

# Utopian Visions and Real Estate Dreams: The Eco-city Past, Present and Future

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## Abstract

This article traces the evolution of the eco-city as a concept and an urban planning model over the last 40 years, outlining the various definitions, applications and critiques of the term historically and today. What distinguishes the eco-city from work on sustainable urbanism more broadly, the article argues, is its attempt to create a comprehensive and transferable model of sustainable urban development. Over the years, the eco-city, in both theory and application, has evolved along with broader trends in environmental thought. The idea of the eco-city originally emerged out of counterculture movements of the 1960s and 1970s as an approach to urban development that would respect environmental limits. Contemporary eco-city projects attempt to transcend these limits and are often driven as much by economic objectives as environmental ones. Although many eco-city projects market themselves as models for future urban development, the article argues that they are better seen as sites of experimentation and innovation, helping drive broader socio-technical transitions. The article concludes that the ability of eco-cities to achieve their utopian ambitions may be limited by the realities of operating within a profit-driven, entrepreneurial planning environment. However, they can still play a valuable role, providing a place to test new ideas and an ideal to aspire to.

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History offers up many grand, utopian ideas for how to use the tools of architecture, engineering, planning and design for the betterment of society as a whole. Many of the visionaries in the urban planning canon such as Ebenezer Howard, Frank Lloyd Wright and Le Corbusier rejected the idea of gradual improvements to the conditions of existing cities in favour of comprehensive transformations of the urban environment (Fishman 2003). Over the years, the nature of utopian solutions have tended to reflect broader socio-economic trends and public concerns. Howard's Garden City was intended to be a cure for the environmental and moral hazards of cities of the Industrial Revolution (Basiago 1996; Hall 2002; Kostof 1991). Orderly modernist tower blocks were a remedy for the chaos of urban slums in the post-war era, and large highways and boulevards a cure for congested roads and a nod towards the ascendance of the private automobile as the primary mode of transportation (Hall 2002). In more recent times, many cities have created gleaming, homogenized financial districts in order to enhance their ability to compete for investment on a global scale (Albrechts 1991; Fainstein 2001).

In line with the tendency for utopian planning ideas to reflect broader societal concerns of their time, over the last 40 years academics and practitioners in planning and related fields have proposed a range of approaches to urban development that address concerns about the environment and sustainability. These include McHarg's (1969) ecologically sensitive approach to land use planning, the compact city (Breheny 1992; Commission of the European Communities 1990; Jenks et al. 1996), the codified principles of 'neotraditional town planning' espoused by the New Urbanists (Calthorpe 1993; Katz 1994) and the eco-city. The eco-city, an idea that initially developed out of grassroots environmental movements of the 1960s and 1970s, will be the focus of this article.

Today, people use the term ‘eco-city’ to describe a wide range of urban projects, from small retrofits to large-scale new towns. To encapsulate this diversity, this article conceptualizes the eco-city not as a single entity but rather an ‘umbrella concept’ (Jabareen 2006) pulling together a collection of both normative and procedural principles about how to create more sustainable urban areas. While concern for the natural environment has been a common theme throughout the history of Western urban planning (Wong and Yuen 2011), eco-cities bring this concern to the forefront of the planning process. Eco-cities were originally conceived of as small-scale interventions in existing built environments. These interventions were to be developed through a bottom-up process led by citizens and architects motivated by concerns about ecological limits and social equity. Contemporary eco-city projects, particularly those appearing in Asia and the Middle East, are more likely to be large, ambitious, technologically driven projects led by state and private sector actors. These projects like to advertise their ‘eco-ness’. Their plans and publicity materials contain bold claims, ambitious targets, attractive designs, innovative technologies and, quite often, a whole lot of green. Yet while environmental concerns remain a driver of these projects, they are also mobilized in the pursuit of larger aims and objectives which are as likely to be political or economic in nature as environmental.

Despite the popularity of the concept over the years and the recent spate of high-profile eco-city projects, there have been surprisingly few attempts to critically evaluate the eco-city’s broader meaning and implications. The aim of this article is to contribute to filling this gap through a critical review of the way in which the concept has been elaborated in theory and practice over the last 40 years. The article is divided into four sections. The first reviews attempts to define the eco-city and explores how the concept relates to the broader debates around urban sustainability more generally. The article then traces the evolution of eco-city initiatives from the small-scale, bottom-up initiatives led by environmental activists in the 1970s to the ambitious, technologically driven eco-cities of today. The next section considers the extent to which eco-city projects are driven by economic as well as environmental objectives. The final section explores the role that the eco-city might play in a broader transition to a more sustainable society.

### *Defining the Eco-city*

How does an eco-city differ from a normal city, or even a sustainable city? The term was first coined in the 1980s by Richard Register, a California-based architect and environmental activist, who defined an eco-city in 1987 as ‘an urban environmental system in which input (of resources) and output (of waste) are minimized’ (Register 1987). As the concept’s usage has become more widespread, so too have the meanings associated with it and the diversity of projects adopting the label. A consistent theme in the literature on eco-cities is that there is no one accepted definition of the concept (Joss 2011a; Keeton 2011; Roseland 1997). Those definitions that do exist tend to be either lists of principles or very broad. Roseland (1997) argues that literature on a collection of ideas including reduction in car use, wetland restoration and affordable housing should all be considered as part of an eco-city framework. Kenworthy (2006) argues that the eco-city should incorporate ten key dimensions, with sustainable urban form and transport at the core of the model.

One route to developing a definition is to look at actual eco-city projects themselves. Joss (2011a) did just this, conducting a survey of eco-city initiatives around the world. He identifies three types of eco-city projects: new developments, expansions of urban areas and retrofits, in which existing cities adopt eco-city principles. The diversity of initiatives using the term eco-city discovered in Joss’s survey reinforces the challenge of developing a

meaningful definition of the term. Ultimately, Joss elects to define eco-city broadly once again, using three analytical categories: an eco-city must be a development of substantial scale, occurring across multiple sectors, which is supported by policy processes (Joss 2011a, p. 280).

