Urban Political Ecology

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Introduction
Urban Political Ecology (UPE) is a conceptual approach that understands urbanization to be a political, economic, social, and ecological process, one that often results in highly uneven and inequitable landscapes. Cities are not seen as the antithesis of nature but rather are a second nature, representing the dominant form of living in the contemporary age. Those drawing on UPE reject as false any dichotomy between nature and society. A central concern of much UPE scholarship has been in unpacking the ways that urbanization and cities rely on the transformation of biophysical matter into commodities and tracing the flows of these commodities into and through cities, understood as a metabolic process. Urban political ecologists argue that these processes cannot be understood in isolation but rather are deeply embedded in the social, political and economic systems that shape the context in which they develop. Thus a significant strand of research in this sub-field has focused on the infrastructural arrangements of capitalist modernity – particularly networked water. Urban political ecology scholarship is often characterized by a deeply historical and material understanding of the city and seeks to capture the multi-scalar process and relationships of power that shape urban landscapes. Reflecting the origins of this approach in Marxist urban geographies this analysis has often been underpinned by a broader critique of the ways that capitalist production shapes cities in deeply unjust and uneven ways. In recent years a subset of scholars are increasingly influenced by post-structuralist understandings of power and seek to illuminate how other forms of social power are (re)produced through the production of socio-natures. As the field has grown scholars have increasingly applied an UPE lens to the analysis of a range of resources including water, urban greenery, food, waste and other discards, sanitation, electricity, and climate change. This article proceeds by introducing the reader to the field more generally through progress reports, a selection of key early texts, and section on emerging conceptual and theoretical shifts in the field. The later part of the article is organized around socio-material objects of analysis, reflecting the deep utility of the field in analyzing concrete environmental phenomena and problems. The review presented here is

limited, with a few noted exceptions, to research that explicitly situates itself in conversation with UPE scholarship.

General Overviews - Urban Political Ecology Progress Reports
This set of papers are review papers and progress reports rather than research pieces. They provide a good overview of the literature and begin to map conceptual and analytical shifts in this rapidly evolving sub-field. The earliest reviews, by Keil 2003 and Keil 2005 map the field in its relative infancy and provide a good overview of the conceptual origins of UPE and the early works in UPE and related fields of inquiry, particularly those drawing on Marxist (Geographical) thought. The review by Zimmer 2010 already identified shifts in the field towards a greater focus on Southern cities and towards more actor-oriented approaches. In doing so she foreshadows the emergence of what Heynen 2014 refers to as the "second wave" of UPE, a body of research that engages with more local and everyday scales of analysis, drawing on post-structuralist and post-humanist perspectives. In his two following reviews Heynen 2015 and Heynen 2017 highlight what he sees as key areas of growth, evolution and engagement for UPE scholars – namely a more thorough engagement with ways that race, conditions of post-colony and indigeneity shape the reproduction of uneven urban natures, and how engagement with feminist and queer perspectives can illuminate further dimensions of inequality and power.

Heynen, Nik. 2014. "Urban political ecology I: The urban century." *Progress in Human Geography* 38 (4):598-604. doi: 10.1177/0309132513500443.
This report offers an overview of the evolution of the subfield. It identifies the emergence of a "second wave" of UPE theorizing that engages with post-humanist ontologies and addresses important methodological questions (see subsection **Challenging "methodological cityism" in Urban Political Ecology**) and intersectionality through feminist and post-structuralist approaches (see also *Feminist, Queer, and Decolonial Perspectives in Urban Political Ecology*). The paper also effectively captures the diversity of the sub-field that has elucidated the plurality of ways that social change and the urban environment are co-determined.

Heynen, Nik. 2015. "Urban political ecology II: The abolitionist century." *Progress in Human Geography*. doi: 10.1177/0309132515617394.
Heynen 2015 introduces the term "abolitionist ecology" to capture the potential for UPE to engage with postcolonial, anti-racist and indigenous theory in-order to explore how racialized processes leads to the (re)production of highly uneven and inequitable urban environments. In elucidating these processes the author sees scope for the identification of ways in which urban nature can be created free of white supremacist logics.

Heynen, Nik. 2017. "Urban political ecology III: The feminist and queer century." *Progress in Human Geography* 42 (3):446-452. doi: 10.1177/0309132517693336.
In this progress report Heynen 2018 explores the potential for UPE to draw on feminist and queer perspectives to broaden its intellectual horizons towards a more praxis oriented intellectual project. See also **Feminist, Queer and Decolonial Perspectives in Urban Political Ecology**.

Keil, Roger. 2003. "Urban Political Ecology: Progress Report." *Urban Geography* 24 (8):723 - 738.

> This article maps the early emergence of UPE as a distinct sub-field and traces the origins of the field. Usefully it identifies a number of researchers whose work broadly aligns with the key concerns of urban political ecology prior to the term and its conceptual underpinnings having wide-spread take up in the academic literature.

Keil, Roger. 2005. "Progress Report - Urban Political Ecology." *Urban Geography* 26 (7):640 - 651.

> A follow up to Keil 2003, this report continues to chart the emergence of UPE. The early dominance of North American and European case studies is evident in this report, as well as the early interest in water and urban green spaces (trees, lawns and parks). It also points to the emergence of key analytical concepts in UPE, including those of urban metabolism and cyborg urbanism.

Zimmer, Anna. 2010. "Urban Political Ecology. Theoretical concepts, challenges, and suggested future directions." *Erdkunde* 64 (4):343-354. doi: 10.3112/erdkunde.2010.04.04.

> This review piece provides a succinct overview of the basis of UPE thought and of key concepts in the subfield. Zimmer foreshadows a number of the future direction that the subfield would take by highlighting the need for: more focus on cities in non-industrial nations; the recognition of the diversity of socio-natural relationships in cities and the presence of a plurality of urban political ecologie**s;** and the potential for actor oriented and non-Marxists approaches to contribute to theorizing urban political ecology.

Journals

There is no Urban Political Ecology journal, however there is a clear pattern of publishing in critical urban studies and critical geography journals. *Antipode*, owned by the Antipode Foundation and published by Wiley has been an important outlet for Urban Political Ecologists. *International Journal of Urban and Regional Research (IJURR)* was founded in the 1970s to push for a revitalisation of global interdisciplinary urban studies research. The *IJURR* Foundation through its studentships and writing up grants is potentially an important source of support for early career scholars working in the field. The *Environment and Planning* journal series has evolved with the growth of urban and regional analysis particularly in geography. *Environment and Planning A* some of the first scholarship in the field and seems to be particularly favoured by those examining Global South case studies. However, a restructuring of the journal series in 2018 is likely to bring with it a shift towards publishing more in *Environment and Planning C: Politics and Space* or *Environment and Planning E: Nature and Space. Geoforum* remains a preferred outlet for urban geographies in general and Urban Political Ecology in particular. *Geoforum,* focusses on economic, social, political and environmental systems.

Antipode. 1969 –

Antipode is a journal of radical geography with a particular focus on critical approaches that pushes dialogue in the field forward. There is significant engagement with Marxist, socialist, queer and feminist thought in the journal, as well as other forms of critique. It is published five times per year and is available online or in print via a subscription.

Environment and Planning A. 1969-2018
Environment and Planning A was a generalist journal of urban and regional analysis which published critical approaches to the city. It represent an important outlet for those working in the UPE tradition. In 2018 Environment and Planning A relaunched as Environment and Planning A: Economy and Space.

International Journal of Urban and Regional Research. 1977-
IJURR, as the journal is more commonly referred to, is an interdisciplinary journal of urban and regional research. The journal publishes research from broad range of fields including geography, anthropology, sociology, planning and political science amongst others. It publishes six times per year and is available online and in print via a subscription.

Geoforum . 1970-
Geoforum is broadly a human geography journal that publishes both research and commentary pieces. The focus of the journal is on social, political, economic and environments systems. It publishes 10 times per year and is available online and in print via a subscription.

Foundational Texts
The term Urban Political Ecology was coined by Eric Swyngedouw 1996 in his paper "The city as hybrid: on nature, society, and cyborg urbanization" where water is used as a lens into the political, economic and ecological process of urbanisation. In doing so he mapped out the early terrain and influenced the focus of much of the early UPE research. The political economy and ecology of piped water infrastructure, something which represents the large scale taming and commodification of nature in cities has been a central focus of analysis since Swyngedouw 1996 and Swyngedouw 1997. Kaika 2003 for example explored how a drought was used to justify the neoliberalisation of water infrastructure, a case that is given more thorough treatment in Kaika 2005. Water is also the subject of a number of the chapters in the edited volume of Heynen et al 2006 (see also *Urban Political Ecologies of Drinking Water*). These early works in Urban Political Ecology largely adopted a historical materialist focus, one that informs Gandy 2002 study of New York City and Robbins 2007 of urban lawns. These foundational texts all represent Marxist approaches to UPE, in recent years a "Second Wave" has emerged, as is discussed later in the article (see also *Towards UPEs "second wave"*).

Gandy, Matthew. 2002. *Concrete and Clay: Reworking Nature in New York City.* Boston, MA: MIT Press.
In an early monograph Gandy 2002 examines the urbanization of nature in New York City. The book focusses on infrastructural change, namely the production of a landscaped highway system, of a modern water supply and the redefinition and expansion of public space (including parks and gardens). It also examines

activism, namely the environmental politics of the barrio in the 1960s-70s and contemporary environmental justice movements in the city.

Heynen, Nik, Erik Swyngedouw, and Maria Kaika, eds. 2006. *In The Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism*. London; New York: Routledge.
> An early and influential edited volume in Marxist UPE. The contributions in this volume attempt to untangle the political, economic and social processes that shape and ae shaped by ecological processes in the city. The volume presents a manifesto for Urban Political Ecology that is a useful starting point for those new to the field.

Kaika, Maria. 2003. "Constructing Scarcity and Sensationalising Water Politics: 170 Days That Shook Athens." *Antipode* 35 (5):919-954. doi: 10.1111/j.1467-8330.2003.00365.x.
> Kaika 2003 examines how a natural weather environmental phenomena – a drought – was enrolled into political strategies that sought to justify the neoliberal privatization of water management and allocation in Athens.

Kaika, Maria. 2005. *City of flows: modernity, nature, and the city*. New York: Routledge.
> Drawing on material from Athens and London this monograph offers a detailed and critical historical materialist tracing of the flow of water, through large scale projects of taming nature, to the establishment of distributive infrastructure through to everyday consumption. Kaika demonstrates that flows of water have shifted from representing the pinnacle of urban modernity to the banal, and from a public project to an integral part of the capitalist base of western economies.

Swyngedouw, Erik. 1996. "The city as hybrid: on nature, society, and cyborg urbanization." *Capitalism, Nature, Socialism* 7(2): 65-80
> It is in this paper that the term "urban political-ecology" is coined and the original research agenda sketched out. Swyngedouw uses water as a lens through which the circulations of capital, humans and non-humans, technologies, knowledge and power can be exposed in order to explore the material production of socio-natures. This allows for an analysis of the relationships between ecology, modernity and capitalism in the urbanization process.

Swyngedouw, Erik. 1997. "Power, nature, and the city. The conquest of water and the political ecology of urbanization in Guayaquil Ecuador." *Environment and Planning A* 29 (2):311 - 332.
> An important and early study of the urban political ecologies of water by one of the founders of the sub-field. Swynegdouw 1997 examines how urbanization processes in Guayaquil relied on the domestication and urbanization of water resources that serve to extend the ecological and political-economic effects of urbanization well beyond city borders. A useful introduction to the foundational ideas and process of UPE analysis.

Swyngedouw, Erik, and Nic Heynen. 2003. "Urban political ecology, justice and the politics of scale." *Antipode* 35 (5):898-918.

This article is an introduction to a special issue on UPE. It lays out the subfield and argues for the political program of Marxist UPE the identification of strategies that could result in the production of more inclusive urban environments. It is included in this subsection though for the discussions of how UPE can grapple with scale by focusing on the particular socio-ecological processes through which a particular scale is (re)produced.

Robbins, Paul. 2007. *Lawn People: How Grasses, Weeds, and Chemicals Make Us Who We Are.* Philadelphia: Temple University Press.
  Cultivating a lush urban lawn, often with the aid of significant amounts of chemical and water, is one of mundane practices of ordinary urban residents across North America that contribute to a particular type of urban environment. Robbins 2007 unpicks the social, economic and political practices of "lawn people" to demonstrate that the production of this urban greenery is far from a neutral project of aesthetics.

Towards UPE's "second wave"
The evolution of UPE as a field has been rapid, particularly since the later part of the 2000s. As the progress report by Zimmer 2010 (cited under *Urban Political Ecology Progress Reports*) already begins to acknowledge that there has been significant broadening of both the theoretical underpinnings and the focus of UPE literature. In his progress report Nik Heynen 2014 (see Heynen 2014 under *General Overviews – Urban Political Ecology Progress Reports*) identifies a "second wave" of urban political ecology research that adopts a more post-structuralist and intersectional understanding of power and seeks to account for the multiple dimensions of marginalization and injustice that shape the production of uneven urban socio-natures. The scale of analysis for these case studies is often on the micro and everyday level and they often, though not exclusively, arise from case studies in the Global South. A number of researchers have sought to encourage these changes and provide inspiration for how scholarship may be broadened by bringing Urban Political Ecology into conversation with other bodies of literature. For example the scope for drawing on non-western urban studies to situate and nuance analysis in the subfield is advocated by Lawhon, Ernstson, and Silver 2014 who demonstrate the potential for African Urbanism to inform a more grounded and nuanced production of theory. Zimmer 2015 makes a not dis-similar argument in here call for deeper engagement with South Asian urban studies. Gabriel 2014 and Cornea, Zimmer and Véron 2017 both highlight ways to broaden engagement in UPE by considering other perspectives on governance, particularly those that see governance as a power laden and continually negotiated process.

Cornea, Natasha, Anna Zimmer, and René Véron. 2017. "Everyday governance and urban environments: Towards a more interdisciplinary Urban Political Ecology." *Geography Compass* 11 (4). doi: 10.1111/gec3.12310.
  This article argues that UPE's increasingly poststructuralist turn demands a more thorough engagement with the concepts and insights offered by fields outside of geography (the disciplinary home of many urban political ecologists). In particular they highlight the contributions of the mostly anthropological research on the 'Everyday State' arising largely from Indian case studies and on 'Everyday Governance' in Africa.

Gabriel, