

Constructing Ideologies and Valuing Nature in Two Eco-Cities

Introduction

Eco-city development is flourishing as the scale and scope of environmental damage becomes increasingly clear. While there are no standard criteria of what constitutes an eco-city, the term has been increasingly applied to a number of different projects that straddle a broad array of ideological and ecological goals. On the one hand, eco-city development represents a serious attempt to apply place-based pathways to environmental change, in particular as a strategy for adapting to climate change. However laudable these goals may be, eco-city development does not come without contradictions or complications, ecological or otherwise.

This chapter explores the changing social, political and economic processes that have complicated interrelations between people and nature in cities in the context of intensifying conditions of climate change. We do so by arguing that contemporary theories and practice of sustainability and urban ecology turn on ecological modernization narratives and practices (Fisher and Freudenburg 2001; Spaargaren and Mol 1992; Spaargaren *et al.* 2006; York and Rosa 2003; Young 2000). Moreover, we add that an urban ecological conceptual framework must take into account not only the complexity of urbanization processes but also conceptual accounts of the naturalization of nature embedded in ecological modernization narratives. We draw on two eco-city proposals, which we present as case studies for the example of contemporary ecology, sustainability and urban processes. The two eco-city proposals we examine include one located in Abu Dhabi in the United Arab Emirates and another one in Shanghai, China. Through both, we examine how ecological modernization narratives of environmental and urban development processes have shifted the narratives from ecological issues and sustainability to an examination of eco-cities, i.e., cities designed to be ecologically and economic responsible.

From ecology to eco-city: green-washing externalities

While the emergence of eco-cities is in itself not a new process, what is new about each of these projects is their social, political and economic contexts. Both emerge from politically authoritarian regimes, which may have made their development more feasible since the state completely controlled their development. Moreover, both of these eco-cities were supposed to be entirely zero-waste and carbon-neutral, and highly lauded in the global media. Most importantly, both failed in critical ways. Dongtan was never built (although there are still ongoing attempts to create an ecological institute on the site). Masdar is also in the throes of emerging failure (although in this case, the parallel Masdar Institute of Science and Technology-MIST- was built, and is a seemingly successful graduate research institution focused entirely on renewable energy and sustainable technology development, associated with the Massachusetts Institute of Technology-MIT). Consequently, despite the fact that both cities were planned in authoritarian states, where development would be closely controlled, the feasibility of each eco-city's existence is highly questionable.

Drawing upon our experiences in both Dongtan and Masdar and after conducting a survey of materials produced by the project proponents, we identified the serious gap in current theoretical approaches of the intersection of the urban and the ecological in the contemporary eco-city. Utilizing concepts derived from the fields of critical geography and political ecology, we argue that contemporary eco-city narratives present a new process of the consumption of nature that functionally segregate the social and political from the urban ecological.

In both Masdar and Dongtan, the evolution of the eco-city is wrapped in the ecological modernization narratives of sustainability, and ecological concern for the environmental crisis afflicting the planet and threatening its continued survival. Ecological modernization provides a set of concepts used to analyze environmental policies and institutions developed to solve environmental problems in a capitalist society (Spaargaren and Mol 1992). Central to the concept of ecological modernization is the idea that the ecological crisis can be overcome through modernization, that is to say, the efficiency of the market through economic growth, and technological development. For Spaargaren and Mol, the leading authors on ecological modernization, their concept replaces the loosely defined sustainability concept and advances the idea that society and environment can coexist alongside each other (Spaargaren and Mol 1992). Externalities such as pollution, critics such as Fisher and Freudenburg, Robertson, and Gomez-Baggethun explain, are incorporated into market schemes that are promoted as infrastructural projects such as wetland, biodiversity and carbon emission markets. Fisher and Freudenburg, add, that the strategy is to create a perceived internalization of externalities to create a “green” image (Fisher and Freudenburg 2001).

If the central metaphor of ecology is about “interconnected” systems, eco-cities metaphorically fail because they erase interconnectedness in one crucial sense: the eco-city is conceptualized as an enclosed space through which to measure ecological virtue (zero-waste, carbon neutral, etc). In sharp contrast to eco-city proponents who argue that the only way to measure inputs and outputs is through containing the eco-city into a particular place, theorists from urban socio-nature, radical geography, and political ecology reject the separation of the urban from the ecological. Thus, ultimately, embedded within the ideology of the eco-city lies the failure of the promises of the eco-city vision.

