; Garrand et al 2017) using strategies that can be scaled up from gardens (Gaston et al 2005; Goddard et al 2010). Cities are nested in a fabric of biodiversity with remnant vegetation including large trees playing important roles as keystone structures in urban landscapes, increasing bird diversity and deserving tree protection policies (Stagnoll et al 2012). Urban areas contribute to meso-scale networks of habitats enabling us to reconceive of connectivity as occurring in and through urban areas (Andersson et al 2014) with Melbourne’s Yarra River Corridor of contiguous parks from the city to the River’s source in the mountains providing a useful and vivid example of greater urban-bioregional connectivity.

Urban ecologies should not be thought of as only being remnants of pre-existing ecosystems that occurred before cities or suburbs engulfed the countryside. Cities are embedded in networks of ecosystem
relationship and are generating novel ecosystems driven by changes in fundamental processes of nutrient, material, genetic energy and water flows (Schaefler 2009) both in urban areas and by the economic drivers of landuse beyond the urban periphery. Applied vegetation strategies can enhance carbon sequestration and biodiversity with Standish et al (2013) identifying options including conserving and restoring habitat areas at the fringes of cities, restoring remnants and actively managing novel ecosystems including gardens. Thus, urban conservation strategies involve restoring and conserving remnant ecosystems and the management of novel ecosystems (Garrand et al 2017; Standish et al 2013). The latter deserve to be taken seriously as part of the ways biodiversity conservation challenges are met (Lisle 2010; Low 2002; Ellis 2013).

5. RESTORATION OR DESIGN ECOLOGY?

Through agriculture and urbanisations humans have remodelled much of the earth to meet their needs. In doing so we have created vast Anthromes (Ellis 2013) with negative consequences for many other species. Applied ecology has aimed to reduce these impacts, often with only marginal success, which Matthew et al (2015) claim are a result of “design failures, not failures in the science.” It is also possible that these failures are compounded by a lack of recognition of the dynamic nature of all ecosystems and the use of static conservation paradigms as the foundation for setting goals.

Anthropogenic impacts including climate change compound existing stressors on ecosystems presenting new challenges for integrated assessment, planning, and management (Alexandra 2012). While understanding of ‘undisturbed’ or reference ecosystems is useful, responses to local and global challenges are not well served by the use of objectives derived from historically derived ‘natural’ benchmarks, although these are one of the dominant ways in which conservation and restoration goals are established. More flexible and adaptive approaches are called for due to the complex relationships and non-linear feedbacks between social, ecological, and climatic systems. Anthropogenic drivers of change and the dynamic nature of the ecosystems result in inherent complexities that make static conservation paradigms and stationary hydrology models increasingly redundant (Alexandra 2012). ‘Predict and control’ and restoration based strategies are likely to be less useful (Alexandra 2012). For example, water resources planning and aquatic ecosystem management needs to adjust to as the “death of stationarity” which undermines the foundations of hydrology making past ways of knowing less reliable guides to the future (Milly et al 2008). Idealised pre-development benchmarks for ecosystems are increasingly redundant, requiring a rethinking of the way conservation or restoration objectives are established (Dunlop and Brown 2008; Alexandra 2012).

‘Design’ or designer ecology approaches and contingent planning modalities are needed that accommodate the challenges of the changing climates of the Anthropocene. With new climate parameters (macro climates and urban micro climates) new and different species may be filling niches and fulfilling key ecological functions in urban and rural systems due to range expansion, deliberate or accident introductions. These new assemblages of species can produce weedscapes and enable agricultural and urban diversification.

Recognition of the dynamic nature of ecosystems and an increased focus on understanding and working with the key drivers of ecosystems are required to move to non-static paradigms that are capable of handling non-linear changes and multiple transformation processes (Alexandra 2012). If we abandon use of historic benchmarks derived from reference ecosystems as the basis for setting targets for ecological restoration clearly defining what constitutes the goal of conservation programs and sustainable management of natural resources will require a focus on defining objectives (what is to be achieved) and desirable functions rather than restoring specific assemblages of species. Abandoning a static view of natural systems allows introduction of climate change driven dynamism to our mental models of the environment helping us accept that dynamic ecosystems shift to radically altered states (Scheffer et al. 2001).

The use of idealised ‘pre-development’ benchmarks for biodiversity conservation and ecosystem restoration are increasingly problematic and fundamental rethinking of the ways in which ecological objectives are set is needed. By recognising the co-produced nature of ecosystems we can focus on setting forward-looking planning objectives rather than attempting to derive goals from idealised past ‘natural’ states. If we accept the challenges of designer ecology within the context of climate adaption imperatives in the Anthropocene epoch we need more research on the challenges of governing not only uncertain climatic futures but also post-natural “natural resource management”. In this epoch it is possible to arrive at the conclusion that both nothing is natural and everything is natural.

