1 Urban political ecology

Politicizing the production of urban natures

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It is in practice, hard to see where "society" begins and "nature" ends . . .
[I]n a fundamental sense, there is in the final analysis nothing unnatural about New
York City.

(Harvey 1993: 31, 28)

Urbanization as a process has constituted the city and the countryside, society and
nature, a "unity of opposites" constructed from the integrated, lived world of human
social experience. At the same time, the "urbanization of consciousness" constitutes
Nature as well as Space.

(FitzSimmons 1989: 108)

The "city" as a form of life is a specific, historically developed model of the regulation
of the societal relationship with nature . . .. [U]rban struggles are predominantly
socio-ecological struggles, since they are always about the social and material
regulation and socio-cultural symbolization of societal relationships with nature.

(Jahn 1991: 54 – translation Keil 1995)

INTRODUCTION

In the summer of 1998, the Southeast Asian financial bubble imploded. Global
capital moved spasmodically from place to place, leaving cities like Jakarta with a
social and physical wasteland where dozens of unfinished skyscrapers were dotted
over the landscape while thousands of unemployed children, women, and men were
roaming the streets in search of survival. In the meantime, El Niño's global dynamic
was wrecking havoc in the region with its climatic disturbances. Puddles of stagnant
water in the defunct concrete buildings that had once promised continuing capital
accumulation for Indonesia became great ecological niches for a rapid explosion
of mosquitoes. Malaria and Dengue Fever suddenly joined unemployment and
social and political mayhem in shaping Jakarta's cityscape. Global capital fused
with global climate, with local power struggles, and with socio-ecological
conditions to re-shape Jakarta's urban socio-ecological conditions in profound,
radical, and deeply troubling ways.

This example is just one among many to suggest how cities are dense networks
of interwoven socio-spatial processes that are simultaneously local and global,

human and physical, cultural and organic. The myriad transformations and metabolisms that support and maintain urban life, such as, for example, water, food, computers or hamburgers always combine infinitely connected physical *and* social processes (Latour 1993; Latour and Hermant 1998; Swyngedouw 1999).

The world is rapidly approaching a situation in which most people live in cities, often mega-cities. It is surprising, therefore, that in the burgeoning literature on environmental sustainability and environmental politics, the urban environment is often neglected or forgotten as attention is focused on "global" problems like climate change, deforestation, desertification, and the like. Similarly, much of the urban studies literature is symptomatically silent about the physical-environmental foundations on which the urbanization process rests. Even in the emerging literature on political ecology (see for example Walker 2005), little attention has been paid so far to the urban as a process of socio-ecological *change*, while discussions about global environmental problems and the possibilities for a "sustainable" future customarily ignore the urban origin of many of these problems. Similarly, the growing literature on the technical aspects of urban environments, geared primarily to planners and environmental policy makers, fails to acknowledge the intimate relationship between the antinomies of capitalist urbanization processes and socio-environmental injustices (Whitehead 2003). This book seeks to address this gap and to chart the contours of a critical academic and political project that foregrounds the urban condition as fundamentally a socio-environmental process.

We were faced with two major challenges while moving this intellectual project forward. First, there is a need to revisit the overtly "sociological" nature of much of twentieth-century urban theory. If we take David Harvey's dictum that "there is nothing unnatural about New York City" seriously, this impels interrogating the failure of twentieth-century urban social theory to take account of physical or ecological processes. While late-nineteenth-century urban perspectives were acutely sensitive to the ecological imperatives of urbanization, these considerations disappeared almost completely in the decades that followed (with the exception of a thoroughly "de-natured" Chicago school of urban social ecology). Re-naturing urban theory is, therefore, vital to urban analysis as well as to urban political activism. Second, most of environmental theory has unjustifiably largely ignored the urbanization process as both one of the driving forces behind many environmental issues and as the place where socio-environmental problems are experienced most acutely. The excavation of these processes also constitutes one of the central concerns of an evolving urban political ecology.

The central message that emerges from urban political ecology is a decidedly political one. To the extent that cities are produced through socio-ecological processes, attention has to be paid to the political processes through which particular socio-environmental urban conditions are made and remade. From a progressive or emancipatory position, then, urban political ecology asks questions about who produces what kind of socio-ecological configurations for whom. In other words, urban political ecology is about formulating political projects that are radically democratic in terms of the organization of the processes through which the environments that we (humans and non-humans) inhabit become produced.

As global/local forms of capitalism have become more entrenched in social life, there are still powerful tendencies to externalize nature. Yet, the intricate and ultimately vulnerable dependence of capital accumulation on nature deepens and widens continuously. It is on the terrain of the urban that this accelerating metabolic transformation of nature becomes most visible, both in its physical form and its socio-ecological consequences.

In this introductory chapter, we chart the contours of such an ambitious urban political ecological (UPE) perspective. Obviously, our perspective is filtered through our own critical theoretical lens and political sensitivities. In the first part, we explore how urbanization is very much a process of socio-metabolic transformations and insist that the re-entry of the ecological in urban theory is vital both in terms of understanding the urban and of engaging in a meaningful environmental politics. The second part suggests how critical theory, and in particular political economy, can and should be reformulated in a way that permits taking the environment politically seriously. The third part explores the implications of urban political ecology and frames the contributions that form the core of this collection. We consider the deeply uneven power relations through which contemporary "cyborg" cities become produced. Evidently, these uneven and often outright oppressive socio-ecological processes do not go uncontested. All manner of socio-ecological activism and movements have arisen that both contest the dominant forms of urbanizing nature and chart the contours for both transforming and democratizing the production of urban natures. In the final part of this introductory chapter, the structure of the book and the main lines of the contributions are briefly outlined.

THE CITY AS SOCIO-ECOLOGICAL PROCESS

Within the last couple of decades, theorization about human/environment relations has made substantial progress. In particular, a perspective that attempts to transcend the dualist nature/culture logic and the moral codes inscribed therein has replaced this crude binary ruling of city versus the environment. Critical to this progress has been the realization that the split between humanity and environment that first became prominent during the seventeenth century (Gold 1984) has long impeded understanding of environmental issues. Along these lines Swyngedouw (1999: 445) suggests that "[c]ontemporary scholars increasingly recognize that natural or ecological conditions and processes do not operate separately from social processes, and that the actually existing socionatural conditions are always the result of intricate transformations of pre-existing configurations that are themselves inherently natural *and* social". This had of course already been recognized by Marx more than 150 years ago, and only recently regained the attention it deserves, from Marxists and non-Marxists alike (Pulido 1996; Whatmore 2002; see Swyngedouw, this volume). While the notion that all kinds of environments are socially produced is not new, the idea still holds much promise for exploration, discussion and illustration. In his landmark book, Smith (1984: xiv) suggests:

> What jars us so much about this idea of the production of nature is that it defies the conventional, sacrosanct separation of nature and society, and it does so with such abandon and without shame. We are used to conceiving of nature as external to society, pristine and pre-human, or else a grand universal in which human beings are but small and simple cogs. But . . . our concepts have not caught up with our reality. It is capitalism which ardently defies the inherited separation of nature and society, and with pride rather than shame.

Despite often being neglected by urban studies, "environmental" issues have always been central to urban change and urban politics. Throughout the nineteenth century, visionaries of all sorts lamented the "unsustainable" character of early modern cities and proposed solutions and plans that would remedy the socio-environmental dystopias that characterized much of urban life. Friedrich Engels (1987 [1845]) had already noted in the mid-nineteenth century how the depressing sanitary and ecological conditions of England's great cities are related to the class character of industrial urbanization. Much later, Raymond Williams pointed out in *The Country and the City* (Williams 1985 [1973]) that the transformation of nature and the social relations inscribed therein are inextricably connected to the process of urbanization. Indeed, the urbanization process is predicated upon a particular set of socio-spatial relations that produce "an ecological transformation, which requires the reproduction of those relations in order to sustain it" (Harvey 1996: 94). The production of the city through socio-environmental changes results in the continuous production of new urban "natures", of new urban social and physical environmental conditions (Cronon 1991). All of these processes occur in the realms of power in which social actors strive to defend and create their own environments in a context of class, ethnic, racialized and/or gender conflicts and power struggles (Davis 1996).

The relationship between cities and nature has long been a point of contention for both environmentally minded social theorists and socially minded environmental theorists. Urbanization has long been discussed as a process whereby one kind of environment, namely the "natural" environment, is traded in for, or rather taken over by, a much more crude and unsavoury "built" environment. Bookchin (1979: 26) makes this point by suggesting that "[t]he modern city represents a regressive encroachment of the synthetic on the natural, of the inorganic (concrete, metals, and glass) on the organic, or crude, elemental stimuli on variegated wide-ranging ones". The city is here posited as the antithesis of nature, the organic is pitted against the artificial, and, in the process, a normative ideal is inscribed in the moral order of nature.

Although many view the notion of urban environmental landscapes as an oxymoron, Jacobs (1992 [1961]: 443) long ago already suggested that urban environments "are as natural as colonies of prairie dogs or the beds of oysters". David Harvey substantiates his claim that there is nothing intrinsically *unnatural* about New York City by suggesting that human activity cannot be viewed as external to ecosystem function (Harvey 1996: 186). "It is inconsistent", Harvey (1996: 187) continues, "to hold that everything in the world relates to everything

else, as ecologists tend to, and then decide that the built environment and the urban structures that go into it are somehow outside of both theoretical and practical consideration. The effect has been to evade integrating understandings of the urbanizing process into environmental-ecological analysis." The conclusion then that there is nothing unnatural about produced environments like cities, dammed rivers, or irrigated fields comes out of the realization that produced environments are specific historical results of socio-environmental processes. This scenario can be summed up by simply stating that cities are built out of natural resources, through socially mediated natural processes.

Lefebvre's take on the notion of "second nature" provides an often-neglected platform from which to discuss the social production of urban environments. Regarding the social production of urban environments, Lefebvre (1976: 15) suggests:

> Nature, destroyed as such, has already had to be reconstructed at another level, the level of "second nature" i.e. the town and the urban. The town, anti-nature or non-nature and yet second nature, heralds the future world, the world of the generalized urban. Nature, as the sum of particularities which are external to each other and dispersed in space, dies. It gives way to produced space, to the urban. The urban, defined as assemblies and encounters, is therefore the simultaneity (or centrality) of all that exists socially.

While perhaps relinquishing some of the inherent "natural" qualities of cities, e.g. water, vegetation, air etc., Lefebvre's explanation of second nature defines urban environments as necessarily socially produced and thus paves the way to understand the complex mix of political, economic and social processes that shape and reshape urban landscapes. In addition, for Lefebvre (as well as for Harvey or Merrifield (2002)), the urban constitutes the pivotal embodiment of capitalist or "modern" social relations, and, by implication, of the wider (and often global) socio-ecological relations through which modern life is produced, materially and culturally.

While landscape architects like Olmstead and Howard are often credited with "creating" urban natural landscapes, the metabolization of urban nature has a history as long as urbanization itself (Olmstead 1895). To this end, Gandy (2002: 2) suggests that "[n]ature has a social and cultural history that has enriched countless dimensions of the urban experience. The design, use, and meaning of urban space involve the transformation of nature into a new synthesis." Still, understanding the politicized and uneven nature of this urban synthesis should be the main task.

In capitalist cities, "nature" takes primarily the social form of commodities. Whether we consider a glass of water, an orange, or the steel and concrete embedded in buildings, they are all constituted through the social mobilization of metabolic processes under capitalist and market-driven social relations. This commodity relation veils and hides the multiple socio-ecological processes of domination/ subordination and exploitation/repression that feed the capitalist urbanization process and turn the city into a metabolic socio-environmental process that stretches from the immediate environment to the remotest corners of the globe. Indeed, the

apparently self-evident commodification of nature that fundamentally underpins a market-based society not only obscures the social relations of power inscribed therein, but also permits imagining a disconnection of the perpetual flows of metabolized, transformed and commodified nature from its inevitable foundation, i.e. the transformation of nature (Katz 1998). In sum, the environment of the city (both social and physical) is the result of a historical-geographical process of the urbanization of nature (Swyngedouw and Kaika 2000).

THE PRODUCTION OF URBAN NATURES

The importance of the social and material production of urban nature has recently emerged as an area of importance within historical-geographical materialist and radical geography (Benton 1996; Braun and Castree 1998; Castree 1995; Castree and Braun 2001; Gandy 2002; Grundman 1991; Harvey 1996; Hughes 2000; Keil and Graham 1998; Smith 1984; Swyngedouw 1996; 2004a,b; Desfor and Keil 2004). This presents an important departure away from the agrarian focus of much environmental history (see Worster 1993). While there is an important body of literature that focuses on urban environmental history (see Tarr 1996; Hurley 1997; Melosi 2000), urban political ecology more explicitly recognizes that the material conditions that comprise urban environments are controlled, manipulated and serve the interests of the elite at the expense of marginalized populations (Swyngedouw 2004a). These conditions, in turn, are not independent from social, political and economic processes and from cultural constructions of what constitutes the "urban" or the "natural" (Kaika and Swyngedouw 1999; Kaika 2005).

   The interrelated web of socio-ecological relations that bring about highly uneven urban environments as well as shaping processes of uneven geographical development at other geographical scales have become pivotal terrains around which political action crystallizes and social mobilizations take place. The excavation of these processes requires urgent theoretical attention. Such a project requires great sensitivity to, and an understanding of, physical and bio-chemical processes. In fact, it is exactly those "natural" metabolisms and transformations that become discursively, politically and economically mobilized and socially appropriated to produce environments that embody and reflect positions of social power. Put simply, gravity or photosynthesis is not socially produced. However, their powers are socially mobilized in particular bio-chemical and physical metabolic arrangements to serve particular purposes; and the latter are invariably associated with strategies of achieving or maintaining particular positionalities and express shifting geometries and networks of social power. This social mobilization of metabolic processes, of course, produces distinct socio-environmental assemblages. This book addresses exactly this mobilization and transformation of nature and the allied process of producing new socio-environmental conditions. Roger Keil (2003: 724) has recently summarized urban political ecology (UPE) as follows:

   [T]he UPE literature is characterized by its intensely critical predisposition; critical is defined here as the linking of specific analysis of urban environmental

problems to larger socio-ecological solutions. This necessitates, as a minimum, some modicum of indebtedness to radical and critical social theory. It is no coincidence then, that the emerging field of UPE has many of its multiple roots in the intellectual traditions of fundamental social critique: eco-Marxism, eco-feminism, eco-anarchism, etc. It is also, however, indebted to a neo-pluralist and radical democratic politics that includes the liberation of the societal relationships with nature in the general project of the liberation of humanity.

Nature and humans are simultaneously social and historical, material and cultural (Smith 1996; 1998a; Castree 1995; Haraway 1997). While an understanding of the changes that have occurred within urban environments lies at the heart of political-ecology research, they must be understood within the context of the economic, political and social relations that have led to urban environmental change. It is therefore necessary to focus on the political economic processes that bring about injustice and not only on the natural artefacts that are produced through these uneven social processes (Swyngedouw and Kaika 2000). The material production of environments is necessarily impregnated with the mobilization of particular discourses and understandings (if not ideologies) of and about nature and the environment.

The social appropriation and transformation of nature produces historically specific social and physical natures that are infused by social power relationships (Swyngedouw 1996). Things like commodities, cities, or bodies, are socio-metabolic processes that are productive, that generate the thing in and through the process that brings it into being. Social beings necessarily produce natures as the outcome of socio-physical processes that are themselves constituted through myriad relations of political power and express a variety of cultural meanings (Haraway 1991; 1997). In addition, the transformation of nature is embedded in a series of social, political, cultural, and economic social relations that are tied together in a nested articulation of significant, but intrinsically unstable, geographical configurations like spatial networks and geographical scales. Indeed, urban socio-ecological conditions are intimately related to the socio-ecological processes that operate over a much larger, often global, space.

Engels (1940: 45) spoke to the complexities inherent to these socio-ecological relations when he suggested that "[w]hen we consider and reflect upon nature at large . . . at first we see the picture of an endless entanglement of relations and reactions, permutations and combinations, in which nothing remains what, where, and as it was, but everything moves, changes, comes into being and passes away". The notion of "metabolism" is the central metaphor for Marx's approach to analyzing the dynamic internal relationships between humans and nature that produces socio-natural entanglements and imbroglios referred to by Engels. In the most general sense, "labouring" is seen exactly as the specifically human form through which the metabolic process is mobilized and organized (see Swyngedouw, this volume). This socio-natural metabolism is for Marx the foundation of, and possibility for, history, a socio-environmental history through which both the nature of humans and of non-humans is transformed. To the extent that labour constitutes the universal

premise for human metabolic interaction with nature, the particular social relations through which this metabolism of nature is enacted shape the form this metabolic relation takes. Clearly, any materialist approach insists that "nature" is an integral part of the "metabolism" of social life. Social relations operate in and through metabolizing the "natural" environment and transform both society and nature.

Under capitalist social relations, then, the metabolic production of use values operates in and through specific social relations of control, ownership, and appropriation, and in the context of the mobilization of both (sometimes already metabolized) nature and labour to produce commodities (as forms of metabolized socio-natures) with an eye towards the realization of the embodied exchange value. The circulation of capital as value in motion, then, is the combined metabolic transformations of socio-natures in and through the circulation of money as capital under social relations that combine the mobilization of capital and labour power. New socio-natural forms are continuously produced as moments and things in this metabolic process (see Grundman 1991; Benton 1996; Burkett 1999; Foster 2000). While nature provides the foundation, the dynamics of social relations produce nature's and society's history. Whether we consider the production of dams, the making of an urban park, the re-engineering of rivers, the transfiguration of DNA codes, the making of transgenic cyborg species like Dolly the cloned sheep, or the construction of a skyscraper, they all testify to the particular social relations through which socio-natural metabolisms are organized. Socio-ecological "metabolism" will therefore be one of the central material and metaphorical tropes that will guide the case-studies and other analyses presented in this book.

Political ecology, then, "combines the concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land-based resources, and also within classes and groups within society itself" (Blaikie and Brookfield 1987: 17). Furthermore, Schmink and Wood (1987: 39) propose that political ecology should be used to explain "how economic and political processes determine the way natural resources have been exploited". While these broad definitions lay a sound foundation from which to begin to understand urban political ecology, these concepts are in need of further elaboration and expansion (see Forsyth 2003). The processes of urbanization, while implicit in much geographical research, often tend to simply play the role of backdrop for other spatial and social processes. While there has been work done that helps us consider the spatial distribution of limited urban environmental resources (Gandy 2002; Swyngedouw 2004a), there does not exist a framework through which to systematically approach issues of uneven urban socio-ecological change, related explicitly to the inherent spatial patterns the distribution of environmental amenities take under urban capitalism. Such a framework is an important step towards beginning to disentangle the interwoven knots of *social process, material metabolism*, and *spatial form* that go into the formation of contemporary urban socionatural landscapes (Swyngedouw and Heynen 2003). This book seeks to present urban political ecology as a theoretical platform for interrogating the complex, interrelated socio-ecological processes that occur within cities (see also Kaika 2005).

THE URBANIZATION OF NATURE, SOCIO-ENVIRONMENTAL JUSTICE AND UNEVEN GEOGRAPHICAL DEVELOPMENT

In line with seeking out a synthetic understanding of urban environments, we must point out that the social forms of urban change have been of primary interest within urban geographic research (Gober *et al*. 1991). This work, however, neglects the fact that the processes of uneven deterioration that accompany urban socio-economic restructuring also contribute to changes in the ecological forms of urban areas more broadly. While environmental (both social and physical) qualities may be enhanced in some places and for some people, they often lead to a deterioration of social and physical conditions and qualities elsewhere (Peet and Watts 1996; Keil and Graham 1998; Laituri and Kirby 1994), both within cities and between cities and other, often very distant places. A focus on the uneven geographical processes inherent to the production of urban environments serves as a catalyst for a better understanding of socio-ecological urbanization.

Issues of social justice have also explicitly entered ecological studies, most visibly through the rubric of the environmental justice movement (Wenz 1988; Bullard 1990; Szaz 1994; Dobson 1999). As a result of the political mobilization that has occurred around many environmental issues, the environmental justice literature has evolved through political praxis and focuses on the uneven distribution of both environmental benefits and damages to economically/politically marginalized people. Because it comes from praxis as opposed to theoretically driven academic research, it provides a distinctly different context through which to understand urban human/environment interactions (see Bullard and Chavis 1993; Di Chiro 1996). Because it is a *movement* rather than a research program *per se*, it must explicitly appeal to a broad coalition of either environmentally minded or social justice minded groups, thus promoting the widespread dissemination of the struggles endured. However, although much of the environmental justice literature is sensitive to the centrality of social, political and economic power relations in shaping process of uneven socio-ecological conditions (Wolch *et al*. 2002; MacDonald 2002), it often fails to grasp how these relationships are integral to the functioning of a capitalist political-economic system. More problematically, the environmental justice movement speaks fundamentally to a liberal and, hence, distributional perspective on justice in which justice is seen as Rawlsian fairness and associated with the allocation dynamics of environmental externalities. Marxist political ecology, in contrast, maintains that uneven socio-ecological conditions are produced through the particular capitalist forms of social organization of nature's metabolism.

Henri Lefebvre reminds us of what the urban really is, i.e. something akin to a vast and variegated whirlpool replete with all the ambivalence of a space full of opportunity, playfulness and liberating potential, while being entwined with spaces of oppression, exclusion and marginalization (Lefebvre 1991 [1974]). Cities seem to hold the promise of emancipation and freedom whilst skilfully mastering the whip of repression and domination (Merrifield and Swyngedouw 1997). Perpetual change and an ever-shifting mosaic of environmentally and socio-culturally distinct urban ecologies – varying from the manufactured and manicured landscaped

gardens of gated communities and high-technology campuses to the ecological war-zones of depressed neighbourhoods with lead-painted walls and asbestos covered ceilings, waste dumps and pollutant-infested areas – still shape the choreography of a capitalist urbanization process. The environment of the city is deeply caught up in this dialectical process and environmental ideologies, practices and projects are part and parcel of this urbanization of nature process (Davis 2002). Needless to say, the above constructionist perspective considers the process of urbanization to be an integral part of the production of new environments and new natures. Such a view sees both nature and society as combined in historical-geographical production processes (see, among others, Smith 1984; 1996; 1998a; Castree 1995).

From this perspective, there is no such thing as an unsustainable city in general, but rather there are a series of urban and environmental processes that negatively affect some social groups while benefiting others (see Swyngedouw and Kaika 2000). A just urban socio-environmental perspective, therefore, always needs to consider the question of who gains and who pays and to ask serious questions about the multiple power relations – and the networked and scalar geometries of these relations – through which deeply unjust socio-environmental conditions are produced and maintained. This requires sensitivity to the political-ecology of urbanization rather than invoking particular ideologies and views about the assumed qualities that inhere in nature itself. Before we can embark on outlining the dimensions of such an urban political-ecological enquiry, we need to consider the matter of nature in greater detail, in particular in light of the accelerating processes by which nature becomes urbanized through the deepening metabolic interactions between social and ecological processes.

Urban political ecology research has begun to show that because of the underlying economic, political, and cultural processes inherent in the production of urban landscapes, urban change tends to be spatially differentiated, and highly uneven. Thus, in the context of urban environmental change, it is likely that urban areas populated by marginalized residents will bear the brunt of negative environmental change, whereas other, affluent parts of cities enjoy growth in or increased quality of environmental resources. While this is in no way new, urban political ecology is starting to contribute to a better understanding of the interconnected processes that lead to uneven urban environments. Several chapters in this book attempt to address questions of justice and inequality from a historical-materialist perspective rather than from the vantage point of the environmental justice movement and its predominantly liberal conceptions of justice. Urban political ecology attempts to tease out who gains and who loses (and in what ways), who benefits and who suffers from particular processes of socio-environmental change (Desfor and Keil 2004). Additionally, urban political ecologists try to devise ideas/plans that speak to what or who needs to be sustained and how this can be done (Cutter 1995; Gibbs 2002). In other words, environmental transformations are not independent of class, gender, ethnicity, or other power struggles. These metabolisms produce socio-environmental conditions that are both enabling, for powerful individuals and groups, and disabling, for marginalized individuals and groups. These processes precisely produce positions of empowerment and disempowerment. Because these relations

form under and can be traced directly back to the crisis tendencies inherent to neo-liberal forms of capitalist development, the struggle against exploitative socio-economic relations fuses necessarily together with the struggles to bring about more just urban environments (Bond 2002; Swyngedouw 2005). Processes of socio-environmental change are, therefore, never socially or ecologically neutral. This results in conditions under which particular trajectories of socio-environmental change undermine the stability of some social groups or places, while the sustain-ability of social groups and places elsewhere might be enhanced. In sum, the political-ecological examination of the urbanization process reveals the inherently contradictory nature of the process of socio-environmental change and teases out the inevitable conflicts (or the displacements thereof) that infuse socio-environmental change (see Swyngedouw *et al*. 2002a).

Within this context, particular attention is paid in this book to social power relations (whether material or discursive, economic, political, and/or cultural) through which socio-environmental processes take place and to the networked connections that link socio-ecological transformations between different places. It is this nexus of power and the social actors deploying or mobilizing these power relations that ultimately decide who will have access to or control over, and who will be excluded from access to or control over, resources or other components of the environment. These power geometries shape the social and political configurations under and the urban environments in which we live.

A "MANIFESTO" FOR URBAN POLITICAL ECOLOGY

Throughout this book, a series of common perspectives and approaches are presented. Although urban political ecology neither has, nor should have, a hermetic canon of enquiry, a number of central themes and perspectives are clearly discernible. We thought it would be useful to articulate these principles in sort of a ten-point "manifesto" for urban political ecology (see also Swyngedouw *et al*. 2002a,b). Although manifestos are not really fashionable these days, they never-theless often serve both as a good starting point for debate, refinement, and transformation, and as a platform for further research.

1   Environmental and social changes co-determine each other. Processes of socio-environmental metabolic circulation transform both social and physical environments and produce social and physical milieus (such as cities) with new and distinct qualities. In other words, environments are combined socio-physical constructions that are actively and historically produced, both in terms of social content and physical-environmental qualities. Whether we consider the making of urban parks, urban natural reserves, or skyscrapers, they each contain and express fused socio-physical processes that contain and embody particular metabolic and social relations.

2   There is nothing a-priori unnatural about produced environments like cities, genetically modified organisms, dammed rivers, or irrigated fields. Produced environments are specific historical results of socio-environmental processes.

The urban world is a cyborg world, part natural/part social, part technical/part cultural, but with no clear boundaries, centres, or margins.

3 The type and character of physical and environmental change, and the resulting environmental conditions, are not independent from the specific historical social, cultural, political, or economic conditions and the institutions that accompany them. It is concrete historical-geographical analysis of the production of urban natures that provides insights in the uneven power relations through which urban "natures" become produced and that provides pointers for the transformation of these power relations.

4 All socio-spatial processes are invariably also predicated upon the circulation and metabolism of physical, chemical, or biological components. Non-human "actants" play an active role in mobilizing socio-natural circulatory and metabolic processes. It is these circulatory conduits that link often distant places and ecosystems together and permit relating local processes with wider socio-metabolic flows, networks, configurations, and dynamics.

5 Socio-environmental metabolisms produce a series of both enabling and disabling social and environmental conditions. These produced milieus often embody contradictory tendencies. While environmental (both social and physical) qualities may be enhanced in some places and for some humans and non-humans, they often lead to a deterioration of social, physical, and/or ecological conditions and qualities elsewhere.

6 Processes of metabolic change are never socially or ecologically neutral. This results in conditions under which particular trajectories of socio-environmental change undermine the stability or coherence of some social groups, places or ecologies, while their sustainability elsewhere might be enhanced. In sum, the political-ecological examination of the urbanization process reveals the inherently contradictory nature of the process of metabolic circulatory change and teases out the inevitable conflicts (or the displacements thereof) that infuse socio-environmental change.

7 Social power relations (whether material or discursive, economic, political, and/or cultural) through which metabolic circulatory processes take place are particularly important. It is these power geometries, the human and non-human actors, and the socio-natural networks carrying them that ultimately decide who will have access to or control over, and who will be excluded from access to or control over, resources or other components of the environment and who or what will be positively or negatively enrolled in such metabolic imbroglios. These power geometries, in turn, shape the particular social and political configurations and the environments in which we live. Henri Lefebvre's "Right to the City" also invariably implies a "Right to Metabolism".

8 Questions of socio-environmental sustainability are fundamentally political questions. Political ecology attempts to tease out who (or what) gains from and who pays for, who benefits from and who suffers (and in what ways) from particular processes of metabolic circulatory change. It also seeks answers to questions about what or who needs to be sustained and how this can be maintained or achieved.

9 It is important to unravel the nature of the social relationships that unfold between individuals and social groups and how these, in turn, are mediated by and structured through processes of ecological change. In other words, environmental transformation is not independent from class, gender, ethnic, or other power struggles.

10 Socio-ecological "sustainability" can only be achieved by means of a democratically controlled and organized process of socio-environmental (re)-construction. The political programme, then, of political ecology is to enhance the democratic content of socio-environmental construction by means of identifying the strategies through which a more equitable distribution of social power and a more inclusive mode of the production of nature can be achieved.

DOING URBAN POLITICAL ECOLOGY

The fifteen chapters collected in this volume explore, both theoretically and empirically, the themes, perspectives, and politics that are central to an urban political ecological analysis. Although this collection by no means aspires to be exhaustive and discusses almost exclusively the "developed" world, it brings together a rich and multi-faceted scholarship that focuses on the fusion between the social and the natural in the process of urbanization. There are a number of themes and perspectives that run through the book and that, hopefully, provide a series of coherent arguments that contribute to define both the epistemological and methodological ground on which urban political ecology rests.

Two central tropes run throughout the book, metabolism and circulation. They are mobilized as guiding vehicles that permit casting urbanization as a dynamic socio-ecological transformation process that fuses together the social and natural in the production of distinct and specific urban environments. The politicization of socio-physical circulation and metabolism processes constitutes the core of our attempt to chart an urban political ecology and its associated politics of radical democratization. Needless to say, these two metaphors are deeply contested and historically constituted in their own rights. The contributors to this collection interpret them in their own specific way. While some focus on the materiality of socio-ecological metabolic and circulatory processes, others insist on the discursive and symbolic powers associated with the foregrounding of these metaphors and how this, in turn, shapes the "nature" of the urban imaginary and urban socio-environmental politics. All agree that the production of urban "nature" is a highly contested and contestable terrain.

In the first three chapters after this introduction, the contours of an urban political-ecological project are outlined. In chapter 2, Erik Swyngedouw insists on the powerful possibilities that the mobilization of a historical-materialist framing of "metabolism" and "circulation" holds for capturing the political-ecological dynamics of urbanization. Metabolic urbanization and the production of cyborg cities are the central figures through which urban political ecology is explored in this chapter. In chapter 3, Roger Keil and Julie-Anne Boudreau mobilize urban political ecology and the metaphor of metabolics to explore how Toronto's

recent urban politics and urban movements reshaped the urban agenda towards "environmentalism" in promising new directions. Matthew Gandy, in chapter 4, excavates the intricate and shifting relations between the historical dynamics of the urbanization of nature on the one hand and the transformations in ecological imaginaries on the other. All three contributions insist on the need to move away from reactionary ecological imaginaries of the past and to construct an environmental politics framed around the co-evolutionary dynamics of the social and bio-physical world. These introductory chapters provide a tapestry of the field of urban political ecology against which the other chapters of the book can be situated. In chapter 5, Eliza Darling's dazzling and whirlwind analysis of "nature's carnival" at Coney Island, New York reflects on the paradoxical carnivalesque staging of nature-as-play at the turn of the twentieth century. She explores how the tropes of nature continue to haunt urban space in an age of rapid industrialization and urbanization. For her, nature still constitutes spectacle in Gotham. From a different perspective, Stuart Oliver suggests, in his account of the disciplining of the river Thames in the UK in chapter 6, how cultural imaginaries, the desires of individuals, and the material conditions of river flows fuse together with economic imperatives in the making of a managed, engineered, and urbanized nature. The construction of distinct cultural-material urban environments is also explored in Robbins and Sharp's chapter on this quintessentially American urban nature, the lawn (chapter 7). Moving from Louis Althusser to organophosphates and back, they explore how the lawn produces a turf grass subject. Examining the array of linkages of the contemporary turf grass yard to chemical production economies and community values, they show how the lawn is a capitalized system that produces a certain kind of person, one who answers to the needs of community landscape. The fusion between the interests of the chemical industry and the constructed aesthetics of lawn-based suburbia explored in this chapter testifies to the intricate power relations, both symbolic and material, that operate at a variety of geographical scales but become materialized in the particular geographies of high-input lawns.

From the cyborg city, we move to the urban human body as the leitmotiv of chapters 8 and 9. The cyborg bodies of Nik Heynen in chapter 8 are those of the hungry, the marginalized bodies of the urban poor. The chapter charts their metabolic struggles in the context of a capitalist urbanization of food; a process that produces hunger as a socio-physical condition in the midst of the lush and abundant urbanized natures of US cities. Simon Marvin and Will Medd, in turn, excavate in chapter 9 the discursive and material politics of "fat" bodies in "fat" cities. For them, the urban metabolism and circulation of fat, both in the bodies of human as well as in the "body-work" of the city (sewers, and the like) is constructed as a threat to the circulatory and metabolic processes within bodies and cities alike. In an imaginative *tour de force* they combine the political-economy of fat with the politics of producing "lean" cities.

Chapters 10, 11, and 12 enter the political ecological metabolism of the city through the lens of water. Maria Kaika's engaging account of the politics of drought and scarcity in Athens evokes the mechanisms through which the urbanization of nature becomes an integral part of the politics and power relationships that drive

the urbanization process. She suggests how the political-economy of urbanization in Athens operates, among others, in and through the interweaving of discursive and material practices with respect to the urbanization of nature, and, in particular, of water. The contested politics of urban water circulation are simultaneously the arena in which and means through which particular political-economic programmes are pursued and implemented. The geographical strategies of competitiveness and water control are also broached by Alexander Loftus who analyses in chapter 11 how the political ecology of Durban's waterscape has increasingly come to embody the contradictory tendencies of capitalism. The local waters of the city constitute a sphere in which a commercialized state entity has attempted to ensure its profitability, through fencing in something formerly considered to reside outside of capital's orbit. Simultaneously, this entity has tried to expand its operations throughout the southern hemisphere – but failed dismally. In chapter 12, Laila Smith and Greg Ruiters focus their analysis of urban water in South Africa on the choreography of public/private governance. They consider how the part-privatization of water delivery services affects the state/citizen relationship and the associated transformations in power choreographies.

The final part of the book explores socio-ecological urban politics and governance further. In chapter 13, Alec Brownlow delves into Philadelphia's contested politics to fuse a fragmented "environmentalism" with a competitive entrepreneurial strategy in the struggle to "clean-up" Philly's industrial legacy. He considers how entrepreneurial and inherited narratives of nature are both products of and responses to earlier industrial fragmentations. He shows how the new urban fragmentations and narratives of neo-liberal urbanism – be they "new" discourses of nature and eco-modernization or regimes of urban ecological governance – articulate themselves with the inherited ecologies and social geographies of the industrial city. In chapter 14, David Pellow takes the argument global. He insists that the pollution of urban areas is not fundamentally distinct from the despoliation of rural spaces because they are part of the same process and reflect the urbanization of nature on a global scale. Cities in the Global North are the point of origin for many of the world's toxic wastes. He explores the nature of activism among Global North Environmental Justice (EJ) organizations in order to construct a profile of the transnational EJ movement that combines an emphasis on challenging discursive and structural practices with sensitivity to the material and political relations between local tactics and global strategies. He also examines the changing contours and scales of urban environmental justice politics in light of the growth of transnational activism. In the final chapter, Stephen Graham chillingly explores the geo-politics of targeting urban metabolisms in new forms of warfare. In military tactics, attacking the metabolic live lines of big cities has become a "vital" and extraordinarily effective strategy of warfare. At the time of writing these lines, water distribution and electricity delivery were still not fully restored in Baghdad after they had been taken out "surgically" during the first days of the Iraq war. With the massive technical infrastructure that sustains urban metabolism becoming the target of increasingly sophisticated strategies of political violence, this chapter seeks to probe into the political ecology and political economy of forced de-modernization. That is, it

explores the deliberate targeting of the "transformation of Nature into City" as a strategy of political violence. Graham analyses how the deliberate targeting of urban technics in political violence impacts on the political ecologies and urban metabolisms of targeted cities.

URBAN POLITICAL ECOLOGY: TOWARDS THE DEMOCRATIC PRODUCTION OF CYBORG CITIES

In sum, this collection seeks to suggest how urban political ecology provides an integrated and relational approach that helps untangle the interconnected economic, political, social and ecological processes that together form highly uneven urban socio-physical landscapes. Because the power-laden socio-ecological relations that go into the formation of urban environments constantly shift between groups of human and non-human actors and of spatial scales, historical-geographical insights into these ever-changing urban configurations are necessary for the sake of considering the future evolution of urban environments. An urban political ecological perspective permits new insights in the urban problematic and opens new avenues for re-centreing the urban as the pivotal terrain for eco-political action. To the extent that emancipatory urban politics reside in acquiring the power to produce urban environments in line with the aspirations, needs, and desires of those inhabiting these spaces, the capacity to produce the physical and social environment in which one dwells, the question of whose nature is or becomes urbanized must be at the forefront of any radical political action. And this is exactly what the contributions in this book attempt to illuminate. They also endeavour to open up a research agenda and a political platform that may set pointers for democratizing the politics through which cyborg cities are produced as both enabling and disempowering sites of living for humans and non-humans. "Urbanizing" the environment, therefore, is a project of social and physical environmental construction that actively produces the urban (and other) environments that we wish to inhabit today.

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