

URBAN WORLDS

'Urban Ecological Security': A New Urban Paradigm?

MIKE HODSON and SIMON MARVIN

Abstract

The term 'ecological security' is usually used in relation to attempts to safeguard flows of ecological resources, infrastructure and services at the national scale. But increasing concerns over 'urban ecological security' (UES) are now giving rise to strategies to reconfigure cities and their infrastructures in ways that help to secure their ecological and material reproduction. Yet cities have differing capacities and capabilities for developing strategic responses to the opportunities and constraints of key UES concerns. These include resource constraints and climate change, and consequently these newly emerging strategies may selectively privilege particular urban areas and particular social interests over others. In this article, we focus on world cities and outline the challenges posed by the growing concern for UES. We review the emerging responses that may increasingly form a new dominant 'logic' of infrastructure provision, which we characterize as Secure Urbanism and Resilient Infrastructure (SURI). We conclude by addressing the extent to which this new dominant 'logic' underpins a new strategy of accumulation or more 'progressive' politics by outlining alternatives to SURI, possibilities for shaping SURI more 'progressively' and developing an agenda for future research.

Introduction

This article presents an argument and a set of propositions about how world cities attempt to secure their material and ecological reproduction under conditions of 'urban ecological security' (UES). Although the term 'ecological security' is usually used in

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relation to attempts to safeguard flows of resources, infrastructure and services at the national scale, increasing concerns over UES are now informing strategies to reconfigure cities and their infrastructures in ways that help to secure their ecological and material reproduction. While debates around economic, social and ecological reproduction have historically been viewed as interrelated (e.g. Meadows *et al.*, 1972; Hajer, 1995), in an era of resource constraint and climate change, we argue that the maintenance of — or the pursuit of enhanced — economic growth means that economic, social and ecological reproduction questions have become strategically intertwined at an urban level.

The significance of this is that it adds further layers to the economic, place-based competition between cities, characteristic of post-Keynesian urbanism. The ‘re-emergence’ in recent decades of particular subnational territorial forms of organization (see, e.g., Sassen, 2000; Scott, 2001) can be viewed as informed by and informing selective competition (nation-) state strategies (Jessop, 2002; Brenner, 2004) to create both a context for economic globalization and spatial responses to it. Under the competition state, relationships between national governments, cities and regions are constituted differentially, with particular cities enjoying privileged positions. National governments often view cities in different ways, they build different relationships with them and allocate national resources variably. Additionally, cities and regions have differential capacities and capabilities to respond to national initiatives, to shape national priorities and also to develop ‘their own’ agendas in competition and collaboration with other cities. Cities are constituted by complex geometries of power relationships cutting across multiple scales.

We argue that in addition to the intensified economic competition between cities under neoliberal conditions of contemporary global capitalism, we are now seeing a ‘race’ to try to ‘secure’ — produce and consume — (increasingly scarce) resources to maintain and enhance economic growth. Where the sourcing and production of oil may have peaked (Leggett, 2005), when conflicts around access to and the organization of water resources abound (Swyngedouw, 2004), where key strategic resources are vulnerable to rising sea levels, and when the relationship between production and disposal of wastes is increasingly contested, the very resources that underpin the economic competition between cities, but which also support the material, social and ecological reproduction of cities, are now the source of the struggle (Keil and Boudreau, 2006): a struggle between economic ‘competition’, particular notions of ‘ecology’ and ‘security’, and the reproduction of cities.

In particular, we are interested in the increasingly dominant strategic responses to UES. Such responses are emerging from social interest groups who coalesce around and often claim to speak on behalf of the world’s largest and most powerful cities (see, e.g., the C40¹ network of cities). We are also concerned with understanding the processes through which these strategies are assuming hegemonic status in relation to the role of world cities in responding to UES. Yet, we are not only motivated to outline these strategic responses but also to interrogate their broader significance in terms of whose interests are being served and excluded through this agenda, both within and between cities. We also look at the potential alternatives to the dominance of these responses. In doing this, we are concerned with understanding the extent to which this new dominant ‘logic’ underpins a new strategy of accumulation or more ‘progressive’ politics.

Our argument is developed in six sections. The second section below provides an overview of the concept of UES, identifying what it is, why it is emerging and why it is becoming an agenda of significance to the urban research community. The third section develops the theoretical underpinnings of UES and the ‘exemplary’ role of world cities in constructing responses to the issues generated by UES. The fourth section provides a critical outline of the dominant response to UES being developed in the context of the world’s largest and most powerful cities, which we characterize as Secure Urbanism and Resilient Infrastructure (SURI). The fifth section critically examines the wider strategic

1 URL <http://www.c40cities.org/> (accessed 29 January 2008).

importance and conceptual implications of UES and SURI for urban studies. The final section summarizes the key findings of the article and reviews the most pressing urban research implications of UES and SURI.

The emergence of 'urban ecological security'

Extending critical infrastructure protection into ecological security

To situate the emergence of UES historically, we argue that there has been a re-casting of the terms of debate informing the socio-technical organization of infrastructure that moves on from a post-9/11 position, which saw an intertwining of 'critical' socio-technical infrastructures and a particular understanding of national security (see, for instance, Lewis, 2006 and the *Journal of Critical Infrastructure Protection*). The post-9/11 agenda took as a key national concern the security and protection of 'critical' national infrastructures, such as energy, transportation, water and telecommunications. The perceived and actual 'threats' to these 'critical' infrastructures were seen to emanate from attack from other states, individuals or groups, including through terrorist activity, bio-terrorism and cyber-terrorism, and also through disasters such as hurricanes, fires and flooding. Not only was a particular notion of national security tied closely to the 'protection' of 'critical' infrastructure but it was also tied to ensuring continued levels of economic growth in a context of economic globalization and competitiveness.

A move is now taking place from this narrow notion of national security, infrastructure 'protection' and economic competitiveness to a position where issues around 'ecological security' (see Pirages and Cousins, 2005) are influencing this debate. In an era of resource constraints and climate change, national security, infrastructure 'protection' and economic competitiveness are being overlaid with concerns around energy security, constraints on water resources, the growth of diseases, increased flood risks and multiple aspects of demographic shifts (migration, ageing population, etc.) (UNEP, 2007). The claim is that a series of 'new' socio-economic and political problems posed by, for example, resource constraints and climate change, is pushing issues of ecological security up the agenda of national governments — in other words, the ability of states to ensure that they have 'secure' access to the resources needed to ensure their replication.

Rescaling ecological security

Yet ecological security is also increasingly becoming an issue not only at a national level but also on an urban scale. The emergence of this discourse on an urban scale is the consequence of four interrelated sets of pressures.

First, the justification being made for cities' strategic involvement in responding to resource constraints and climate change is that whilst around half of the world's population now lives in cities, a figure that is estimated will increase to around 60% by 2030 (United Nations, 2006), cities are responsible for disproportionate levels of consumption of resources and greenhouse gas emissions. So, for example, despite accounting for around half of the world's population, cities are responsible for around 75% of energy consumption and 80% of greenhouse gas emissions (C40).²

Second, the claim is that cities, with their concentrations of population, are likely to be chief amongst the 'victims' of resource constraints and climate change. Cities as 'motors' of national and regional economic activity, concentrations of population and cultural centres have been shown to consume resources disproportionately. This suggests the potential for disproportionate consequences in a context of resource constraints. Cities are positioning themselves as chief amongst the 'victims' of climate change

2 URL <http://www.c40cities.org/climatechange.jsp> (accessed 17 November 2007).

through, for example, the susceptibility of many coastal and river-side cities to flooding and the health consequences of the urban heat island effect (see, e.g., Roaf *et al.*, 2005).

Third, the claim is that cities give the potential contexts for the response to issues of resource constraint and climate change. In particular, given their concentrations of populations and resources, cities are seen as offering the contexts within which to demonstrate and experiment with decentralized energy and water technologies, and new urban mobility and transportation systems based on, for example, hydrogen and biodiesel. Cities' strategic interest in developing such responses may also be driven by new forms of regulatory carbon control as places to seek to 'guarantee' continued economic growth against a background of carbon constraint (While, 2008). The rhetoric that city and local governments are often unencumbered with the 'paralysis' afflicting national governments in responding to resource security and climate change issues, and that they are generally closer to the lives of those on 'the ground' to enact change, is also being mobilized (C40).³

Finally, the changing historical relationships between national state, subnational territories and economic activity means that, in an era of intensified economic globalization and competition between places, 'new state spaces' based on a variable relationship between national governments and their territories within a multi-scale architecture of governance are opening up (Brenner, 2004). Work on new state spaces has not received anywhere near the same attention in relation to environmental concerns as it has with regard to economic activity. To push this further would be to start to ask what would an ecological state look like with ecological protection as one of its foremost regulatory functions (Barry and Eckersley, 2005; Meadowcroft, 2005)? This is a particularly interesting issue given that national states increasingly have strategic, variable and multiple relationships with their territories (Brenner, 2004). But also what do different urban capacities and capabilities in relation to national states look like? Or to put it another way, to what extent are particular urban coalitions able to anticipate, shape and respond strategically to national priorities or do they merely absorb them and 'muddle through' in a piecemeal and reactive manner?

This set of four issues raises the question of *how* the economic and ecological wellbeing of cities can be secured in a context of a growing demand for resources and resource constraints (water, energy, etc.), climate change and intense competition for economic activity and jobs: how are attempts to try and achieve UES manifested?

Towards urban ecological security: the 'exemplary' role of world cities in constructing responses

Underpinning not only the pressures to achieve UES but also the construction of responses to UES is the role of world cities and, more specifically, coalitions of interest groups claiming to speak on behalf of world cities. We claim that the emerging role of world cities, and the coalescence of interests around a UES agenda, has significance for understanding the ways in which infrastructures are politically mobilized by particular social interests in specific ways. In building this argument, we outline and bring together four sets of issues, through: (1) building on recent literatures and work on the politicization of urban infrastructures; (2) outlining the privileging of world city contexts in exemplifying emergent infrastructural responses; (3) assessing the predominance in urban governance of a concern with economic governance to the relative neglect of ecological aspects of governance; and (4) outlining an increasing incorporation of urban economic and ecological governance.

3 URL <http://www.c40cities.org/climatechange.jsp> (accessed 29 January 2008).

Cities and the politics of infrastructure

In recent years, the view that urban infrastructures are largely de-politicized and can be reduced to technocratic and administrative mechanisms for providing and distributing public and private goods has been challenged (Graham and Marvin, 2001). Emerging arguments around infrastructures and information and communications technologies (Graham and Marvin, 1996), water (Guy *et al.*, 2001), energy (Hodson and Marvin, 2006) and transport have addressed the mutuality and dynamism, the circulation of flows of relationships mediated with and through urban infrastructures (Guy *et al.*, 2001): they challenge the separations between the technological and the social and between different scales of political activity in informing the production of urban infrastructures. The shifting role of the nation state is crucial in terms of an emerging spatial differentiation in relationships with the subnational. In addition, with privatization, liberalization and a questioning of the (rhetorical at least) goal of universal service (Graham and Marvin, 2001), cities become differentially positioned in relation to nation states and network infrastructures, but where also there is a polarization within urban centres between those 'premium' networked spaces (Graham, 2000) of horizontally connected and favoured interests and places. However, there is also a by-passing, excluding or disconnecting from those less-favoured places. This raises issues about the customization of existing infrastructure provision, its particularities and thus politicization.

When set in a context of globalization, privatization and deregulation in relation to many Western contexts, this mutuality in (re-)producing and transforming infrastructures has illuminated the potential for the contestation and political mobilization of infrastructures, through particular geographies and forms of attribution, representation and reconfiguration. Reconfiguring infrastructures becomes intertwined with urban governance, highlighting questions of the ways in which configurations of urban governance mobilize particular understandings and attributions of infrastructure transformations, and the ways in which existing infrastructure configurations structure possibilities and constraints upon urban governance.

World cities as exemplars of infrastructural responses

An emblematic feature of globalization and urban governance is the networks between large cities and their particular, differential and privileged positions in a division of labour in an interconnected world system. These have been characterized as world cities (Friedmann, 1986) or global cities (King, 1990; Sassen, 1991). World cities are seen as 'command centres' of the global economy (Sassen, 1991), where infrastructures of transport, financial markets, and circuits of financial services more broadly, and information and communications technologies constitute connections *between* and flows *through* world cities predicated on technological architectures, flows of data, people and goods but also a series of multi-level political and economic relationships between political and economic elites. It is this connectivity and relationality that constitutes the underpinnings of power relationships between world cities and where this connectivity informs the competitive 'race' between world cities to attract investment, labour and technological innovations. In this respect, infrastructural innovation in the context of world cities can be seen as 'exemplary', not only in underpinning the capability of world cities to attract investment, labour and technological innovations, but also in framing the sorts of possible responses assumed to be available to other cities (Hodson and Marvin, 2007a).

World city theories are not without critics and critical engagement (see Abu-Lughod, 1991; Derudder, 2006). The danger in the contemporary phase of globalization is in overplaying the role of physical and technological infrastructures, or a technological determinism (Smith and Marx, 1994) which ignores the neoliberal political and ideological institutional shifts around privatization and deregulation, which have encouraged the growth of financial, information and knowledge services, and

infrastructures to support this. The key point being that economic activity is not left to the market but is the product of a complex coordination of institutional mechanisms (Hollingsworth and Boyer, 1997). The relationship between global flows and place are complex and variable. Multi-spatial-scale governance, in turn, is therefore both a political product of and a response to increasing economic activity in the 'space of flows' (Castells, 2000). A neoliberal drive for ever-increased innovation, entrepreneurial activity and turnover times for economic output, in the space of flows, finds contradictions in that there are tensions between the ever-faster production turnovers and volumes of flows and the temporal implications of embedding and fixing such economic activities in specific places.

The predominant strands of world cities' literature with their narrow economic framing and concerns, exemplified through a small number of 'pre-eminent' world cities, have often eschewed a critical analysis of and engagement with debates that seek to rethink not only the relationships between the 'global' and the 'urban' but also between 'nature' and the city. Often world cities' approaches have underplayed or even ignored ecological and local political processes informing the (re-)production of world cities (see Keil, 1995). In doing so, the specificity and distinctiveness of urban ecologies and the particular ways in which local strategies and responses to globalized urbanization — predicated on local histories and experiences and locally embedded power relations and negotiations — are constituted are undervalued. World cities are constituted through processes where the relatively small number of 'pre-eminent' world cities should not just be understood in terms of the (often private) networks of and relationships between these cities but within the wider context of the pervasive processes of globalized urbanization (Luke, 2006). The (re-)production of this particular class of world city is predicated on the 'world-wide webs of logistics flows' (*ibid.*: 277) where these cities are interdependent on human and non-human relationships enmeshed across the system of 'global cities' conceived more broadly. Viewing the small number of 'pre-eminent' world cities in relation to these broader processes provides the possibility of opening up to scrutiny the privatized ecology of these cities and the potential for a 'highly public ecology, which must be repoliticized, resocialized, and relocalized by environmental activists in many everyday struggles' (*ibid.*: 278).