Valuing Urban Nature: Debates and Trends

Despite the valuable contributions to urban theory from social scientists, urban theory remains largely a separate area of study from the study of nature itself. As Matthew Gandy points out, this separation owes much of its rationalization to ideological considerations, rather than analytical ones, as societies exist within the context of a natural environment (Gandy 2002).

In tracing the trajectory of how the urban and the ecological have become an issue of primary concern to social scientists, a key global event marks this shift: the United Nations Conference on Sustainable Development held at Rio de Janeiro, Brazil in 1992 (Becker *et al.* 1999). Becker, Becker and Jahn suggest that the reason sustainability had not been properly researched by social scientists was because anything having to do with environmental concerns drew the attention of

physical scientists. While the term ‘sustainability’ along with the term ‘globalization’ emerged as the buzzwords of the decade in the 1990s, what they actually meant was not entirely clear. Despite the nature of the term ‘sustainability’, the term possesses an elusive definition. It serves, as Becker *et al* note, as a sketch more than as a framework for the development of guidelines aimed at conservation, protection and rehabilitation of natural resources (IPIECA 2007). Terms such as ‘smart growth’, ‘sustainable communities’ and ‘sustainable villages’, ‘green living’ emerged during this period, to signify the concern of local communities and international institutions such as the UN for the environment in urban areas.

The emergence of the concepts of sustainability that connect human processes to nature parallels the history of the study of ecological processes and ecosystems. To show how the linkages between human and nature come together in an urban area, we turn to the work of ecological economists. Their work helps us to conceptualize how nature acquires a quantifiable value through techniques of measurement and quantification and becomes part of an ideological economic construct that assigns a monetary value to nature. Of note is the work of Erik Gomez-Baggethun (2010) which traces the development of the theory and practices of the commodification of ecosystem services. This has taken many forms, but primarily is represented through regulations aimed at protecting the environment and the public. For example, the Clean Water Act has served as a conduit to establish a market place for Wetland Mitigation. The work of Robertson (2000), shows how the establishment of mitigation banks, where rights to wetland conservation, preservation and rehabilitation are exchanged for land development and mitigation rights in urban areas are used to ‘protect’ nature through its commodification. Moreover, the Clean Air Act has also served as a conduit to the establishment of a market for emissions. The sulfur market, established in the mid 1980s and aimed at reducing acid rain in the New England region of the United States (MacKenzie 2007), has served as the basis for current emission markets across the globe, the EU-ETS and most recently with AB 32 in California.

However, perhaps more importantly, Gomez-Baggethun’s work ties the movement and shift of the linkages of nature to humans through the changes in economic ideology. He argues: “...[t]he conceptualization of ecosystem services suggest that the trend towards monetization and commodification of ecosystem services is partly the result of a slow move from the original economic conception of nature’s benefits as use values in Classical economics to their conceptualization in terms of exchange values in Neoclassical economics.” (2010: 8) This transformation of ecosystem services has taken place through the valuation of nature in terms of the application of cost-benefits analysis. The standard definition for an ecosystem and ecosystem service is provided by the Millennium Ecosystem Assessment (MEA). The MEA defines an ecosystem as a dynamic complex of plant, animal and microorganism communities and the nonliving environment interacting as a functioning unit. Ecosystem services are defined as those benefits people obtain from ecosystems (Millennium Ecosystem Assessment 2005) Robertson (2007) traces how ecologists working for state agencies perform the uncertain tasks of measuring and quantifying nature for the ostensible purpose of preserving it for the public good. Rudolf de Groot’s (2002) criticism of the way ecosystem services work takes Robertson’s analysis further and shows how the economic valuation of nature proposed by environmental economists is too simplistic and riddled with contradictions. Instead, he proposes a valuation method that considers

ecological uses and benefits, socio-cultural uses of nature and economic quantification of market and non-market nature.

This overview of the debates about identifying an economic value for nature are relevant in terms of making gaining a clear understanding of the ideologies that underpin eco-cities particularly when the purpose is to “create value” of nature for the purpose of commercializing it as a natural “greening” process. In the next section of this chapter, we present two case studies of eco-cities that have been proposed for development. Each illustrates the disconnect between the purported goal of developing a city that is ecologically sound and the reality on the ground.

Dongtan

Dongtan eco-city was announced to great fanfare in 2003. Dongtan eco-city was to be located on Chongming Island near Shanghai in China and was to exemplify a “green” approach to urban design, architecture and infrastructure (including sustainable energy and waste management) and economic and business planning. Dongtan was supposed to house 500,000 people by 2050 and to be carbon-neutral, “zero-waste” and based entirely on renewable energy and to be built on ecologically sensitive wetlands that are famous as a stopping point for highly diverse bird species on their annual migration. Dongtan was a product of a transnational collaboration between institutional and individual actors in the United Kingdom and China, widely touted in its early days, as an example of “best practices” in global sustainability.

In 2005, Arup, a global planning, engineering and design firm based in London, announced that it was going to build Dongtan for the Shanghai Industrial Investment Corporation (SIIC), the investment arm of the Shanghai municipality and one of China’s largest real estate developers. Much of the global media coverage adopted Arup’s descriptions of Dongtan from the press releases, which claimed that: “Dongtan represents the quest to create a new world.” Laudatory articles, from *Wired* to *Science* extolled Dongtan’s model, which was supposed to represent a fundamentally different model for Chinese sustainable urbanism, which explicitly rejected a sequential view of economic development as a precondition for environmental protection. As of January 2011, Dongtan has not been built and its future prospects look grim. Before Dongtan’s spectacular flameout, the project was a big political affair (Sze and Zhou, 2011).

The ideologies of “natural capital” saturate Dongtan’s development discourse. In other words, what historically made Chongming Island “backward,” its natural and rural character, open space, under-development and lack of industry, are now considered the island’s main economic virtues and gives the Island its ecological value. The ecology and beauty of the island is –now- the source of its “natural capital” giving the area an economic value. The central premise behind Dongtan is based on the ideas of “natural capital” a concept taken from Hawken, Lovins and Lovins influential manifesto (1999) and which is an influential idea that undergirds Arup’s Dongtan plan. Arup’s concept is that the predominant views of nature under industrial capitalism

are as abundant but without value. However, new contexts of scarcity of natural resources transform this view of nature. Thus, companies who can recognize a new paradigm of valuing “natural capital” are positioned to profit in the contemporary political climate.

Dongtan is structured with an eye towards preserving the natural resources that are its setting. Dongtan is divided into two sections: first, an 86 square kilometer conservation area of farmland and aquaculture enclosed between the 1968 and 1998 dykes; and second, the exterior wetlands on the sea-side of the 1998 dyke. The wetland area exterior to the 1998 dyke was listed as a nationally protected area in 1992, and in 2001 became an Important Bird Area listed under the Ramsar Convention on Wetlands. While best known as a passage area for the critically endangered Black-faced Spoonbill, the Dongtan wetlands also provide passage for the Spotted Greenshank and winter grounds for the Hooded Crane (May, ADD CITE).

Arup’s master plan for Dongtan has a planning trajectory of 45 years and was intended to be completed in 2050. The plan provides 29 square meters of green space per person, more than 4 times the amount in Los Angeles and ensures that no place in the city is further than 540 meters from a bus stop. Dongtan’s ecological footprint is modeled as being less than half that of a typical Chinese city. Ninety percent of all waste is to be recycled; and 95% of all energy is to come from renewable sources. Biogasification of rice husks would supplement wind and solar power. Public transportation will be made viable by ensuring a density of 160 people per hectare. Only cars with zero tail-pipe emissions would be allowed inside the city; all others would have to be left in a parking lot on the edge of the development. Through the conversion of agriculture lands into parks, green roofs, and waterways, Arup projected that biodiversity will increase in the conservation area. The city of Dongtan would be formed through the integration of three towns, Marina Village, Lake Village, and Pond Village. Each town will feature a bi-focal town center system. Each town will have its own central downtown that will serve as a secondary medium-density area to a high-density town center at the periphery. In addition to the town and city plan, SIIC’s comprehensive master plan includes three leisure parks, each focused on a different theme: International Leisure Center—equine and water sports (Arup), New Energy Park—water sports and science education (Arup), National Wetland Park—water sports and vacation villas (Fleming). Marina Village and each of the three leisure parks were to be finished by 2010, and the Marina was to provide residence for 50,000 (May, ADD CITE)