6. DESIGNER ECOLOGY - DESIGNER SOLUTIONS

Developing and implementing integrated solutions requires design. Design or redesign of systems can be seen as an important approach to solving problems that requires reformulating both the nature of problems and the scope of solutions. Putting together multiple complimentary components into systems that work is a generic design challenge that manifests at many scales. Design can be seen as processes and pathways for
solving problems. Passive solar architecture provides a useful example: the same skills and materials can be used to build energy efficient, passive solar houses or poorly orientated buildings that are hot in summer and cold in winter requiring energy intensive heating and cooling for the life of the building.

Global cooperation on the design for systematic innovations could accelerate the transformation of human production and habitation systems, decoupling production, energy and resource use and pollution intensity and help to develop integrated global scale solutions. Furthermore because biodiversity conservation, water and land use, energy production, carbon intensity and global food supplies are intimately linked, these 21st Century challenges need to be conceived not as separate issues but as converging. Given this, there are compelling arguments for addressing these matters in innovative and integrated ways – in designed ways. The policies that support innovation and transformations must also be designed. A landmark Dutch R&D program found that not only are major technological and policy innovations required to respond to sustainability imperatives, but that for global scale solutions to be developed and adopted our systems of innovation need to be overhauled (Weaver et al 2000).

Furthering the theory and practice of ecological design offers some strong prospects for systemic innovations. Pioneering work on permaculture provides some useful examples of how ecological design can contribute to reorientating the future of urban and agricultural systems (Ferguson & Lovell 2014). Permaculture’s poly-cultural systems aim to maximise productivity through enhancing synergises of multiple symbiotic relationships between the human, structural and biotic elements of urban and farming systems and their landscapes. According to Mollison (1988) permaculture involves the conscious design and maintenance of productive human occupied ecosystems that mimic the diversity, stability, and resilience of natural systems like forests. Through design, permaculture systems aim for the harmonious integration of landscapes, structures and people so that human needs for food, energy, shelter, and other material needs are provided sustainably and with minimal negative impacts. Ferguson & Lovell (2014) review of permaculture found at its core the concept that “systematic site design, emphasizing diversity at multiple scales, integrated water management, and access to global germplasm” can increase productivity whilst “retaining their most desirable attributes of sustainability and multifunctionality.”

Permaculture theory emphasises the use of diverse species in an effort to maximize productivity, diversity and the functional relationships between multiple components, in order to generate designed synergies or symbiosis. This reflects earlier work by Howard Odum on systems ecology. Ferguson & Lovell (2014) found that permaculture was heavily influenced by ecologist Howard Odum who proposed “the design of novel and productive ecosystems in which species are regarded as distinctive but interchangeable system components which should be selected from a global pool … the distinctive inputs and outputs of each species will connect in novel assemblages” (Odum 1971, p. 280).

The central tenant of working with novel ecosystems to meet human needs is relevant to reinventing the nature of cities. With urban farms movements changing cities and their gardens, cities are becoming ‘farms’ with a burgeoning interest in the benefits of local and diverse food systems (Wakefield et al 2007). Design ecology can be applied to creating more sustainable food systems, whilst also investing in the applied R&D needed to bring new food crops and new poly-cultural systems of production into widespread use. Improving food systems at the local and global scale remains critical to the wellbeing and security of billion of people and could be achieved with more concerted effort using redesign to improve the productivity of millions of villages and their gardens including throughout the suburbs of the world’s mega cities. By adopting this approach the city is not only nature but also a farm and the farm is part of the city and of nature.

7. CONCLUSIONS

This paper has argued for new visions and logics to underpin the remaking of cities. A central feature of the new logic is seeing the city as nature and the reordering ideas about the nature of the city. But given the scale of challenges there is a need to develop capacity for anticipatory governance to enable and drive the social, technical and scientific capabilities for adaptation (Boyd et al 2015; Alexandra 2017b). Effective adaptation requires systematically developing integrated systems for energy, agriculture, biodiversity conservation and community development that build local resilience and sustainability. These systems are functionally orientated novel ecosystems suited to the landscapes of the anthromes whether in the cities or the bush.

Design ecology has critical roles to play by bringing together the ecological and design disciplines in ways that stimulate the adoption of innovations needed for scalable solutions. Design ecology can be applied to the transformations of urban and rural systems, but not by looking backward to restoration goals but by looking forward and by contributing to the ongoing renovation and modernisation of human production and habitation systems, at all scales from villages through to mega-cities in ways which respond to the new responsibilities of the Anthropocene, actively reconnecting them to the biosphere. In this way the city is
nature. The nature of the new reinvented cities will reflect the new visions and logics creating the climate adaptive, bio-cities of the Anthropocene

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