Within a lattice of governance arrangements, a multiplicity of different actors, public and private, at different scales, supranational, national, city-regional, organizational, with often differing motivations and aspirations, take a view of and make claims on the city. The contestation and negotiation of these differentially positioned views of world cities, in a context of deregulation and privatization of national economies, asks questions about how we understand these 'new' forms of territorial world city governance, which are bound up in formal and informal governing arrangements and re-regulation across different scales and actors, where the global, the local and the national are mutually constitutive rather than distinct scales of social activity, and relations between the global and the local, mediated through the national, are themselves undergoing a fundamental transformation in the current period. This raises issues about the active roles of world cities in the UES debate. Yet, in both the world cities and urban governance literatures, the focus has been primarily economic, with a relative neglect of ecological questions.

Infrastructure and urban economic and environmental governance

In this respect, a dominant theme in the urban governance literature argues for the centrality of cities as 'engines of economic development' for business interests and, in doing so, provides a rationale for how capital flows and investments are appropriated 'entrepreneurially' to drive urban growth (Logan and Molotch, 1987; Harding, 1995). The dominance of economic thinking in urban governance is an important focus when one thinks of the transformative possibilities that the 're-emergence' of the subnational under the latest phase of globalization and 'multi-level governance' opens up, and the

ways in which such narrowly economic understandings of transformative potential have become dominant in many Western contexts.

Although scalar and multi-level governance approaches have been utilized in addressing urban economic governance, scalar appreciations have been relatively neglected by the literature around urban environmental governance, where space and scale are usually unquestioned (Bulkeley, 2005). Environmental governance often reflects a cascade approach (Bulkeley and Betsill, 2003) to political scale, where there is a hierarchical and vertical set of relationships predicated on relationships between scales which often lack dynamism. An emphasis on inter-nation-state negotiations and their production of international environmental agreements is central to cascade approaches. The nation state is characterized by the singularity of its position, thereby often neglecting a diversity of opinion, and in many regards is seen as a black box. The negotiation of these agreements subsequently sees a conferring of the role of ensuring (or not) compliance on the nation state with the key role of the subnational as the scale at which environmental obligations will be met. Cascade approaches again view the local level as largely a black box.

The consequences of this are at least fourfold (see Bulkeley and Betsill, 2003: 15–18). First, the view of the role of the nation state as encompassing a relatively unitary position often neglects the wide variety of different positions within national contexts. Second, at the same time, this, and the view of a black-boxed local, reinforces relatively fixed notions of boundaries and the interplay of different scales of political activity. Third, through viewing the local as a container for the passing down and achievement of international agreements, this overplays the stability of the governing of nation states and underplays the possibilities for local forms of agency and spatial differentiation. Finally, this is particularly important given the role of subnational governments in transnational governance networks. These arguments about the hollowing out of the state, the 're-emergence' of the subnational and the ways in which scalar configurations of 'new' forms of governance are produced have largely been missing from environmental governance debates (for notable examples to the contrary, see *ibid.*; Keil, 2003; Desfor and Keil, 2004). This highlights issues, in particular, about how we understand the active ways in which environmental commitments are incorporated into urban governance (While *et al.*, 2004), how this is contested and negotiated with the predominance of urban economic governance, or indeed is prefigured by urban governance coalitions.

Rethinking the governance of urban infrastructure

What this illustrates is that the contestation of dualisms of economy and environment, technology and society, global and local is questioned: 'Urban–nature relations are now increasingly constituted at various scales of the globalization process as natural relations and urban social relations are produced through complex processes of "glocalization" and entangled in myriad flows of capital, things and people' (Keil, 2003: 729). These arguments resonate with urban political ecology (UPE) approaches (*ibid.*; Swyngedouw and Heynen, 2003; Heynen *et al.*, 2006) which, with their view of 'the urban' as simultaneously local and global and human and non-human, draw together aspects of political economy and ecological approaches, affording a focus on issues of the scalar, material and discursive construction, negotiation and contestation of cities. 'Nature' is not seen as external to the social world but as produced in entangled material, social, political and economic relationships. The circulation of flows of these relationships, resources and artefacts and their metabolic processing are central concepts and, in the transformation of both physical and social environments, inform the production of urban contexts (see Heynen *et al.*, 2006). These concepts have been interpreted variably by researchers with differing degrees of emphasis on the symbolic/discursive and material aspects of circulation and metabolism (see *ibid.*). Our interest here is with addressing the symbolic and discursive. In this respect, moves towards and attempts to achieve UES are a source of unfolding struggles between different social interest groups and coalitions of

social interests mobilizing different discourses of 'economy' and 'ecology', and the relationship between the two. It is to an emerging and dominant discursive response, being fashioned in the name of world cities, which we now turn.

Secure urbanism and resilient infrastructure

World cities have an emerging and increasingly influential role in developing responses to the challenges of resource constraints and climate change. They are positioning themselves as *the* context for *action* on resource constraints and climate change. World cities' political leaders are working together with multinational corporations to develop network responses to the challenges of securing their material reproduction and also building resilient infrastructures in an era of resource constraints and climate change. In doing this, these networks increasingly provide a locus for 'collaboration' between world cities and key corporates, where they develop a particular view of both 'the problem' of resource constraints and climate change, and 'the solution', which informs the dominant responses of these cities (Hodson and Marvin, 2007b).

Our concern is that the strategic re-orientation to resource constraints is leading to the development of new styles of infrastructure development that privilege particular spatial and socio-technical configurations of infrastructure around 'strategic protection', 'building autarky' and developing 'new global urban agglomerations' (Hodson and Marvin, 2007a; 2007b; 2007c). In a period of resource constraints and climate change, the world's largest cities are beginning to translate their strategic concern about their ability to guarantee resources into strategies designed to reshape the city and their relations with resources and other spaces. We argue that there are three emblematic configurations that are being developed in response to UES through world cities: strategic protection, developing autonomy and global agglomerations.

Ensuring the strategic 'protection' of cities

The first response is ensuring the strategic protection of cities from the impacts and effects of climate change and associated resource constraints. Central to such strategies is investment in generating a systemic understanding of the city-specific and long-term effects of climate change, especially in relation to flood risk and temperature rise, and the development of systemic responses through strategic flood protection, green infrastructure and retrofitting to deal with increased temperatures.

Emblematic of such responses is the active positioning of central government, in the UK, by the Greater London Authority to take prime responsibility for the potential investment required to protect London post-2030 from climate-change-induced flooding. The Thames Estuary 2100 study aims to determine the appropriate level of flood protection needed for London and the Thames Estuary for the next 100 years.⁴ The effects of climate change, such as sea level rise, increased rainfall and storm frequency, mean that London and the Thames Estuary will be at greater risk from flooding in future years. Furthermore, many flood risk areas are undergoing development and regeneration, meaning that more people, buildings and infrastructure are likely to be exposed to the risk of flooding in the future. Although London's existing tidal defences offer a high level of protection from today's flood risks, they were only designed to provide protection up until 2030. After 2030, billions of pounds may need to be spent on raising 300km of other defences to protect the capital — and even more than that if the sea level rises still further (Lavery, 2007: 2). The mayor of London has consistently argued that: 'At least part of this funding would be required to be provided by the Government because of the national

4 URL http://www.thamesweb.com/topic.php?topic_name=Flood%20Defence (accessed 29 January 2008).

importance of protecting homes in and business in the London area' (GLA, 2005: 10). There is clear strategic prioritization of London within systemic adaptation plans as central government has been positioned as responsible for post-2030 plans and, at the same time, there is active pressure from the mayor and GLA for the state to take on the financial commitment of new investment.