Some hold that the lack of a clear definition of the eco-city detracts from its value and argue that we need some sort of standard or set of indicators to evaluate progress and measure a project's 'eco-city-ness' (International Eco-city Framework and Standards 2011; Keeton 2011; Kline 2000). Such standards would clarify the line between an eco-city and a city with some environmentally friendly aspects. A competing viewpoint is that a broad definition of an eco-city is a positive thing, as some degree of flexibility in how to achieve the eco-city is necessary in order to deal with the variety of contexts in which the model will be applied (Afiff 2010; Lye and Chen 2010a; Surjan and Shaw 2008).

The existing broad definitions of the eco-city help differentiate it from normal cities but do not clarify what distinguishes an eco-city from any other urban sustainability initiative. This is not helped by the inconsistency in the way the term is used. With no particular standards to meet in order to use the term, any project, even one with limited sustainability credentials, is free to call itself an eco-city. Meanwhile, some ambitious projects do not consistently describe themselves as eco-cities. In particular, it is difficult to determine what differentiates an eco-city retrofit initiative from other, similar, sustainability initiatives occurring in cities around the world. While some cities explicitly adopt the 'eco' label, others, such as Curitiba, Brazil, have had the label applied largely by outsiders (Downton 2009; Kenworthy 2006; Suzuki et al. 2010).

Adding to the confusion is the considerable overlap between the literature on eco-cities and that on urban planning and sustainability more generally. The primary themes discussed in the literature on urban sustainability are compactness, sustainable transport, density, mixed land uses, diversity, passive solar design and greening (Jabareen 2006), all of which are also commonly mentioned in discussions of eco-cities. There is one thing, however, that distinguishes the two bodies of literature. In contrast, much of the broader literature on sustainable cities is analytical, attempting to test various propositions about what makes a city sustainable, until recently, most of the literature on eco-cities focused on normative prescriptions for achieving eco-city status (Girardet 2008; Kenworthy 2006; Register 2002). The relationship between planning and urban design interventions and sustainability objectives is heavily contested in the academic literature (Bulkeley and Betsill 2005; Williams 2009). Yet many articles on eco-cities gloss over or do not even acknowledge these debates. Some works simply consist of a very general and uncritical discussion of some of the dimensions of urban sustainability (Head and Lamb 2011; Walter 1992).

A clear, widely agreed upon definition of the eco-city has yet to emerge. Given this, the eco-city is best conceived of as not a single entity but rather an 'umbrella concept' (Jabareen 2006) pulling together a collection of proposals, both normative and procedural, about how to create more sustainable urban areas. This understanding of an eco-city helps explain how such a diverse and varied range of projects have used the term over the years. These projects are the focus of the next section of this article.

### *Building the Eco-city*

Eco-city initiatives in the 1970s and 1980s were locally oriented, led largely by citizen activists focused on improving environmental conditions through the application of environmental ideas popular at the time, such as bioregionalism (Imura 2010; Pow and Neo 2010; Register 2002; Roseland 1997). These included the establishment of a number of 'eco-villages' combining communitarian living with a low-impact lifestyle, integrating

various aspects of ecological design, permaculture, ecological building, green production alternative energy and community building practices (Global Ecovillage Network). These early eco-city projects reflected the prevailing environmental discourse of the 1970s, that of ecological limits and survivalism. Epitomized in publications such as *Limits to Growth* and *The Population Bomb* (Ehrlich 1968; Meadows et al. 1974), this perspective questioned whether economic growth could continue without increased environmental degradation (Dryzek 2005). With few practical examples of implemented projects, this early phase of eco-city development was characterized by a gap between aspirations and achievements (Barton 2000, cited in Joss 2011a).

The 1990s brought an explosion of interest in the environmental and sustainability dimensions of urbanization, precipitated in part by two landmark events. The first was the publication of the Report of the World Commission on Environment and Development (commonly known as the Brundtland Report) which introduced the concept of sustainable development into the common lexicon. The second was the United Nations Earth Summit in Rio de Janeiro in 1992. At Rio, member nations adopted Agenda 21, an action plan for sustainable development. The concept of 'sustainable development' proved popular and contributed to the marginalization of the more pessimistic environmental discourses of the 1970s (McManus 1996). Sustainable development proposes that there can be a positive-sum relationship between goals such as economic growth, environmental protection and social justice. It holds that the limits to development are technical, cultural and social rather than environmental (Kirkby et al. 1995). An understandably appealing idea, the idea of sustainable development as proposed in the Brundtland report underpins the mainstream interpretation and application of sustainability today (Adams 1993).

The majority of urban sustainability and eco-city initiatives in the 1990s adopted sustainable development as their objective, in particular the idea of a tripartite definition of sustainability in which environmental, economic and social factors are given equal weight. In embracing sustainable development, many urban sustainability and eco-city projects have also ascribed to the closely related theory of ecological modernization, which sees environmental degradation not as an impediment, but as an impetus for growth (Dryzek 2005; Hajer 1996). Translated to the urban arena, ecological modernization promises that technological and procedural innovation can solve urban environmental problems (Hajer 1996; Myllylä and Kuvaja 2005). Accordingly, many contemporary eco-cities rely heavily on technology as a means for achieving their sustainability objectives (Downton 2009; Joss and Molella 2013; Keeton 2011; The World Bank 2009).

The Earth Summit led to a period of local and national experimentation in urban sustainability in existing cities, as cities developed and adopted 'Local Agenda 21' action plans for sustainable development (Downton 2009; Jörby 2002; Joss 2011a; Voisey et al. 1996). In some cases, these experiments were done under the banner of the eco-city. Eco-city developments that emerged during this time tended to be demonstration projects. They were conceived of and funded by national and supranational governments in locations including Japan, India and the European Union (European Commission 2008; Gaffron et al. 2005a, 2005b; Surjan and Shaw 2008; Van Berkel et al. 2009).