Why, given the tremendous amount of energy, resources and excitement did Dongtan eco-city fail? Arup contends that the Dongtan project was “dead” but that the fate of Dongtan was not in its hands (Brenhouse). The most oft given explanation for its failure is political corruption. The other major reason given is that there was “confusion” about who was to pay for the project, Arup, or SIIC. In reality, Dongtan’s failure is tied to several factors specific to that project and the land in question (Sze and Zhou, 2011).

Although the future of Dongtan is in doubt, the idea of developing a modern eco-city is still alive and well in another part of Asia. As described previously in this chapter, Masdar in the UAE was the crown jewel of that nation's exhibit at the United Nations Conference of Parties 16 (COP16) in Cancun, Mexico in December 2010. In the following section we describe the Masdar project in greater detail.

Masdar

Masdar is a planned city in Abu Dhabi, in the United Arab Emirates being built by the Abu Dhabi Future Energy Company and designed by Foster + partners, led by the British-born Sir Norman Foster. The majority of seed capital for Masdar (amounting to \$22 billion USD) is from Abu Dhabi Future Energy Company, provided by the government of Abu Dhabi in the United Arab Emirates. The aim of Masdar, announced in 2006, is to be carbon-neutral, zero-waste, and car-free.

Scheduled for completion in 2016, once developed the population of Masdar will be 50,000 residents and it will be home to 1500 businesses. In its initial stages, the city's electricity will be from photovoltaics, concentrating solar power (CSP), and waste to energy. CSP plants currently produce electric power by converting the sun's energy into high-temperature heat using mirror configurations. The heat is then channeled through a conventional generator. Masdar also aims to divert 98% of its waste from landfills by 2020, working with a US based firm called EnerTech for a waste-to-energy facility that will produce biosolids, converted to renewable E-fuel for energy generation. Lastly, Masdar has a "Carbon Management Unit" that is in charge of developing CO₂ emissions reduction projects, such as carbon capture and storage (CCS) technologies, and the creation of a national CCS network for enhanced oil recovery. Masdar is also home to a hydrogen power plant (Crampsie).

Masdar received considerable international attention when the New York Times architectural critic, Nicholas Oussaroff, wrote a cover story in September 2010, which detailed how many early accounts of Masdar were a gimmick or fad. He writes of the considerable cynicism associated with a project focused on sustainability whose funding comes from oil wealth: "Well, those early assessments turned out to be wrong. By this past week, as people began moving into the first section of the project to be completed — a 3 ½-acre zone surrounding a sustainability-oriented research institute — it was clear that Masdar is something more daring and more noxious."

The more daring -the attention to local architectural tradition alongside the most high-tech innovation, the subordination of the car- are counterbalanced by what Oussaroff calls the "gated community mentality" obsessed with utopianism and the Disneyland-like experience. Much of that Disneyland experience can be captured in the contradictions of two central features of MIST (the only part of Masdar that has been built, as of early 2011): the elevation of MIST on a hill, and the submersion of the car underground. According to Oussaroff, "With the help of environmental consultants, Mr. Foster's team estimated that by combining such approaches (such as elevation of the site), they could make Masdar feel as much as 70 degrees cooler (2010).

The cars underground are tiny pods (Personal Rapid Transport System) that run on electric power drawn from batteries from solar energy, using high-tech chips and sensors keep the vehicles on the road and from hitting people.

Like Dongtan, Masdar has also failed to achieve certain timelines for its development, but for a different set of reasons than Dongtan. Due to the financial crisis, the rollout time was extended, and the cost reduced 10-15% (Haider, 2010). However, the project is still slated to move forward. As in Dongtan, the larger regional context is difficult to ascertain, if focus is just on the physical bounds of the Masdar site. For example, although the site is car-free, few people who work and even live in Masdar (at MIST) are completely car-free. According to one faculty member at MIST, the vast majority of the faculty drives from central Abu Dhabi (XX miles away), and some even from Dubai (over an hour and a half drive). That is in line with early estimates that at the project completion, over 60,000 workers will commute to the city from off-site, to join the 50,000 residents on the site.

At the 16th Conference of Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) in Cancun, Mexico held in November-December 2010, Masdar held a prominent place. At a conference aimed at establishing a global agreement on the reduction of green-house gas (ghg) to avoid the impacts of climate change, it is not unusual to see technologies such as wind, and solar being displayed alongside nature, in the form of tropical forests as ready made market solutions to abate climate change. The Masdar Eco-City display stood as a solution promoted by the UNFCCC and mainstream environmental groups for all countries to embrace as a solution to reduce fossil emissions; a space denaturalized of social, economic and political processes, instead focused on its technological advances and utopian qualities.

Conclusion

In this chapter, we have argued that the human-nature interaction in urban centers is centered upon the production of nature through various processes that, as noted by Gomez-Begathum and Gandy, changes with the evolving interest of the state. The two case studies we presented illustrate how ecological sustainability has been implemented and portrayed as urban utopias. Masdar and Dongtan are placed outside the traditional cities they are most affiliated with (Abu Dhabi, and Shanghai). In being placed outside the major cities to which they lay adjacent, the eco-cities reveal both they are - building something new and high-tech, but also their failing- that they are ultimately irrelevant to the vast majority of urban residents.

These cities are a manifestation of nature as capital sold to the affluent as naturalized spaces that fail to illustrate the politics that transform these into sanitized spaces. Masdar and Dongtan illustrate how discourses of ecology and design are naturalized, specifically around ecological modernization. Paradoxically, this naturalization of ecological and urban design discourses leave unexamined the social, political and economic variables that create the actual ecologies of the city (Gandy). Thus, these eco-cities essentially segregate ecology from the everyday workings of the actual city that spawns the eco-city in question, and ignore the political contexts of their creation.

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Reference Citations

Becker E, Jahn T, Stiess I (1999) Exploring Uncommon Ground: Sustainability and the Social Sciences. In: Sustainability and the Social Sciences: A Cross-Disciplinary Approach to Integrating Environmental Considerations into Theoretical Reorientation (eds. Becker, Jahn, Stiess). Zed Book, Ltd, London, UK

deGroot R S, Wilson M A, Boumans R M J (2002) A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecol Econ.* 41: 393-408

Fisher D, Freudenburg W (2001) Ecological modernization and its critics: assessing the past and looking towards the future. *Society and Natural Resources.* 14: 701-709

Gandy M (2002) Concrete and clay : reworking nature in New York City. MIT Press, Cambridge, Mass.

Gomez-Baggethun E, Groot R d, Lomas P L, Montes C (2010) The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes. *Ecological Economics.* 69: 1209-1218

International Petroleum Industry Environmental Conservation Association (2007) Climate Change: A Glossary of Terms. International Petroleum Industry Environmental Conservation Association, London

MacKenzie D (2007) The Political Economy of Carbon Trading. In: *London Review of Books* pp. 29-31. London Review of Books, London

Millennium Ecosystem Assessment (2005) Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC

Robertson M (2000) No Net Loss: Wetland Restoration and the Incomplete Capitalization of Nature. *Antipode.* 32: 463-493

Robertson M (2007) Discovering Price in All the Wrong Places: The Work of Commodity Definition and Price Under Neoliberal Environmental Policy. *Antipode.* 39: 500-526

Spaargaren G, Mol A P J (1992) Sociology, environment, and modernity: Ecological modernization as a theory of social change. *Society and Natural Resources.* 5: 323-344

Spaargaren G, Mol A P J, Buttel F H eds. (2006) Governing Environmental Flows: Global Challenges to Social Theory. The MIT Press, Cambridge, MA

York R, Rosa E A (2003) Key challenges to ecological modernization theory: Institutional efficacy, case-study evidence, uniots of analysis and the pace of eco-efficiency. *Organization and Environment.* 16: 273-288

Young S C (2000) Introduction: The Origins and Evolving Nature of Ecological Modernisation. In: The Emergence of Ecological Modernisation (ed. Young). Routledge, London, UK