Strategies of protection focus on the role of world cities as 'national exemplars' and the implications this has for socio-technical reconfigurations (Hodson and Marvin, 2007a). In particular, national exemplars are key sites for experimentation, demonstration and development of new infrastructural technologies that are widely seen as having relevance and application in other urban contexts domestically and internationally. National government and corporate interests often have a key role in developing these emblematic configurations both within and across different national contexts. World cities are seeking to ensure that their long-term protection — from heat waves and flooding — is prioritized within national investment and policy priorities to ensure their long-term reproduction. There are systemic attempts in key world cities, including London, Washington and New York, to develop strategies, social relations and technologies that can attempt to guarantee the ecological security of infrastructure. Critically, world cities are working with national governments and corporate interest groups to ensure their infrastructure is resilient.

Decoupling from national infrastructure and building closed cities

Cities have usually sought to guarantee their reproduction by seeking out resources and sinks from locations usually ever more distant and connected through huge socio-technical assemblages. Yet this traditional approach is now being challenged as cities seek to 're-internalize' and 're-localize' resource endowments by creating 'closed loops' and 'circular metabolisms' as they seek to withdraw from reliance on international, national and regional infrastructures. Key examples of this are exemplified in New York's strategy of energy independence, the recent doubling of decentralized energy targets in London, San Francisco's strategy of water autonomy and Melbourne's development of renewable powered desalination. Alongside such strategies, cities are attempting to reduce reliance through water and energy conservation and waste minimization schemes, by developing pricing mechanisms for car-based mobility and reducing reliance on 'external resources'.

This strategy primarily focuses on an increasing withdrawal and decoupling from national and regional infrastructures by building more 'self-sufficient' infrastructures of provision on a city scale. The city is becoming the focus of increasing interest and prioritization by a range of architects and engineers who, we argue, are rapidly populating a new socio-technical trajectory of urban development, the 'eco-city' or the 'closed city' (de Graaf *et al.*, 2007). The new socio-technical configuration is similar to the concept of the autarkic or autonomous city. Cities strategically prioritize attempts to build greater self-sufficiency through their socio-technical networks by a dual strategy of both actively disengaging from external reliance on national and regional infrastructures and building up local and decentralized systems for water and energy supply, waste disposal and mobility systems. This also envisages an extension of pricing mechanisms, such as congestion or emission pricing zones. This new strategy is no longer based on stretching networks to search out resources more distant from cities, but by a strategy of withdrawal and seeking greater independence through developing local resources. Such a socio-technical strategy combines both ecological and security priorities in a new strategy of attempts to guarantee secure urbanism and resilient infrastructure.

For example, the newly released Sierra Club report, 'Moving New York City toward Sustainable Energy Independence', asks the PlaNYC initiative to address this issue, and urges the City Council to resurrect the bill, drafted in 2004 by its own Environmental Committee, which would create a city energy shortage contingency plan. San Francisco and Portland, Oregon have already passed similar bills and are developing their plans.

The report recommends creating such a plan in the short term, and, over the long term, rapid deployment of decentralized, renewable power, and other measures that will enhance PlaNYC 2030 implementation. By cutting energy costs, creating jobs and slowing global warming while buffering the impact of energy shocks, the approach is a win-win solution. The claim is that New York's example could lead the USA toward energy independence.⁵

The mayor of London and the GLA have a clearly articulated strategy for preparing London's infrastructure for major economic, population and housing growth in a style of development that enables London to become the national and international exemplar of a sustainable city. In order to fit in growth of 800,000 jobs and 400,000 homes by 2016, a complete suite of strategies is designed to (attempt to) guarantee the infrastructural underpinnings for this growth, while reducing resource use and carbon emissions. Central to this approach is seeing climate change as an opportunity for developing a new logic of (global) city-regional infrastructure and growth that is an 'exemplary' model for others to follow. Key parts of this strategy have included developing a strategic understanding of London's resource flows and climate change implications (Tyndall Centre, 2008).

A suite of infrastructure strategies for energy, waste and water is explicitly designed to minimize the consumption of resources and production of wastes; to consider reuse, develop decentralized energy production and waste treatment technologies; and reduce reliance on external infrastructure to increase the relative self-sufficiency of London. Consequently, in 2025, the GLA aims to treat over 85% of waste in London, reducing reliance on landfill from 75% to 11%; increase energy production to meet 60% of electricity and over 40% of heat demands within London; substantially reduce inefficient water networks, prioritizing the efficiency of networks, reduced leakage, conservation methods and prioritizing water reuse in new developments prior to considering new supply options (Mayor of London, 2007). Such innovations are being incorporated into the 2012 Olympics and even the new Thames Gateway project stretching from central London into the Thames Estuary. Here there are a series of initiatives to advance a new form of resource-neutral development, with commitments to produce water-neutral, carbon-neutral and waste-neutral development (Mayor of London, 2006a; 2006b).

New eco-city developments designed by engineers, planners and architects are seeking to reduce reliance on external infrastructure by building more autonomous urban development. To take another example, Arup, the global planning, engineering and design consultancy, has signed a contract with Shanghai Industrial Investment Corporation (SIIC) to plan the world's first sustainable city — an eco-city — at Dongtan, in Shanghai, China (Arup, 2005). Dongtan is situated in a strategic position very close to Shanghai and on the third largest island in China, situated at the mouth of the Yangtze river.

Dongtan aims to be the world's first purpose-built eco-city. The city is designed not only to be environmentally sustainable, but also socially, economically and culturally sustainable. Its goal is to be as close to carbon neutral as possible, with city vehicles that produce no carbon or particulate emissions and highly efficient water and energy systems. Dongtan will generate all of its energy needs from renewable sources including bio-fuels, wind farms and photovoltaic panels. A majority of Dongtan's waste will be reused as bio fuel for additional energy production and organic waste will be composted. Even human sewage will be composted and processed for energy and composting, greatly reducing or entirely eliminating landfill waste sites.⁶

The assumed 'transferability' of the eco-city model can be seen in that Arup recently signed a contract to 'roll out' the Dongtan model elsewhere in China, that the model is

5 URL <http://www.beyondoilnyc.org> (accessed 29 January 2008).

6 URL http://www.c40cities.org/bestpractices/buildings/dongtan_city.jsp (accessed 30 June 2008).

also being used in developing city contexts and that the Mayor of London announced from Shanghai plans for a new zero-carbon development in London (Arup, 2006).

Developing new global urban agglomerations

New networks of world cities are concentrating their interests in initiatives like the C40⁷ and the Clinton Climate Initiative. In May 2007, leaders of municipal governments and international businesses from over 30 world cities convened in New York City for the second C40 Large Cities Climate Summit. The cities promised a number of action points, including, most notably, pooling their buying power. The consortium will partner with selected vendors with the aim of lower production and delivery costs and therefore lower prices of building materials, systems and controls; traffic and street lighting; clean buses and waste disposal trucks; and waste-to-energy systems. By mobilizing and networking expert assistance, the self-stated objective is to help cities develop and implement programmes that will lead to reduced energy use and lower greenhouse gas emissions in areas including building efficiency, cleaner transport, renewable energy production, waste management, and water and sanitation systems. More widely, these networks of cities will create and deploy common measurement tools so that cities can establish a baseline on their greenhouse gas emissions, track reductions and share best practice to inform mitigation and evaluation activities.

These world cities are collectively building new global urban agglomerations of new mobility systems. At the same time as focusing on the protected space, bounding and enclosing resources, they seek to guarantee intra-city and inter-world-city mobility through new technologies, including pricing, transport informatics and new fuel systems based on hydrogen, bio fuels or complex hybrids. Cities like New York, Paris and Berlin are working collaboratively to develop new markets for testing and 'rolling-out' global agglomerations designed for world cities in order to guarantee mobility. Emerging socio-technical conceptions of the closed city seem to resonate unhelpfully with the increasing interconnectedness of cities, especially world cities through global agglomerations of communications, airline and international shipping networks. Such networks are responsible for the most rapid growth in carbon emissions and, because of the difficulty of dealing with such networks at the scale of a single city, such emissions are usually excluded from local policy action (*cf.* London). Yet, despite these difficulties, many cities are actively engaged in efforts to rethink and experiment selectively with the reconstitution of such global agglomerations. A range of strategies is being adopted, including networks between world cities and key corporates to develop new hydrogen-based mobility systems based on clean buses and cars. There is also a range of initiatives around the use of bio fuels and hybrid fuel systems to maintain mobility within and between cities. At the same time, cities appear to be increasingly strategically interested in how airline systems can maintain their interconnection for premium business users when there are pressures to address the carbon emissions of the airline sector. Cities are ever more active with corporate partners and national governments in reconfiguring global agglomerations to ensure they continue to meet the needs of world cities in a period of climate change and resource constraints (Hodson and Marvin, 2007b).

In summary, there is clearly a new agenda emerging around the role of cities and their responses to an era of resource constraints and climate change. World cities and leading corporates are developing networks and coalitions which are defining the terms and shape of these responses. Cities are developing fixes that appear to be prioritizing two scales of infrastructure connection: disengagement from national and regional infrastructure and the re-prioritizing of city-based enclosed resources, while at the same time seeking to ensure continued intra- and inter-urban connections through new urban agglomerations of socio-technologies. Such strategies are wrapped within a wider issue

7 See URL <http://www.c40cities.org> (accessed 29 January 2008).

of ensuring strategic protection and seeking to guarantee the longer reproduction of the city. An emerging agenda such as this one raises many new research and policy challenges.

The 'metropolitanization' of ecological resources

This section considers the wider implications of UES and the urban responses through SURI and asks whether this 'logic' reinforces new strategies of economic accumulation within the existing urban hierarchy or whether it signals a more progressive kind of politics that may challenge existing urban hierarchies. This question strikes at the very heart of what the wider social vision of responses to UES signify. Yet, there are no simple answers to this question. Here we raise six sets of issues in response to thinking about the consequences of UES: the rescaling of ecological resources and infrastructure; the development of preparatory urbanism characterized by long-term and strategic approaches to managed transitions; emerging forms of governance and the new coalitions of social interests producing fixes; the changing relations between economy and ecology; the limits of autonomy, bounded spaces and selected archipelagos; and the alternatives to the dominant techno-fixes of SURI. Although our argument is conditional, we feel that there is provisional evidence that is sufficiently convincing to show that we need to think carefully about the wider conceptual and normative implications of UES.

Metropolitanization: the strategic re-localization *and* selective glurbanization of ecological resources

Responses to UES, we argue, are characterized by an increasing 'metropolitanization' of ecological resources and infrastructure networks. The dominant strategic response is exemplified by three interrelated strategies of reconfiguring socio-technical infrastructures in order to secure 'strategic protection' from climate change and resource constraints for the metropolis; to build 'autarky' in the provision of key ecological resources such as energy, water, food and mobility; and to construct new urban agglomerations of infrastructure both within and between world cities. Consequently, the metropolitanization of ecological resources refers to the dual development of a systemic and strategic orientation of major world cities towards ecological resource through two forms of rescaling of their socio-technical infrastructures.

'Strategic re-localization' is based on a simultaneous process of the re-scaling of socio-technical infrastructures 'upwards' from local experiments and test-beds to more strategic and systemic transitions at the metropolitan level, and 'downwards' through active 'withdrawal' from existing regional and national infrastructures. Strategies for the development of decentralized energy, water and food systems are increasingly 'up-scaled' from individual buildings or technologies, and developed into a systemic transition in the social and technical organization of decentralized infrastructure at the scale of the metropolis as coalitions claiming to speak on behalf of cities attempt to build greater autarky and reduce reliance on external infrastructures and resources. Because the aspiration of greater autonomy has to be actively constructed, the process of building territorial 'self-reliance' is paralleled by a political strategy of 'withdrawal' from existing infrastructure networks at the regional, national and international scale as metropolitan-scale infrastructures are reprioritized. For example, the mayor of London has argued that the expansion of decentralized energy generation within London 'will reduce the need for investment in the national grid' (Mayor of London, 2006c: 16). However, building decentralized generation within London 'is likely to require modifications to the distribution system within London to ensure energy balancing within London and to enable surplus electricity to be exported onto the national grid' (Mayor of London, 2006c: 30). Re-localization is best understood as a process through which world cities,

ecological resources and socio-technical infrastructures are increasingly reincorporated and re-enclosed within the metropolitan boundary. Such strategies seek to develop decentralized technologies, local food production, 'closed loop' systems and more circular urban metabolisms, while simultaneously seeking to reduce cities' reliance on more distant and uncertain resource flows and infrastructure.

At the same time, the 'glurbanization' of ecological resource and infrastructure produces two forms of rescaling as selective networks of world cities work collaboratively to 'up-scale' the development of new infrastructure fixes within and between cities, and 'down-scale' the fixes developed in world cities into other cities within the national urban hierarchies. World cities are working collaboratively to share 'best practices', knowledge and expertise in the development of strategic protection and re-localization of resources as they seek to match the performance of the best cities in terms of recycling, energy independence, water savings, etc. At the same time, recognition of the limits of autonomy, especially in relation to fuel supplies for transportation, means such world cities are collaborating in the development of new global agglomerations of new infrastructures, such as biofuels and hydrogen, as they seek to develop new socio-technical systems that can secure such cities' future mobility strategies. Networks of large world cities appear to be occupying a key role in the development of such new infrastructure fixes and may constitute a new scale for the development of new socio-technical configurations. Critically, such world cities appear to be positioning themselves as national and international exemplars for the development of new fixes that can be cascaded down onto other cities in the urban hierarchy (Hodson and Marvin, 2007a). Places like London and San Francisco are acknowledged by national government as being centres of innovation and sources for new infrastructure configurations that can be replicated in other contexts. Consequently, there appears to be a parallel process of world cities up-scaling their attempts to develop new infrastructural configurations and a subsequent downscaling through the national urban hierarchy of such fixes to other less dominant cities.

The 'preparatory' metropolis: long-term strategies, new knowledge and systemic transitions

Cities seeking to build ecological security are attempting to guarantee their longer-term access to key resources in order to ensure social and economic reproduction. Central to such approaches is a significant shift in response — rather than seeing ecological constraint as a limiting factor in cities' future growth ambitions, the new logic is to *anticipate systemically and prepare strategically* for a period of constraint. Consequently, ecological issues become strategic within cities' future growth strategies as the ability to continue to grow is intertwined with a city's ability to guarantee the ecological resources necessary to support economic growth. Longer-term questions about the availability, reliability, control, security and costs of ecological resource become central to cities' own long-term strategies. This new style of thinking appears to have three sets of important implications.