Despite the buzz and excitement created by such projects in the 1990s, very few eco-developments were actually completed, perhaps because environmentally minded idealism was tempered by the realities of the market (Barton 1998). More successful were a small number of innovative sustainable urban projects developed by northern European municipalities at district and neighbourhood scale in the 1990s and early 2000s. Prominent examples include Hammarby Sjöstad in Stockholm, Vauban and Rieselfeld in Freiburg, Germany, and Bo01/Western Harbour in Malmö, Sweden. These projects combined the

social and community focus of the early eco-city movement with the use of design and technology to achieve sustainability goals. While they were not explicitly labelled eco-cities, they can be seen as precursors to and inspirations for the larger eco-city initiatives that followed. Today, they are regularly cited as examples of best practice in sustainable urban development and design (Energy Cities 2008; PRP Architects Ltd et al. 2008; Ritchie and Thomas 2009).

The developments and demonstration projects of the 1990s and early 2000s popularized the idea of incorporating sustainability principles into the planning and design of new urban areas. However, they were still relatively small, limited to neighbourhood and district scales. This changed in the mid-2000s, when ambitious plans began to emerge for entire towns or cities that would be highly sustainable. Today, the most ambitious eco-city projects are occurring primarily in Asia (Joss et al. 2013; Keeton 2011). The first highly publicized proposal for a standalone eco-city was Dongtan Eco-City in 2005. Master-planned by the international engineering firm Arup, the project was to be built on the outskirts of Shanghai. While this project ultimately would not go forward, a 2009 report estimated that over one hundred other eco-city initiatives are currently under development in China (The World Bank 2009). Of these, the Sino-Singaporean Tianjin Eco-city, a collaborative project of the governments of China and Singapore, is currently the closest to completion. In 2006, Abu Dhabi, in the United Arab Emirates, introduced proposals for a new zero-carbon city, Masdar City, master-planned by the prestigious British architecture firm Foster and Partners, also currently under construction.

The eco-city is now a global phenomenon. Building an eco-city is both a powerful way to indicate a commitment to sustainability (Keeton 2011) and a way to differentiate a particular development in a competitive environment (Wu 2012). Governments and developers in countries including the UK, Spain, India, South Korea, the USA and Jordan have also developed proposals for eco-city projects (Joss 2011a). In contrast with the smaller, bottom-up initiatives of the early eco-city movement, or the municipality-driven developments in Europe in the late 1990s, contemporary projects command much higher-level support. Many of the new generation of eco-city and eco-town projects are initiated and/or supported by their national governments. This is the case in China, where national programmes and subsidies promote ecological innovation (Pow and Neo 2013; Shiu-Shen 2013; van Dijk 2011), and in the UK where proposals to build a number of new eco-towns were part of a larger programme by the government to reduce carbon emissions (Smith Morris 2011). This highlights the need to analyse eco-cities not in isolation, or only in reference to other, similar projects, but within the political and economic contexts in which they are developed.

The large, top-down eco-city projects master-planned by prestigious international architects seen today bear little resemblance to the modest, bottom-up initiatives proposed by early eco-city advocates. Indeed, such projects can be seen as reflecting an economically driven approach to urban development as much as one focused on environmental sustainability. The sometimes uneasy coexistence of environmental and economic objectives in contemporary eco-cities is taken up in the next section of this paper.

### *Eco-logical or Eco-nomic?*

There is substantial discussion within more critical intellectual traditions about the inherent contradictions between environmental preservation and the capitalist system (Czech and Daly 2004; Jackson 2009; White 2006). Most contemporary mainstream eco-city projects, however, set these debates aside (Roelofs 2000). Such projects seek to work within, rather

than challenge, growth-oriented models of urban development. Most eco-city projects claim to incorporate environmental, economic and social aspects of sustainability. However, a number of recent publications drawing on detailed case studies of eco-city projects have found that economic concerns consistently take priority over environmental ones (Cugurullo 2013; Datta 2012; de Jong et al. 2013b; Shwayri 2013). In China, for example, most eco-cities are first and foremost entrepreneurial land development projects (Shiuh-Shen 2013). While they may be sincerely committed to sustainability, economic growth and cost minimization are the prevailing concerns of Chinese authorities (de Jong et al. 2013b). As a result, eco-cities ultimately will be judged by their economic rather than their environmental performance (de Jong et al. 2013a, 2013b).

The emphasis on economic performance results from the close ties between eco-city projects and broader economic development objectives, in particular attracting investment and enhancing intranational and international competitiveness (Datta 2012; de Jong et al. 2013b; Shiuh-Shen 2013). Masdar City, for instance, is just one small part of a broader initiative to make Abu Dhabi a leader in the development of renewable energy technology (Nader 2009). Recent case study research has demonstrated that the Masdar City project is intrinsically linked to and driven by this broader economic objective (Caprotti and Romanowicz 2013; Cugurullo 2013). One of the goals of the Tianjin Eco-city project meanwhile is to broaden and deepen economic ties between China and Singapore (Keeton 2011). Central to the eco-city's contribution to economic development is its value in marketing and differentiating urban development projects (Shen and Wu 2012; Wu 2012). The technology-dominated approach of some eco-city projects even promotes the commercialization of the eco-city itself, by requiring inhabitants either to pay for technological innovations or to play a role in the development of commercially viable solutions to urban sustainability (Cugurullo 2013; Evans and Karvonen 2011; Myllylä and Kuvaja 2005).

The underlying assumption of contemporary eco-city projects that economic and environmental goals are compatible demonstrates their adherence to an understanding of sustainability as sustainable development and belief in the idea of ecological modernization. The promise that eco-cities can deliver the best of both worlds is clearly reflected in the way some eco-city projects promote themselves. A promotional document produced by the backers of the Dongtan Eco-city project states:

(T)he development of Dongtan is surely ecological, but by no means at the sacrifice of the enjoyment of modern life; this should surely be the plan, which should in no way be an obstacle to its future growth (Arup Group Ltd. & Shanghai Industrial Investment (Holdings) Company Ltd 2005, p. 118).

