3. Urban political ecologies *of* and *in* the city
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3.1 INTRODUCTION

Urban political ecology (UPE) has been approached from multiple theoretical and methodological fronts, deploying conceptual and root metaphors such as metabolism, cyborgs and assemblage to understand the complex socio-spatial processes of urbanization. At a time when the impacts of the 'urban century' can be felt across the globe, the insights of UPE offer timely and important insights into contemporary urbanization (Heynen, 2014). However, as urban political ecology has sought to seriously engage with the socionatural causes and consequences of planetary urbanization (Brenner, 2013; Merrifield, 2013; Derickson, 2015), the field has struggled, both methodologically and conceptually, to understand the city on the one hand, as *a site of study* and on the other, as a *site that is part and parcel of a larger process of urbanization* – one that engulfs city and countryside. In the words of Rademacher (2015, p. 137), 'How do we conceptualize the city as a field site when urbanization encompasses the full spatial continuum from city to countryside?'

In this chapter, we distinguish between 'UPE *of* the city' and 'UPE *in* the city' as a way to delineate this contradiction within UPE. For some scholars urbanization is a global condition that has subsumed the boundaries of town, city, metropolis and territory through an extended urban fabric that operates at a planetary scale (Amin and Thrift, 2002; Lefebvre, 2003; Merrifield, 2013; Brenner and Schmid, 2014). In contrast, others seek to develop more situated understandings of the interactions between urbanization, the environment and knowledge and power within different places (Roy, 2005; McFarlane, 2010; Lawhon et al., 2013). We borrow our distinction of these two frames from Grimm et al. (2000) and Pickett et al. (2001) who use 'ecology in the city' and 'ecology of cities' to identify two contrasting approaches in the study of urban ecological systems. In their formulation, ecology in the city focuses on the physical environment (e.g. soils, urban hydrology, the distribution of plants and animals, urban heat island, air pollution and exotic-native species interactions). In contrast, the 'ecology of cities' takes a more systems-oriented approach that considers the ecology in cities, but also includes topics such as socio-economic drivers of urban ecological change and the impacts of

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urban systems beyond their borders through in-depth studies of resource flows, urban ecological footprints and urban land teleconnections. What distinguishes these two approaches is the focus on ecological processes within cities versus framings that attempt to incorporate global urbanization processes. We suggest UPE has a similar tension of seeking to expand its scope, but also situate it within local contexts.

The next section overviews the roots of UPE. We then discuss the two approaches (UPE *in* the city and UPE *of* the city) by using examples from the literature to characterize each. In doing so, we do not advocate for one approach over the other, nor do we suggest a rigid dichotomy between these approaches, which have fluid boundaries. Rather, we seek to stimulate discussion on the methodological and analytical focus of the field and its potential across places, territories and scales. The chapter concludes by identifying future avenues for UPE research.

3.2   ORIGINS OF UPE

Urban political ecology is a diverse field with an intellectual history rooted in the traditions of cultural and political ecology, environmental justice and urban geography among other disciplines and subfields. Political ecology, as a distinct subfield, emerged as an outgrowth of human and cultural ecology to explore the 'concerns of ecology and a broadly defined political economy' (Blaikie and Brookfield, 1987, p. 17). UPE shares many of the primary tenets of political ecology, such as a dialectical understanding of nature and society, but stems from a tradition that takes its starting point from Neil Smith's (1984) 'production of nature' thesis and David Harvey's (1996, p. 186) proposition that there is nothing unnatural about cities (Heynen et al., 2006; Loftus, 2012).

Neil Smith (1984, p. xv) begins *Uneven Development* by stating that the book 'represents the meeting of two types of intellectual investigation,' specifically the 'archaic conception of nature that dominates western thought' and the processes of uneven development in North American cities. Through the concept of the 'production of nature,' his seminal book seeks to integrate the two concerns. Drawing upon the work of Henri Lefebvre (1991) and his concept of the 'production of space', Smith argues that nature is socially produced and that nature is increasingly becoming a product of capitalist social relations. Empirical examples include the processes of capital accumulation in urban water provision (Loftus, 2006), the commodification of urban nature and the production of uneven urban greenspace (Keil and Desfor, 2003; Heynen et al., 2006) and the transformation of urban environments wrought by ecological moderniza-

tion (Desfor and Keil, 2004) among many others. Smith's work offered a key intervention into debates on capitalism and nature in geography and brought a Lefebvrian conception of urbanization that offered scholars insights into the social production of urban environments.

Harvey's (1996) contribution to the establishment of UPE includes his theorizations on how cities are 'created ecosystems' – ones shaped by social power and the circuits of capital. These theorizations illustrate the processes perpetually [re]creating the city and firmly situated social and environmental change in dialectical terms. For Harvey (1996), created ecosystems are representative of the social systems that gave rise to them and are adapted forms of 'second nature'. Through this lens, cities are interpreted as a part of nature formed through a constantly shifting and dialectical relationship of continuous social and ecological transformation. This leads to his famous assertion, 'there is nothing unnatural about New York City and sustaining such an ecosystem even in transition entails an inevitable compromise with the forms of social organization and social relations which produced it' (Harvey, 1996, p. 186). In other words, human activity cannot be viewed in isolation to the environment, but instead as co-produced.

Emerging during the same period as the work by Smith and Harvey was a strand of scholarship that began engaging with the untidy categories of the city and countryside. Cronon (1991), for example, linked the growth of Chicago to the natural resource wealth of its hinterland and in doing so disrupted the taken for granted categories of the urban and the rural. Cronon's approach is not in opposition to the approaches advocated by Smith and Harvey, but as Harvey (1996, p. 187) notes, 'translates and extends' Smith's thesis through an historical geographical analysis of commodity exchange and capital accumulation that transformed Chicago and the West. Also exemplary in this regard is Matthew Gandy's (2002) work on the social-ecological history of New York City. Gandy shows how the engineering structures extending out from New York City formed a metabolic system transcending urban and rural space – one driven by powerful interests to open up markets, increase economic efficiency and provide new spaces for capital accumulation.

The emergence of UPE also coincided with the increasing influence of post-structural theory within political ecology (and geography more broadly). It brought attention to the role of social power in knowledge production and in discursive struggles over the meanings and practices of 'nature' (Escobar, 1995; Peet and Watts, 1996; Grove, 2009). In particular, concepts from post-structuralism, such as hybrids, cyborgs and assemblages shaped key UPE interventions with respect to advancing understandings of the uneven urbanization of socio-natural relations

(Swyngedouw, 1996; Gandy, 2005; Heynen et al., 2006). Swyngedouw (1996, 2004), for example, deftly interlinked post-structural and Marxist political-economy by charting the hybrid socio-natural relations that urbanize water and animate its politics. Through these empirical and theoretical interventions, urbanization came to be understood as a metabolic process – dissolving the boundaries between the social and the material world through the production of 'cyborg' cities (Gandy, 1999, 2005).

Collectively, these approaches helped establish the field of UPE. The majority of theoretical approaches are still indebted to Marxist and Lefebvrian inspired theorizations on the 'production of nature' and 'created ecosystems'. Scholars, however, have continued to refine the theoretical and empirical focus of the field. Evident in Swyngedouw's (1996) early theorizations of UPE, efforts continue to bring the analytical strengths of actor-network theory (ANT), post-structuralism and Marxist UPE into conversation (Castree, 2002; Lawhon et al., 2013; Ranganathan, 2015). Although such an approach is subject to debate among urban political ecologists (Holifield, 2009), we see the continued cross-fertilization and integration of concepts from ANT, science and technology studies and other disciplines into UPE as an important interdisciplinary project. One that empirically and theoretically explores how cities are metabolic assemblages – hybrids of human and nonhuman actors and actants (Castán Broto et al., 2012; Newell and Cousins, 2015). While there is still room in UPE to embrace a broader range of theoretical approaches (Grove, 2009; Gabriel, 2014; Heynen, 2014; Cousins, 2017), these efforts have shunned dualist conceptions of nature and society in favor of representing urbanization as a dynamic process metabolizing both human and nonhuman inputs, unevenly producing new socio-spatial formations as an output.

3.3   URBAN POLITICAL ECOLOGY *IN* THE CITY

When political ecology came to the city it brought with it an understanding of urbanization as a socio-natural process that rendered urban environmental injustice and inequality political. Much of the UPE literature, however, has treated the city as a specific socio-natural artifact produced through the metabolization of nature (Swyngedouw and Heynen, 2003; Newell and Cousins, 2015). While scholars have accused UPE of 'methodological cityism' by privileging the *city as site* over *city as process* (Angelo and Wachsmuth, 2015), we suggest UPE *in* the city as a means to clarify the analytical focus and purpose, of studies empirically drawing on those sites traditionally demarcated as 'cities'. The aim is not to ignore the uneven and variegated patterns of planetary urbanization, but rather

address methodological questions concerning 'second wave' UPE. UPE *in* the city is characterized by a focus on individual and comparative case studies that focus on the politics of urban nature occurring within cities. These studies are vital for producing exemplars around which UPE can advance understandings of urban ecological change (Flyvbjerg, 2016). A common thread running through this scholarship is a focus on environmental justice, which has provided an important frame to reveal the distributional inequalities wrought by socioeconomic disparities that underlie socio-natural relationships locally. While environmental justice concerns are also shared within the framework of UPE *of* the city, this set of scholarship acknowledges the multi-scalar urban worlds in which environmental injustices are embedded, but are typically retained to a particular site and locality (Debbané and Keil, 2004). The empirical focus centers on the location where an event of environmental injustice occurs.

The following paragraphs highlight key examples and fields of inquiry that characterize UPE in the city. This is not an exhaustive list. Rather it is representative of some of the dominant scholarship that characterizes UPE in the city – a focus on the questions of democracy, governance and the politics of everyday life in cities (Keil, 2003).

3.3.1   Trees, Parks and Gardens

Investigations into the distribution of and access to trees, parks and gardens has provided a key entry-point for urban political ecologists to understand the socio-natural processes of urban environmental change. The work by Nik Heynen and his colleagues has proven to be highly influential (Heynen and Perkins, 2005; Perkins et al., 2004; Heynen et al., 2006). They have used inner-city case studies to link variables such as median household income, housing-market characteristics and racial and ethnic factors to changes in urban canopy cover to argue that the uneven spatial distribution of the urban forest presents a form of urban environmental inequity. While it has to be noted that trees may not always present a universal environmental good across space and time (Kitchen, 2013), the urban forest continues to be a concern of urban political ecologists engaging with issues of environmental justice and neoliberalism at the city scale (Njeru, 2013). Similarly, parks have become an object for geographers to explore the socio-ecological role of urban parks (Byrne and Wolch, 2009), how parks are enrolled into the discursive formation of the industrial city (Gabriel, 2011) and the challenges of making cities 'just green enough' (Wolch et al., 2014). Likewise, urban agriculture and gardens have proven to be fertile ground to explore the socio-natural production of urban space and the right to the city (Shillington, 2013), the subversive practices of

foraging in urban green spaces (McLain et al., 2014) and the discursive and material practices through which urban gardens became antithetical to normative conceptions of urban space (Moore, 2006).

3.3.2.   Garbage and Waste

Issues of garbage and waste also figure prominently into modernization efforts to bring cleanliness and order to cities in both the Global North and the Global South (Melosi, 2000; McFarlane, 2008; Gandy, 2013). In the Global North urban political ecologists have brought attention to how discourses on public health have shaped the infrastructural systems of the modern city to rid the city of waste and disease (Gandy, 1999). The politics of producing the 'sanitary city' in the Global South have examined the public health discourses that cast sanitation as a political, economic and social-ecological process that re-worked urban infrastructures unevenly across spatio-temporalities (McFarlane, 2008). Issues such as the politics of garbage have also brought attention to how the sociopolitical processes that marginalize groups may also create the conditions to leverage political power and shape new trajectories of socio-environmental change (Moore, 2008). Nonetheless, the social and environmental impacts of waste, when placed in their broader historical and political economic context, are shown to unevenly flow across urban space, producing environmental injustices (Njeru, 2006; Yates and Gutberlet, 2011).

3.3.3   Risks and Hazards

Research into environmental risks and hazards has a long history in political ecology and while exposure to garbage and waste can certainly be considered an environmental hazard, work in this vein investigates biological and biophysical aspects of risk and vulnerability such as floods, fires, pollution and disease. The scholarship utilizes a localized event or exposure to a risk as its starting point to explore urban nature-society relations in the city. For example, Simon and Dooling (2013) use the, 1991 Oakland Hills Firestorm or Tunnel Fire to show how a disconnect between the material and political forms of vulnerability produced a landscape where homes are vulnerable to wildfires. The fire destroyed more than 3,000 homes and is considered California's largest urban wildfire in terms of homes lost, but the production of vulnerability was an outcome of legacies of timber extraction, real estate speculation, suburbanization and disinvestment at a city-scale. Similarly, Collins (2010) uses a case study of the, 2006 El Paso-Ciudad Juarez flood disaster to argue that unequal risk to the floods is an outcome of marginalization and facilitation that shifts exposure to

risk from elite and powerful actors to the poor and vulnerable. Like floods or fires, urban air pollution policies in Delhi, India are also shown to be driven by the environmental interests and values of an influential middle class that consequently displaces various forms of pollution and poorer urban residents spatially (Véron, 2006).

UPE in the city has also focused heavily on the politics of urban nature within the city through explorations of the political imaginaries of planners, developers and residents that drive urban transformations. As Gabriel (2014, p. 40) notes urban imaginaries have long been a focus of UPE to demonstrate the role of discourses in shaping urban landscapes, subjects and practices. Hagerman (2007), for example, examined the discourses of livability shaping the urban imaginaries of planners and developers who articulated waterfront redevelopment as a way to reconnect the city with nature. Kear (2007), similarly explored the political visions seeking to produce nature on Vancouver's waterfront through images of ecology, leisure and livability that have been 'shaped around the consumption preferences of professionals in a service economy' (Kear, 2007, p. 327). While these themes are certainly connected to a political ecology of gentrification (Quastel, 2009) and sustainable urbanism more broadly, they also shed light on the relationships between the natural, social and the technological aspects of urban spaces and natures (Domínguez Rubio and Fogué, 2013). In effect many of these discourses and imaginaries are shown to re-inscribe the ontological division between the urban and natural, whether through representations of urban blight (Millington, 2013) or sustainability initiatives such as urban growth policy (Huber and Currie, 2007). Collectively, this set of scholarship reveals the 'meanings and practices of nature and the city that shape identities that make some forms of urban metabolisms possible while foreclosing others' (Grove, 2009, p. 209).

3.4   URBAN POLITICAL ECOLOGY *OF* THE CITY

For urban researchers to understand the social, economic and ecological aspects of urbanization, the global linkages of urbanization must be connected. This is not a city-centric version of political ecology, but rather one where urbanization has consumed both 'city' and 'countryside' into a complex metabolic system. Urbanization, as perhaps the feature of the Anthropocene, has global impacts that link the global flows of capital and commodities with the quotidian practices of everyday life (Loftus, 2012; Wachsmuth, 2014). Here the case studies focus on the global production networks, commodity flows and infrastructural systems that create an extended landscape of urbanization. These types of theorizations are a

critical component of efforts to urbanize political ecology as part of a 'second wave' of research that seeks to expand the conceptual focus of UPE beyond the city proper (Heynen, 2014). This branch of UPE scholarship has been successful in tracing the metabolisms, resource flows and global assemblages that organize urbanization at a variety of scales.

3.4.1 Metabolisms, Resource Flows and Global Assemblages

The urban metabolism concept has been highly influential in UPE as a means to capture the dynamic and networked flows of goods and materials that form uneven social-ecological systems. The metaphor is useful for highlighting two important aspects of urbanization: transformation and circulation. Through this lens scholars have been able to reveal how the circulation of goods, resources, capital and commodities flow into and out of cities; simultaneously transforming both the city and its hinterland (Cronon, 1991; Newell and Cousins, 2015). This line of work eschews an urban-rural divide and seeks to connect the multiple spatialities under which planetary urbanization operates. Investigations into water infrastructures has been particularly revealing in this regard. Cousins and Newell (2015), for example, capture the flow of flows entangled in Los Angeles's water-energy nexus to reveal the networked impacts of urban metabolisms on ecologies, peoples and places both inside and outside of the 'city'. Domènech et al. (2013) also break down the binary between city and countryside by revealing how two apparently different struggles over water in urban and rural Nepal are connected by an urban metabolism that unevenly distributes benefits and impacts. Then there is Gandy's (2002) and Swyngedouw's (2004) classic work on New York City and Guayaquil, Ecuador to demonstrate how nature is transformed by and enrolled into the political and socio-economic practices that shape metabolic relationships between nature and society and city and countryside. Collectively, this research reveals an extended landscape of urbanization that channels the flow of flows across space.

Similarly, there is strand of research exploring rural geographies in explicitly relational terms. Understood as the urbanization of the countryside (McCarthy, 2008) exurbanization and amenity migration (Walker, 2003; Cadieux and Hurley, 2011), megapolitan political ecology (Gustafson et al., 2014) or the gentrification of the countryside (Phillips, 2004) these scholars demonstrate how urban-rural flows are intertwined. The 'city' and the 'countryside' are not thought of as discrete entities, but instead are constituted by a metabolism that connects human and non-human elements across space and time. Whether 'urban' or 'rural', landscapes occupied for leisure or consumption are reflective of an 'urban

society' that structures new spatial forms at varied regional and eco-
logical scales (Lefebvre, 2003; Brenner, 2013; Newell and Cousins, 2015).
These processes have social and ecological consequences. Walker and
Fortmann's (2003) case of conflict over the politics rural landscapes under
transition, for example, bring forth how competing visions of landscapes
in so-called rural areas are intimately linked to ongoing urbanization in
California. Cadieux and Hurley (2011), similarly show how urban and
rural are entangled through amenity migration and changing trends in the
political economy of land and exurban land uses. The leisurescapes and
resorts urbanites escape to are seen and understood as no less urban, but
part of the urbanization of society.

Other productive avenues have drawn theoretical insights derived
from 'assemblage thinking' and the 'more-than-human' processes driving
urbanization (Braun, 2005, 2006). Much of this research takes ANT and
Deleuze and Guattari's notions of assemblage as theoretical starting
points to describe urbanization as a process that entangles nature and
society through multiple networks that stretch across space and time. The
goal is to come to a more distributive notion of agency that accounts for
the vital materialism of both humans and non-humans (Bennett, 2010).
Scholarship on infrastructure is revealing in this regard. Infrastructures
mediate resource flows and shape many of the social and technical process
that influence how urbanization unfolds. Work by Monstadt (2009),
Graham and Marvin (2001) and others, for example, has empirically and
theoretically illustrated how networked urban infrastructures bring social
and natural process into a relationship that influences how resources and
people flow and circulate across the globe. Power is understood to be dif-
fuse and relational, between human and non-human. As Bennett's (2005)
example of the North American blackout demonstrates, infrastructures
like the grid span beyond any single bounded location and is indeed an
assemblage of many human and non-human components, each exercising
their own agential capacities.

3.5   CONCLUSION

The rich and growing body of UPE scholarship reviewed here signals a
field poised to address the challenges of the Anthropocene. The field has
moved from 'first wave' concerns focused primarily on the production
of nature *in* cities to 'second wave' concerns that simultaneously seek to
expand and situate UPE (Heynen, 2014, 2016). Among the many future
directions UPE can take, we conclude by identifying two potentially
exciting avenues for future research.

First, how might we understand the situated, but evermore multi-sited and interconnected urban worlds we live in? Lawhon et al. (2013) suggests that an UPE with more distributed and situated notions of power rooted in everyday practices may offer a broader range of insights to understand how urban environments are formed and contested than the bulk of contemporary UPE scholarship. They offer examples from their experiences with African urbanism to situate how the everyday practices and subject formations of people mediate the ways materials flow in and through cities. The challenge, however, is how to address the disassociations and interconnections between Southern and Northern urbanisms without compromising theoretical and empirical rigor. The ethnographic work of Choy (2011) also offers a compelling way to understand the everyday lived experiences of people in a globally interconnected world. By focusing on the social practices centered on specification, exemplification and comparison in environmental advocacy he links local-global environmentalisms. Similarly, Anna Tsing's (2005) multi-scalar ethnographic work of supply chains that create 'frictions' around local-global knowledges and specificities offers a way to trace the global connections in an urbanized world.

Second, the emergence of interdisciplinary perspectives in UPE offer avenues to further urbanize political ecology. Pincetl et al. (2012) and Newell and Cousins (2015) have sought to expand urban metabolism and political ecology more broadly, by utilizing metabolism as a boundary metaphor to account for the social, political and ecological factors that shape how materials and energy flow. The development of political-industrial ecology, for example, leverages the disciplinary strengths UPE and industrial ecology to explore the material, political and economic mechanisms shaping the relationships between a product, commodity or material process, its primary inputs and outputs and the relevant social and ecological implications (Cousins and Newell, 2015, p. 41). The approach provides a relational way to map out the cartographic relationships between entities and to explore the qualities of goods, products, processes and other entities that operate on inputs producing outputs. As Cousins and Newell (2015) demonstrate, the urban water metabolism of Los Angeles is dependent on energy inputs for water to circulate and flow, but also requires industrial and infrastructural processes to pump, treat and distribute water and emits carbon as a primary output. Similarly, Guibrunet et al. (2016) illustrate how interdisciplinary perspectives allow urban political ecologists to engage with and politicize key concepts such as 'system boundaries' and 'flows' in areas of inquiry such as urban metabolism research. Leveraging both political and industrial ecology provides a compelling way forward to begin to think through the varied socio-ecological transformations wrought by urbanization. Finally, inter-

disciplinary research can reinvigorate old concepts in a 'second wave' of UPE, as well as infuse new insights, theories and approaches into the sub-field. Examining the political-industrial ecology of infrastructures and the situated political ecologies of urban environmental change offer just two of a body of promising methods and approaches to engage constructively across difference.

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