The first is that cities developing a strategic orientation to resource issues are increasingly using much longer-term timescales in the formulation of their policy and planning priorities. As cities seek to anticipate and prepare for long-run ecological resource changes and attempt to effect complex socio-technical change in the organization of fixed and relatively obdurate infrastructure systems, strategies are increasingly characterized by much longer-term planning horizons. Climate change and planning strategies are being developed up until the end of the twenty-first century, while infrastructure strategies are commonly linked to timescales that reach to 2025 and 2050.

The second implication is that new forms of knowledge, expertise and social interests are being brought into the strategy development process as cities attempt to develop an understanding of issues where they may lack formal responsibilities and/or any experience. This places a premium on cities' abilities to engage and enrol new scientific

and technical capability with respect to climate change, energy security, resource security, technological change, and understand the implications and options for the economy and place-based priorities. New relationships of knowledge production and exchange between cities and consultants, universities and utilities may become critical in generating local understanding of UES and the implications for urbanism and infrastructure.

Finally, strategies being produced by world cities are characterized by increasingly strategic approaches focused on the managed shaping of systemic socio-technical change in their infrastructures. The key feature of this is that cities are developing their own social visions of the style of reconfiguration envisaged in their networks as they attempt to shift from centralized to more decentralized provision, reduce reliance on external resources or find substitute fuels for mobility systems. Increasingly, such efforts are linked to 'low carbon' or 'post-peak oil' transitions in the organization of infrastructure. This implies a much wider, more broadly based and complex view of how cities hope — at least in aspiration — to effect systemic change in their infrastructures, even where they do not own networks or have weak regulatory capacity to shape infrastructure and resources.

Producing 'new fixes': emerging coalitions and trans-urban networks

World cities are attempting to develop new infrastructure fixes that — in aspiration — seek to guarantee resource security and enable these cities to fulfil their economic growth ambitions. Central to this is the development of anticipatory and preparatory strategies that seek to ensure there is sufficient resource to supply cities' economies under conditions of climate change, resource constraints and possibly the introduction of carbon-reduction targets and carbon-pricing strategies. Critically, it appears to us that new sets of social interest groups and stakeholders are being enrolled into these processes. New and opportunistic coalitions of social interest groups at and within the metropolitan scale — city governments, private and corporate interests, in some cases environmental groups — have become active in shaping debates about the development of UES.

Certainly in the case of the large world cities, mayors and government structures at the metropolitan scale appear to be taking much more strategic interest in questions around the long-term ecological security of their cities. This is evidenced by the strategies of, for example, London, New York and San Francisco. Key to this is the critical involvement of private and corporate interests and environmental groups in the development of strategies and proposals for systemic change in the form of partnerships, demonstrations and test-beds. World cities and these economic–ecological coalitions are clearly positioning themselves as being the 'obvious' actors and places to address the 'threats' of resource constraints and climate change. This we can see as the political mobilization of a rhetoric of de-politicization; the result being a particular framing of the agenda as 'obvious'. This is underpinned by politics, where these 'key partners' 'collaborate' in constructing their (narrowly defined) agenda of the 'measurable' results of their initiatives, where resource security and climate change are framed as economic benefits. SURI provides a strategic framework for organizing all manner of individual city targets around resource constraints and climate change.

'Eco-competitive cities': economic growth, ecological security and the replication of new 'exemplars'

Increasingly, we argue that cities are developing a more strategic orientation towards questions about their future resource requirements. Critical to this is the incorporation of resource endowments and the ability to overcome ecological constraints in the economic and social competition between cities. At one level, this becomes another performance indicator in the competition between places but, at another, it becomes a more profound

indicator of the ability of cities to (at least in aspiration) provide the conditions that can 'guarantee' their social, economic and material reproduction in a period of resource constraints. What has shifted here is a move from the post-9/11 agenda of critical infrastructure protection from terrorism or the consequences of environmental damage to a position where the city can guarantee its material resource state against a background of resource constraints and competition. In a very real sense, a new dimension of cities' competitive positioning is their ability to internalize, bound and control their resource endowment, supply, consumption and production.

Such strategies are seen as providing a new focus for economic accumulation in their own right. Pricing technologies, carbon trading, decentralized technologies, new fuels and the physical fabric of the city are all new opportunities for the development of ecological and economic services. Cities are actively seeking to integrate their ecological and infrastructural strategies with their economic strategies, and are actively seeking to ensure the replication of the broader landscapes of SURI in other national and international contexts. Increasingly, questions around ecology and infrastructure become intertwined, where the ability to guarantee growth becomes linked to preparatory ecology and infrastructure, and such reconfigurations become a source of economic growth as they are 'rolled-out' and replicated in other contexts.

Critical to such strategies is the development of emblematic spaces for the piloting and experimentation of the technical fixes of SURI within wider regeneration and new town strategies in world cities. For example, the Thames Gateway is being promoted as the world's first 'eco-region', becoming a key site for the demonstration of water neutrality, waste neutrality, carbon neutrality and energy independence — through the use of conservation and decentralized and low-carbon technologies (DCLG, 2007: chapter 4). Dongtan, a major new town extension of Shanghai, is emerging as the emblematic exemplar with aspirations for self-reliance in energy, water, food and closed loops for waste and energy reuse. Agreements have been reached to 'roll-out' this eco-town model in other parts of China and, more recently, Dongtan-style fixes will be developed in London. The mayor of London and the London Development Agency 'are planning to develop an area of the Thames Gateway in London, which will be based upon the lines of the zero-carbon development of Dongtan in China' (Mayor of London, 2007: 98).

The limits of 'bounded autonomy' and 'archipelagos' of global infrastructure: indivisible or divisible environmental security

A critical issue for us is the way that SURI is emerging as an emblematic technical fix that is developed in particular world city contexts, these being viewed nationally and internationally as producers of innovations that are seen as being replicable in other contexts. But paradoxically, despite such claims, SURI is largely a set of social expectations and visions that have yet to be translated into widespread material action through social and political networks. At this stage, the feasibility of producing such configurations has not been significantly tested in practice and, consequently, we are concerned that there is so much interest in replication when the feasibility of implementing SURI is not systemically understood. Furthermore, we can identify three substantive issues that already give serious cause for concern in strategies that seek to replicate SURI in a range of differing contexts.

First, the emphasis on the construction of 'self-reliant' cities through decentralized technologies — in the form of renewable energy, biodiesel, grey-water recycling, energy from waste, etc., and the wider metaphors of 'closed loops' and 'circular urban metabolisms' — actually misses the point that infrastructures and cities are never truly bounded or autonomous spaces. Cities can only expect to build a relative form of autonomy that reconfigures relations rather than provides total independence. While decentralized water production and re-use and energy production may decrease reliance on centralized networks, they still imply interdependencies. How such relations are

renegotiated and what implications these have are not yet well understood. At the same time, metaphors of 'circular metabolism' are not often entirely accurate in their representation of resource flow, which often has externally dependent relations. An 'internal' focus on the development of biodiesel and hydrogen as new mobility fuels often tends to concentrate on consumption and ignore wider questions of resource production and the new sets of relations and dependencies set up in the low-carbon, post-peak oil city. It might be more accurate to think about the rescaling and reconfiguring of social and technical relations through the reorientation of resource flows and infrastructure rather than the construction of independence, closed loops and circular metabolisms.

Second, there are a set of outstanding issues about the degree of social and political resistance to strategies designed to construct SURI and to its replication in other urban contexts. Many strategies have a strong techno-economic and productionist bias rather than focusing on behavioural and social change and reduction in demand for key resources. Central to this is the extent to which, within world cities, the developers of SURI have to overcome local and community resistance to new infrastructural fixes in order to ensure their implementation. London's hydrogen bus refuelling station, for example, only finally received planning assent following a public inquiry that decided the station should go ahead given its national strategic importance, despite significant local opposition (Hodson *et al.*, 2007). There are also critical questions about the capacity and capability of cities and regions lower down the urban hierarchy to develop and implement the type of fixes piloted in world cities around decentralized technologies. Within the UK, major city-regions lag behind London in meeting national targets for renewable and decentralized energy targets. There are also wider questions about the relevance of technical fixes developed in one context and their transferability to other contexts without a clear understanding of their relevance or applicability.

Finally, there is a wider set of questions related to the points above and, in particular, whether the strategies are really preparatory and anticipatory of global ecological constraints or whether such strategies actually defer environmental costs in time or displace them in space as cities attempt to build the 'divisible securitization' of resources. SURI claims that cities are attempting to transcend a 'zero-sum' game of competition for ecological resources in recognition of the indivisible implications of climate change for all places. Yet, we are concerned that SURI can often result in the displacement of environmental costs elsewhere. The Port of Los Angeles has concluded an agreement with shipping companies that they transfer to clean fuels (only) when they reach the jurisdictional boundaries of the metropolitan area, so that the port can continue to meet the city's air quality emission targets. London's climate change inventory is based on two scenarios, one that includes London airport and another that excludes the airport, which results in 40% lower emissions being allocated to the city. Significantly, the UK government has made it clear that carbon-reduction targets will not prevent expansion of the airport in the national interest. Consequently, there is a wider set of issues about how far SURI is designed to produce a form of divisible security based on the priorities and demands of a set of world cities seeking to ensure their own longer-term security or whether this is really an environmental agenda around the construction of indivisible security.

Exploring alternatives: uneven capacity, social innovation and competing transitions

The active role of world cities and corporate business in addressing resource security and climate change through SURI is predicated on securing the future and boosting the economic competitiveness of world cities, but also ignores the contexts of 'ordinary' cities and many of the cities of the global south. This is not to say that responses are not taking place in these different contexts, more that they are likely to be more piecemeal and episodic in their responses to the pressures of UES. The reconfiguration of

infrastructures under SURI becomes closely intertwined with the aspirations of corporate and city leaders and the 'market opportunities' of resource constraints and climate change. There is little sense in suggesting that responses to resource constraints and climate change could be anything other than the 'solutions' afforded by the huge efforts of coalitions of interest to promote the debate in terms of large-scale investment and the 'possibilities' that technologies open up. This offers some sense as to why these responses are developing in certain ways in particular places. But it also needs empirical interrogation of attempts to produce and translate responses to UES in relation to world city contexts, to evaluate and refine our propositions and the questions they raise. In addition to understanding the responses to UES in world cities, there is also a critical need to understand alternatives and their relations with the dominant response of SURI.

While we have mainly focused on SURI in world cities, in other contexts different responses are emerging. For example, there are now 28 transition towns in the UK:

A Transition Initiative is a community that is unleashing its own latent collective genius to look Peak Oil and Climate Change squarely in the eye and to discover and implement ways to address this BIG question: 'for all those aspects of life that this community needs in order to sustain itself and thrive, how do we significantly increase resilience (to mitigate the effects of Peak Oil) and drastically reduce carbon emissions (to mitigate the effects of Climate Change)?' The resulting coordinated range of projects across all these areas of life leads to a collectively designed energy descent pathway. The community also recognises two crucial points: that we used immense amounts of creativity, ingenuity and adaptability on the way up the energy upslope, and that there's no reason for us not to do the same on the downslope and if we collectively plan and act early enough there's every likelihood that we can create a way of living that's significantly more connected, more vibrant and more in touch with our environment than the oil-addicted treadmill that we find ourselves on today.⁸

Such strategies seem to imply a more collective approach to innovation around climate change and resource constraints not solely oriented around technical fixes but suggest a more socially and culturally driven approach to new solutions and configurations. Critically, these are designed in context and cut across all aspects of urban life. A key focus is on resource reduction rather than the productionist bias of SURI.

To take another example, a US network draws together over 172 urban post-carbon groups worldwide. What is interesting about this network is that:

The Relocalization strategy developed in response to the environmental, social, political and economic impacts of global over-reliance on cheap energy. Our dependence on cheap non-renewable fossil fuel energy has produced climate change, the erosion of community, wars for oil-rich land and the instability of the global economic system.⁹

This implies a more critical view of our reliance on energy and the implications this has produced. Evidently, there would be significant worth in looking further at such alternatives and how they compare and contrast with the strategies involved in SURI. There would be value in contrasting the different logics in terms of the social interests, the solutions developed, the balance between productionist and demand solutions and the implications of such strategies. More widely, there would be benefits in considering how other constructions of SURI could be based on other concepts, such as mutual interdependence, relationality, trading and trade-offs, fair shares and environmental justice.

In summary then, we would argue that there would be considerable value in subjecting SURI to critical conceptual and empirical analysis. We feel that UES and SURI may signal an important change in how we consider three significant urban debates: first, the

8 URL <http://www.transitiontowns.org/> (accessed 29 January 2008).

9 URL <http://relocalize.net/about/relocalization> (accessed 29 January 2008).

issue of whether in urban governance and economies this signals a shift from competitive to eco-competitive city relations; second, within the conventional sustainable cities debate, whether SURI represents a narrowing of the agenda around securitized urban ecologies; finally, in relation to questions around vulnerability of infrastructure, whether SURI now signals a shift to questions around strategic resilience.

Conclusion – an archipelago of transcendent urbanism?

UES, as presented here, is a thesis supported by a set of key propositions, which constitute a research and policy agenda that needs to be critically tested. In particular, we have developed the argument that it is UES that creates the contemporary conditions within which cities must actively seek to reproduce their economic, social and material fabric. The dominant strategic responses to this agenda are being produced through coalitions of corporates, the political leaders of world cities and environmental groups, and are being shaped around the contexts of world cities. This is encompassed in three ‘styles’ of emerging infrastructure provision, which we have characterized as a particular form of infrastructural fix — secure urbanism and resilient infrastructure — that aspires to construct enhanced ecological security for world cities.

The key question we asked at the beginning of the article was: to what extent does this new dominant ‘logic’ underpin new strategies of economic accumulation or more ‘progressive’ politics? Our argument is that it is a very particular and select coalition of social interests that are both creating a context for UES and developing strategic responses through SURI within world cities. In short, we need to assess critically the implications of this new logic in shaping the contours of the emblematic, exemplary and dominant socio-technical-ecological fix for cities in a period of resource constraints and climate change. Accordingly, there are five sets of issues in response to thinking about the consequences of UES (and SURI) that need to be addressed. In doing this, we reiterate our key claims, identify their implications and then outline the contours of a longer-term research agenda around UES.

First, in response to UES, we are witnessing an increasing ‘metropolitanization’ of resource security and responses to climate change, which involves the strategic re-localization and selective glurbanization of ecological resources. The dominant appropriation of this agenda is exemplified by three interrelated strategies or ‘styles’ of reconfiguring socio-technical infrastructures in the name of particular world cities: strategic protection, autarky and urban agglomerations. Clearly, a central point in our argument is that such processes of rescaling are primarily produced through world cities and their own ecological resource base and socio-technical infrastructures. This opens up issues about what it is ‘desirable’ and ‘necessary’ in order to provide strategic protection and which places are privileged, and, conversely, what is seen as being able to be ‘sacrificed’ and where these places are. Furthermore, our concern is that strategic interest in new forms of autarky based on withdrawal from and by-passing of national and regional infrastructure potentially leads to the creation of an archipelago of interconnected ‘self-reliant’ islands of world cities. World cities are using their capability, resources and networks to develop a style of transcendent urbanism that is claimed can overcome the potential limits of climate change and resource constraints to guarantee future economic and territorial growth. Critically, we need to ask what this means for the by-passed places, the new peripheries constructed by ‘enclosure’ and the ordinary cities of the North and global cities of the South. The implication is that such cities simply ‘make-do’ or ‘improvise’ with their restricted resources and constrained capacity as world cities establish themselves as ecologically secure spaces. Alternatively, ‘ordinary’ cities and cities of the south are configured as potential new markets that ‘consume’ the architectural and engineered eco-city fixes produced in the exemplary world cities.

Second, at least in aspiration, this new style of 'preparatory' and anticipatory policy making appears to have new key components, which include long-term timescales, new expertise and the claim of radical systemic change in infrastructures. Yet we have relatively little understanding of what this actually means in practice or what consequences emerge from this style of policymaking. What is 'intended' to be shaped in the long term? Critical for us is that such longer-term timescales and 'locked-in' socio-technological trajectories around SURI then may lead to the shaping of other social, economic and spatial plans and priorities that are designed to prioritize and protect world cities. We are concerned that such shifts privilege particular types of technical knowledge, tightly delimiting what is considered relevant knowledge and expertise. More widely, we are concerned about the limits of the social interest groups involved in constructing new social visions for systemic change in infrastructure and, in particular, the claim that new eco-models — the resource-neutral eco-region being developed in Thames Gateway or the new eco-city developments — are simply replicable in other national and international contexts.

Third, it is emerging coalitions and trans-urban networks of city governance, corporate and environmental groups that are producing these 'new fixes'. Large cities' political elites, corporates and environmental groups are positioning themselves as the 'obvious' actors and places to address the 'threats' of resource constraints and climate change. Central to our argument is the need to understand what might be distinctive about these coalitions responding to UES and constructing new responses through SURI. These are seemingly highly exclusive coalitions of social interest groups involved in the production of such an agenda and speaking 'on behalf of' these cities. The politics of these strategies leads us to ask: who benefits from these strategies *and* whom, where and what do they 'affect'? Critically for us, our concern is that there are particular material and economic interests that enable new coalitions of city-government, corporate and environmental groups to develop around this agenda. Central to this is a desire to pilot, test and 'roll out' new forms and styles of urbanism that effectively — it is claimed — transcend conventional notions of infrastructural and ecological constraint. Such interest groups collaborate to develop particular fixes but also to stress the inevitability and obvious nature of the response constructed and 'rolled out' into other contexts. Rather than build resource-neutral developments or more autonomous cities, our concern is that new resource interrelations and dependencies are being redrawn rather than displaced.

Fourth, this view of the active role of world cities and transnational urban networks in addressing resource security and climate change through SURI is predicated on boosting the economic competitiveness of world cities, but it also provides 'models' for replication. SURI is being developed as a new source of economic accumulation where models are being developed and fixed that can be replicated and 'unproblematically' 'rolled out' in different world city contexts with the 'promise' of replication for other cities. The critical question that emerges from this agenda is how are world cities able to construct UES and responses to it to their competitive advantage and how does this reshape existing hierarchies? For us, it is world cities that are positioned as emblematic places 'producing' the exemplary fixes; is it intended that these are then replicated and 'consumed' in other contexts? Our concern is that a particular pathway is established by SURI in which alternatives are 'locked out'. At the same time, there are wider questions about the political tensions, conflicts and social resistance to SURI that are likely to emerge if it is imposed on different social contexts.

Fifth, critically then we are aware that we have focused on SURI and its construction as the 'inevitable' and dominant response to UES. We recognize that there would be considerable value in understanding and contrasting this response with other less visible alternatives that attempt to construct responses which involve different social interests and solutions. Alternative responses to UES other than SURI — for example transition towns, relocalization networks — need to be made more visible and critically interrogated. We would want to examine the alternatives to SURI that are emerging in different urban contexts around the world. In particular, how do they compare and

contrast to SURI, are there alternatives or can hybrid solutions be developed? Central to this would be an understanding of constructing responses based on other principles, such as fair shares, mutual interdependences and the styles of socio-technical solutions these would imply.

Our most significant concern is how the pressures of UES and SURI as a strategic response are designed to secure the divisible securitization of resources at the metropolitan scale through world cities, rather than actively contributing to wider collective solutions for the implications of climate change and resource constraints. While we have sought to offer clarity about our own position, we also recognize that we are dealing with a set of social visions and socio-technical aspirations that have to be actively translated into social action and produce material consequences in the restructuring of social relations and resource flows. While we firmly believe that there is already sufficient evidence to support our own critical position on the economic motivations and emerging consequences of UES, we also recognize that there is a need for further conceptual and empirical work to test the thesis. There are three critical questions that require further analysis: first, an empirical investigation of the emergence of UES and SURI in several world city contexts, focusing on the resonances and dissonances between pressures and different responses; second, further conceptual and theoretical analysis about whether UES and SURI represent a particular political, ecological and socio-technical response to questions of climate change and resource constraints under conditions of neoliberal urbanism; finally, wider research and political engagement to highlight the visibility and potential of resistance to UES and alternative strategies underpinned by commitments to mutual interdependencies, fair shares and social needs. These, we argue, are the critical issues and questions raised by UES.

Mike Hodson (M.Hodson@salford.ac.uk) and **Simon Marvin** (S.Marvin@salford.ac.uk), Centre for Sustainable Urban and Regional Futures (SURF), University of Salford, Cube Building, 113-115 Portland Street, Manchester M1 6DW, UK.

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Résumé

L'expression 'sécurité écologique' s'applique généralement à des efforts visant à préserver les flux de ressources écologiques, infrastructures et services à l'échelon national. Toutefois, la multiplication des préoccupations en matière de 'sécurité écologique urbaine' (SEU) donne lieu désormais à des stratégies de reconfiguration des villes et de leurs infrastructures dans le but d'assurer leur reproduction écologique et matérielle. Cependant, les villes ont des capacités et des moyens différents d'élaborer des réponses stratégiques aux opportunités et contraintes liées aux grandes questions de SEU. Celles-ci englobant les pénuries de ressources et le changement climatique, les

stratégies émergentes peuvent choisir de privilégier telles ou telles zones urbaines et tels ou tels intérêts sociaux. En s'intéressant aux villes mondiales, l'article présente les enjeux que suscite l'attention croissante pour la SEU. Sont étudiées les premières réponses apportées, susceptibles de constituer progressivement une nouvelle 'logique' dominante dans la fourniture d'infrastructures : ce que nous appelons la SURI (sécurité de l'urbanisme et résistance des infrastructures). La conclusion s'interroge sur la mesure dans laquelle cette nouvelle 'logique' dominante sous-tend une nouvelle stratégie d'accumulation ou bien des politiques plus 'progressistes' en exposant des alternatives à la SURI, des possibilités de conformer la SURI de manière plus 'progressiste' et de concevoir un programme de recherches.

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