Understandably, promises such as these are 'hugely appealing in the current global climate of doomsday predictions and apocalyptic natural disasters' (Keeton 2011, p. 47). But they are a long way from the visions of the early eco-city pioneers and their focus on finding a form of urbanism which respected ecological constraints. Instead, many contemporary projects 'have at their core the vision and aspiration that they are able to transcend conventional notions of ecological constraint' (Hodson and Marvin 2010, p. 303).

Their focus on economics may create some uncomfortable contradictions for eco-city projects. Chang and Sheppard connect the eco-city with the idea of 'green capitalism', in which environmental change is supported by capital investment, individual choices and entrepreneurial innovation (Prudham, 2009, cited in Chang and Sheppard 2013). For most eco-cities, their nature and ecology is an important selling point. However,

capitalizing on this asset in order to promote growth may in time lead to its decay or destruction (Chang and Sheppard 2013).

The idea that eco-cities can transcend ecological constraints and achieve environmental, economic and (though less frequently mentioned) social objectives is an appealing idea promoted by a powerful network of actors. This includes transnational professionals, largely from North America and Europe, who are involved in the design of many eco-city projects (Hult 2013; Pow and Neo 2013; Shen and Wu 2012; Shwayri 2013). International institutions can also play a role. The World Bank, through their 'Eco2Cities' initiative is providing support to cities in developing countries to help them simultaneously achieve both economic and environmental objectives (Suzuki et al. 2010). In seeking to market their services by promoting their expertise in sustainable urban development, international actors create narratives about the universality of particular approaches to achieving sustainable urbanism (Hult 2013). Meanwhile, plans for eco-cities draw on a particular imaginary of sustainable urbanism and promote it as universally applicable (Cugurullo 2013). In these ways, the eco-city is promoted as a product or model which, like ecological modernization, promises the survival of the capitalist system (Pow and Neo 2010). The extent to which the eco-city can and should be considered a 'model' is considered the final section of this paper.

### *The Eco-city: A Universal Model or Site for Experimentation?*

Eco-cities attempt to address at scale and in an integrated fashion the individual issues that are discussed at length in the sustainable urbanization literature (Dunn and Jamieson 2011; Hodson and Marvin 2010). In doing so, many projects come to see and promote themselves as 'models' of sustainable urban form, examples which should be replicated around the world. Masdar City has described itself as 'a model for what can be achieved in other countries' (Nader 2009, p. 3957). Arup, the designers of Dongtan, intended it to be 'a global template for sustainability in urban planning', (Bullivant 2007, p. 127) and a 'prototype for the future of all cities' (Hart 2007, p. 16). The Tianjin eco-city project is intended to be a model for the hundreds of new towns which are due to be constructed in China over the next 20 years (Keeton 2011). Such ambitious claims can be helpful in attracting interest in a project as well as in investment and political support.

However, the presumption that the approach taken in a particular project can be universally applicable is contested. Their adherence to the principles of ecological modernization means that at times eco-cities can seem to fetishize technology, incorporating new and experimental technologies with international appeal rather than low-tech or indigenous solutions (Caprotti and Romanowicz 2013; Datta 2012). However, this emphasis on technological innovation may not be appropriate in many contexts (Myllylä and Kuvaja 2005; Romero Lankao 2007). Without adequate consideration of local lifestyles and standards of living, eco-city projects may end up being impractical or inaccessible to the vast majority of the world's urban dwellers who are unable to pay for such innovations (Cheng and Hu 2010; Lye and Chen 2010b; May 2008; Myllylä and Kuvaja 2005). In this way, eco-city projects could have the undesirable effect of increasing inequality and patterns of exclusion (May 2008; Myllylä and Kuvaja 2005).

Differences in demographics, patterns of urbanization and resource availability also lead to variations in the challenges and priorities that leaders in particular places want to use the eco-city to address. These differences may limit the applicability of the eco-city. The concept's intellectual roots are firmly in the developed world contexts of North America, Europe and Australia, as most of the literature on sustainable cities and eco-cities either is written from a Western perspective or focuses on Western practices (Lye and Chen 2010b).

Myllylä and Kuvaja (2005) argue that because the eco-city was designed to tackle challenges faced by affluent Northern cities, it is based on the presumption that the required societal structures (e.g. democracy, strong civil society and political accountability) are in place. In particular, many cities do not have the governance structures necessary to implement and manage solutions designed for North American or European contexts (Myllylä and Kuvaja 2005; Sorensen et al. 2003). Therefore, the eco-city 'may be inherently incapable of providing a solid theoretical toolbox when analysing various strategies for urban environmental challenges in the South' (Myllylä and Kuvaja 2005, p. 226). An alternative argument is that the eco-city is flexible enough to be adapted to the context of different political and social systems. Wong (2011) argues for instance that due to the particularities of the Chinese context, China's eco-city ambitions might be more about implementing basic services, pollution control measures and ecosystem restoration projects that are taken for granted in the West. This perspective is reiterated by Chang and Sheppard (2013) who demonstrate that in the case of Dongtan, the project backers deployed a particularly Chinese form of urban sustainability, one different from Western eco-city norms.

Rather than providing models to emulate, the transformative capacity of eco-cities may be found in their potential to increase awareness of and test new ideas about how to make urban areas more sustainable. High-profile projects can have a substantial influence at local, national and even international levels. Projects like Dongtan and Tianjin can be seen as demonstration projects, raising the level of environmental consciousness in China (Wong 2011). Dongtan, which only ever existed on paper, still had a profound influence in raising the bar in the theoretical discourse about eco-city planning, influencing many other new eco-city developments (Pow and Neo 2010). Saunders (1997), drawing on his research on a number of ecological communities in Northern Europe, recommends that experimental projects should be used to induce a gradual change of opinion. The advantage of having a demonstration project is that

The general public understands models, especially working ones, better than concepts. As well, a built example is influential because lessons from experimentation can be employed and improved for future projects, thus contributing to the evolution of good design (Saunders 1997, p. 119).

Eco-cities can play a role in a broader process of socio-technical transition towards a more sustainable society, serving as sites of innovation and experimentation. Spath and Rohracher (2011) describe the process of socio-technical transformation towards sustainability using a multilevel perspective on innovation (Geels 2002; Rip and Kemp 1998). There are three levels at which innovation can occur: the micro level of protected niches, which can be test beds for new socio-technical arrangements; the meso level of socio-technical regimes, such as energy systems; and the broader socio-technical landscape of cultural norms, values and persistent socio-technical structures (Spath and Rohracher 2011). Within this framework, eco-cities can create the space needed for the learning, interaction and building of social networks that help create niches (Bulkeley and Castán Broto 2013).

Some eco-cities, such as Masdar, explicitly take on this role as sites for experimentation, or 'living laboratories' where technology and society are brought together as co-evolving entities (Cugurullo 2013; Evans and Karvonen 2011). The experimentation and innovation occurring in eco-city projects is not just technological Joss (2011b) demonstrates that eco-cities can also be seen as sites for experimentation in the management and governance of new models of urban development. However, it is difficult to predict whether experiments conducted in small, controlled environments can be scaled up to a level at which they may generate widespread change (Evans and Karvonen 2011; Keeton 2011). High-profile



projects like Masdar may attract significant amounts of attention and visitors, but they also may not be replicable. They are the product of a particular set of conditions, in Masdar's case, (nearly) unlimited oil wealth and a national economic development programme. Such projects risk becoming model towns, exhibits rather than real places (Keeton 2011).

### *Concluding Reflections: Utopian Dreams, Concrete Realities*

Utopian models of urban planning have always had a poor track record in terms of actual implementation. Eco-city projects' chances are not helped by the fact that they are being developed within an 'entrepreneurial' paradigm in which the private sector is the primary driver of urban development, and economic growth its chief objective (Harvey 1989). This situation creates something of a paradox for ambitious projects whose visions of a sustainable urban future cannot be made into reality without the financial backing of more entrepreneurially minded parties. By attempting to work within rather than challenge dominant approaches to urban development, eco-city projects may find themselves compromising on elements of their utopian visions. This leads to criticism from eco-city sceptics. Dongtan was proclaimed 'greenwasher of the year' by *Ethical Corporation* magazine in 2007 (French 2007), while Tianjin has been criticized for not being ambitious enough in its objectives (Keeton 2011). Masdar also had to scale back some of its original ambitious environmental objectives as a result of the 2008 financial crisis (Cugurullo 2013). Eco-cities will always find it difficult to achieve the delicate balance between ambition and realism (Keeton 2011).

This does not mean we should give up on trying to construct eco-cities. Eco-city projects, with their diverse range of approaches to urban sustainability, give us something to study, learn from and debate. The flexible nature of the concept is important, as this helps make these experimental projects happen. Like sustainability, the eco-city's popularity is in part due to its ability to mean different things to different people (Hajer 1995; Lock 2008). It can be used as a unifying discursive 'storyline' (Hajer 1995) bringing together a variety of actors with disparate interests and objectives. Without the eco-city banner bringing the necessary actors together and serving as a constant reminder of underlying sustainability objectives, these projects might not happen at all or would drift even more towards conventional, economically driven approaches.

Just as we need to continue developing eco-city projects, so too do we need more research on and critical analyses of these projects. Too much of the existing eco-city literature glosses over the complexities of creating sustainable urban projects at scale, focusing instead on arguing for the benefits of a set of principles to guide urban planning and highlighting the successes of an extremely small number of existing projects. But it is precisely these complexities that we need to understand if the experience of existing projects is to be usefully applied elsewhere. To paraphrase a comment Roelofs made over a decade ago, we need less sets of principles derived from experience, and more descriptions of those experiences (Roelofs 2000). Thus, a welcome contribution to the literature on eco-cities is the recent publication of a number of in-depth case studies of the development of eco-city projects (Caprotti and Romanowicz 2013; Chang and Sheppard 2013; Cugurullo 2013; Datta 2012; De Jong et al. 2013a; Joss 2011b; Joss and Molella 2013; Shwayri 2013). These studies demonstrate that the construction of an eco-city is far from the simple application of a set of broadly agreed principles. Rather, it 'not only involves active physical construction but also a more subtle reconstruction and deconstruction of what it means to be an eco-city' (Pow and Neo 2010, p. 103). Eco-city projects are simultaneously creating and drawing on imaginaries of an alternative, environmentally sustainable urban future. They offer a valuable opportunity

to test ideas for improving the sustainability of urban living at a time when this is one of the most critical challenges facing humankind. For these reasons among others, academics, policymakers and practitioners must continue to engage with eco-cities in theory and practice.

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### *Short Biography*

Elizabeth is a doctoral candidate in Urban Sustainability and Resilience at University College London. Her research interests include urban sustainability, the international exchange of ideas in urban planning and design and the role of private sector consultants in contemporary urban planning. Her doctoral research focuses on the role of international consultants in the development and dissemination of ideas about sustainable urban planning and design. Prior to beginning her doctorate, Elizabeth worked for nearly a decade on urban issues in a number of countries around the world. Elizabeth holds a BA in American Government and Politics from Wesleyan University in the USA and a MSc in Regional and Urban Planning Studies from the London School of Economics.

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### *References*

- Adams, B. (1993). Sustainable development and the greening of development theory. In: Schuurman, F. J. (ed.) *Beyond the impasse? New directions in development theory*. London: Zed Books, pp. 207–222.
- Affif, S. A. (2010). Challenges to implementing the eco-city concept in Indonesia's major cities. In: Lye, L. F. and Chen, G. (eds) *Towards a liveable and sustainable urban environment: eco-cities In East Asia*. Singapore: World Scientific Publishing, pp. 129–140.
- Albrechts, L. (1991). Changing roles and positions of planners. *Urban Studies* 28 (1), pp. 123–137.
- Arup Group Ltd. & Shanghai Industrial Investment (Holdings) Company Ltd. (2005). *Shanghai Dongtan: an eco-city*. Shanghai, London: SIIC Dongtan Investment & Development (Holdings) Co., Ltd.; Arup.
- Barton, H. (1998). Eco-neighbourhoods: a review of projects. *Local Environment* 3 (2), pp. 159–177.
- Basiago, A. D. (1996). The search for the sustainable city in 20th century urban planning. *The Environmentalist* 16 (2), pp. 135–155.
- Breheny, M. (1992). The contradictions of the compact city: a review. In: Breheny, M. J. (ed.) *Sustainable development and urban form*. European research in regional science. London: Pion, pp. 138–159.
- Bulkeley, H. and Betsill, M. (2005). Rethinking sustainable cities: multilevel governance and the “urban” politics of climate change. *Environmental Politics* 14 (1), pp. 42–63.

- Bulkeley, H. and Castán Broto, V. (2013). Government by experiment? Global cities and the governing of climate change. *Transactions of the Institute of British Geographers* 38 (3), pp. 361–375.
- Bullivant, L. (2007). Dongtan—a Shangri-La for Shanghai? *Architecture and Urbanism* 440, pp. 122–127.
- Calthorpe, P. (1993). *The next American metropolis: ecology, community, and the American dream*. New York: Princeton Architectural Press.
- Caprotti, F. and Romanowicz, J. (2013). Thermal eco-cities: green building and urban thermal metabolism. *International Journal of Urban and Regional Research* 37 (6), pp. 1949–1967.
- Chang, I.-C. C. and Sheppard, E. (2013). China's eco-cities as variegated urban sustainability: Dongtan eco-city and Chongming eco-island. *Journal of Urban Technology* 20 (1), pp. 57–75.
- Cheng, H. and Hu, Y. (2010). Planning for sustainability in China's urban development: status and challenges for Dongtan eco-city project. *Journal of Environmental Monitoring* 12 (1), pp. 119–126.
- Commission of the European Communities. (1990). *Green paper on the urban environment*. Brussels: Commission of the European Communities.
- Cugurullo, F. (2013). How to build a sandcastle: an analysis of the genesis and development of Masdar city. *Journal of Urban Technology* 20 (1), pp. 23–37.
- Czech, B. and Daly, H. E. (2004). The steady state economy—what it is, entails, and connotes. *Wildlife Society Bulletin* 32 (2), pp. 598–605.
- Datta, A. (2012). India's ecocity? Environment, urbanisation, and mobility in the making of Lavasa. *Environment and Planning C: Government and Policy* 30 (6), pp. 982–996.
- van Dijk, M. P. (2011). Three ecological cities, examples of different approaches in Asia and Europe. In: Wong, T.-C. and Yuen, B. (eds) *Eco-city planning: policies, practice and design*. Dordrecht; London: Springer, pp. 31–50.
- Downton, P. F. (2009). *Ecopolis: architecture and cities for a changing climate*. Dordrecht: Springer.
- Dryzek, J. S. (2005). *The politics of the earth: environmental discourses*. Oxford: Oxford University Press.
- Dunn, S. and Jamieson, W. (2011). The relationship of sustainable tourism and the eco-city concept. In: Wong, T.-C. and Yuen, B. (eds) *Eco-city planning: policies, practice and design*. Dordrecht; London: Springer, pp. 93–112.
- Ehrlich, P. R. (1968). *The population bomb*. New York: Ballantine Books.
- Energy Cities. (2008). Guidebook of sustainable neighbourhoods in Europe. Besancon, France: Energy Cities. [Online]. Retrieved on 28 August 2012 from: [http://www.energy-cities.eu/IMG/pdf/ademe\\_sustainable\\_districts\\_en.pdf](http://www.energy-cities.eu/IMG/pdf/ademe_sustainable_districts_en.pdf).
- European Commission. (2008). ECO-City Project. [Online]. Retrieved on September 3, 2012 from: <http://www.ecocity-project.eu/index.html>.
- Evans, J. and Karvonen, A. (2011). Living laboratories for sustainability: exploring the politics and epistemology of urban transitions. In: Bulkeley, H., Castán-Broto, V., Hodson, M. and Marvin, S. (eds) *Cities and low carbon transitions*. Routledge Studies in Human Geography. London: Routledge, pp. 126–141.
- Fainstein, S. S. (2001). *The city builders: property development in New York and London, 1980–2000*. Lawrence: University Press of Kansas.
- Fishman, R. (2003). *Urban utopias: Ebenezer Howard, Frank Lloyd Wright, Le Corbusier*. In: Campbell, S. and Fainstein, S. S. (eds) *Readings in Planning Theory*, 2nd Edition. Cambridge, MA: Wiley-Blackwell, pp. 21–60.
- French, P. (2007). Arup and Dongtan, worthy winner of greenwasher of the year. Ethical Corporation. [Online]. Retrieved on 3 September 2012 from: <http://www.ethicalcorp.com/content/arup-and-dongtan-worthy-winner-greenwasher-year>.
- Gaffron, P., Huismans, G. and Skala, F. (eds) (2005a). *Ecocity (book I): a better place to live*. Vienna, Austria: Facultas Verlags-und Buchhandels AG.
- Gaffron, P., Huismans, G. and Skala, F. (eds) (2005b). *Ecocity (book II): how to make it happen*. Vienna, Austria: Facultas Verlags-und Buchhandels AG.
- Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy* 31 (8–9), pp. 1257–1274.
- Girardet, H. (2008). *Cities, people, planet: urban development and climate change*. Chichester: John Wiley.
- Global Ecovillage Network. What is an ecovillage? [Online]. Retrieved on 2 September 2012 from: <http://gen.ecovillage.org/ecovillages/whatisanecovillage.html>.
- Hajer, M. A. (1996). Ecological modernisation as cultural politics. In: Lash, S., Szerszynski, B. and Wynne, B. (eds) *Risk, environment and modernity: towards a new ecology*. London: Sage, pp. 246–268.
- Hajer, M. A. (1995). *The politics of environmental discourse: ecological modernization and the policy process*. Oxford: Clarendon Press.
- Hall, P. G. (2002). *Cities of tomorrow: an intellectual history of urban planning and design in the twentieth century*. Oxford: Blackwell.
- Hart, S. (2007). Zero-carbon cities. *Architectural Record* 195 (3), pp. 162–164.
- Harvey, D. (1989). From managerialism to entrepreneurialism: the transformation in urban governance in late capitalism. *Geografiska Annaler B* 71 (1), pp. 3–17.

- Head, P. and Lamb, D. (2011). How cities can enter the ecological age. In: Wong, T.-C. and Yuen, B. (eds) *Eco-city planning: policies, practice and design*. Dordrecht; London: Springer, pp. 17–30.
- Hodson, M. and Marvin, S. (2010). Urbanism in the Anthropocene: ecological urbanism or premium ecological enclaves? *City* 14 (3), pp. 298–313.
- Hult, A. (2013). Swedish production of sustainable urban imaginaries in China. *Journal of Urban Technology* 20 (1), pp. 77–94.
- Imura, H. (2010). Eco-cities: re-examining concepts and approaches. In: Lye, L. F. and Chen, G. (eds) *Towards a liveable and sustainable urban environment: eco-cities in East Asia*. Singapore: World Scientific Publishing, pp. 19–46.
- International Eco-city Framework and Standards. (2011). About the IEFS initiative. [Online]. Retrieved on 1 September 2012 from: <http://www.ecocitystandards.org/about/>.
- Jabareen, Y. R. (2006). Sustainable urban forms: their typologies, models, and concepts. *Journal of Planning Education and Research* 26 (1), pp. 38–52.
- Jackson, T. (2009). *Prosperity without growth: economics for a finite planet*. London: Earthscan.
- Jenks, M., Burton, E. and Williams, K. (eds) (1996). *The compact city: a sustainable urban form?* London: E & FN Spon.
- de Jong, M., Wang, D. and Yu, C. (2013a). Exploring the relevance of the eco-city concept in China: the case of Shenzhen Sino-Dutch low carbon city. *Journal of Urban Technology* 20 (1), pp. 95–113.
- de Jong, M., Yu, C., Chen, X., Wang, D. and Weijnen, M. (2013b). Developing robust organizational frameworks for Sino-foreign eco-cities: comparing Sino-Dutch Shenzhen low carbon city with other initiatives. *Journal of Cleaner Production* 57, pp. 209–220.
- Jörby, S. A. (2002). Local Agenda 21 in four Swedish municipalities: a tool towards sustainability? *Journal of Environmental Planning and Management* 45 (2), pp. 219–244.
- Joss, S. (2011a). Eco-cities: the mainstreaming of urban sustainability; key characteristics and driving factors. *International Journal of Sustainable Development and Planning* 6 (3), pp. 268–285.
- Joss, S. (2011b). Eco-city governance: a case study of Treasure Island and Sonoma Mountain Village. *Journal of Environmental Policy & Planning* 13 (4), pp. 331–348.
- Joss, S., Kargon, R. H. and Molella, A. P. (2013). Editorial. *Journal of Urban Technology* 20 (1), pp. 1–5.
- Joss, S. and Molella, A. P. (2013). The eco-city as urban technology: perspectives on Caofeidian International Eco-City (China). *Journal of Urban Technology* 20 (1), pp. 115–137.
- Katz, P. (1994). *The new urbanism: toward an architecture of community*. New York; London: McGraw-Hill.
- Keeton, R. (2011). *Rising in the East—contemporary new towns in Asia*. Amsterdam: SUN Architecture.
- Kenworthy, J. R. (2006). The eco-city: ten key transport and planning dimensions for sustainable city development. *Environment and Urbanization* 18 (1), pp. 67–85.
- Kirkby, J., O’Keefe, P. and Timberlake, L. (1995). Sustainable Development: An Introduction. In: Kirkby, J., O’Keefe, P. and Timberlake, L. (eds) *The Earthscan reader in sustainable development*. London: Earthscan Publications, pp. 1–14.
- Kline, E. (2000). Planning and creating eco-cities: indicators as a tool for shaping development and measuring progress. *Local Environment* 5 (3), pp. 343–350.
- Kostof, S. (1991). *The city shaped: urban patterns and meanings through history*. London: Thames and Hudson.
- Lock, D. (2008). Eco-towns and planning processes. *Town and Country Planning* June 2008, pp. 260–261.
- Lye, L. F. and Chen, G. (2010a). Towards eco-cities in East Asia. In: Lye, L. F. and Chen, G. (eds) *Towards a liveable and sustainable urban environment: eco-cities in East Asia*. Singapore: World Scientific Publishing, pp. 1–18.
- Lye, L. F. and Chen, G. (2010b). Some thoughts on the development of eco-cities in Asia. In: Lye, L. F. and Chen, G. (eds) *Towards a liveable and sustainable urban environment: eco-cities in East Asia*. Singapore: World Scientific Publishing, pp. 57–90.
- May, S. (2008). Ecological citizenship and a plan for sustainable development—lessons from Huangbaiyu. *City: Analysis of Urban Trends, Culture, Theory, Policy, Action* 12 (2), pp. 237.
- McHarg, I. L. (1969). *Design with nature*. Garden City, N.Y.: Natural History Press.
- McManus, P. (1996). Contested terrains: politics, stories and discourses of sustainability. *Environmental Politics* 5 (1), pp. 48–73.
- Meadows, D. H., Meadows, D., Randers, J. and Behrens, W. H. I. (1974). *The limits to growth: a report for the Club of Rome’s project on the predicament of mankind*. London: Pan.
- Myllylä, S. and Kuvaja, K. (2005). Societal premises for sustainable development in large southern cities. *Global Environmental Change Part A* 15 (3), pp. 224–237.
- Nader, S. (2009). Paths to a low-carbon economy—the Masdar example. *Energy Procedia* 1 (1), pp. 3951–3958.
- Pow, C. P. and Neo, H. (2010). Building ecotopia: critical reflections on eco-city development in China. In: Lye, L. F. and Chen, G. (eds) *Towards a liveable and sustainable urban environment: eco-cities in East Asia*. Singapore: World Scientific Publishing, pp. 91–106.
- Pow, C. P. and Neo, H. (2013). Seeing red over green: contesting urban sustainabilities in China. *Urban Studies* 50 (11), pp. 2256–2274.
- PRP Architects Ltd., URBED and Design for Homes. (2008). *Beyond eco-towns applying the lessons from Europe: report and conclusions*. London: PRP Architects Ltd.

- Register, R. (1987). *Ecocity Berkeley*. Berkeley, CA: North Atlantic Books.
- Register, R. (2002). *Ecocities: building cities in balance with nature*. Berkeley, CA: Berkeley Hills Books.
- Rip, A. and Kemp, R. (1998). Technological change. In: Rayner, S. and Malone, E. L. (eds) *Human choice and climate change: resources and technology*. Columbus, Ohio: Battelle, pp. 327–399.
- Ritchie, A. and Thomas, R. (eds) (2009). *Sustainable urban design: an environmental approach*. Abingdon: Taylor & Francis.
- Roelofs, J. (2000). Eco-cities and red green politics. *Capitalism Nature Socialism* 11 (1), pp. 139–148.
- Romero Lankao, P. (2007). Are we missing the point? Particularities of urbanization, sustainability and carbon emissions in Latin American cities. *Environment and Urbanization* 19 (1), pp. 159–175.
- Roseland, M. (1997). Dimensions of the eco-city. *Cities* 14 (4), pp. 197–202.
- Saunders, T. (1997). Ecology and community design: lessons from Northern European ecological communities. In: Roseland, M. (ed.) *Eco-city dimensions: healthy communities, healthy planet*. Gabriola Island, B.C.: New Society Publishers, pp. 113–124.
- Shen, J. and Wu, F. 2012. Restless urban landscapes in China: a case study of three projects in Shanghai. *Journal of Urban Affairs* 34 (3), pp. 255–277.
- Shih-Shen, C. (2013). Chinese eco-cities: a perspective of land-speculation-oriented local entrepreneurialism. *China Information* 27 (2), pp. 173–196.
- Shwayri, S. T. (2013). A model Korean ubiquitous eco-city? The politics of making Songdo. *Journal of Urban Technology* 20 (1), pp. 39–55.
- Smith Morris, E. (2011). Down with eco-towns! Up with eco-communities. Or is there a need for model eco-towns? A review of the 2009–2010 eco-town proposals in Britain. In: Wong, T.-C. and Yuen, B. (eds) *Eco-city planning: policies, practice and design*. Dordrecht; London: Springer, pp. 113–130.
- Sorensen, A., Marcotullio, P. and Grant, J. (2003). Towards sustainable cities. In: Sorensen, André, Marcotullio, P. and Grant, J. (eds) *Towards sustainable cities: East Asian, North American, and European perspectives on managing urban regions*. Urban planning and environment. Aldershot: Ashgate, pp. 3–23.
- Spath, P. and Rohracher, H. (2011). The “eco-cities” Freiburg and Graz: the social dynamics of pioneering urban energy and climate governance. In: Bulkeley, H., Castan-Broto, V., Hodson, M. and Marvin, S. (eds) *Cities and low carbon transitions*. Routledge studies in human geography. London: Routledge, pp. 88–106.
- Surjan, A. and Shaw, R. (2008). “Eco-city” to “disaster-resilient eco-community”: a concerted approach in the coastal city of Puri, India. *Sustainability Science* 3 (2), pp. 249–265.
- Suzuki, H., Dastur, A., Moffatt, S., Yabuki, N. and Maruyama, H. (2010). *Eco2 cities: ecological cities as economic cities*. Washington, D.C.: World Bank Publications.
- The World Bank. (2009). *Sino-Singapore Tianjin eco-city: a case study of an emerging eco-city in China*. Washington, D.C.: The World Bank.
- Van Berkel, R., Fujita, T., Hashimoto, S. and Geng, Y. (2009). Industrial and urban symbiosis in Japan: analysis of the eco-town program 1997–2006. *Journal of Environmental Management* 90 (3), pp. 1544–1556.
- Voisey, H., Beuermann, C., Sverdrup, L. A. and O’Riordan, T. (1996). The political significance of Local Agenda 21: the early stages of some European experience. *Local Environment* 1 (1), pp. 33–50.
- Walter, B. (ed.) (1992). *Sustainable cities: concepts and strategies for eco-city development*. Los Angeles, CA: Eco-Home Media.
- White, D. F. (2006). A political sociology of socationatures: revisionist manoeuvres in environmental sociology. *Environmental Politics* 15 (1), pp. 59–77.
- Williams, K. (2009). Sustainable cities: research and practice challenges. *International Journal of Urban Sustainable Development* 1 (1), pp. 128–132.
- Wong, T.-C. (2011). Eco-cities in China: pearls in the sea of degrading urban environments? In: Wong, T.-C. and Yuen, B. (eds) *Eco-city planning: policies, practice and design*. Dordrecht; London: Springer, pp. 131–150.
- Wong, T.-C. and Yuen, B. (2011). Understanding the origins and evolution of eco-city development: an introduction. In: Wong, T.-C. and Yuen, B. (eds) *Eco-city planning: policies, practice and design*. Dordrecht; London: Springer, pp. 1–16.
- Wu, F. (2012). China’s eco-cities. *Geoforum* 43 (2), pp. 169–171.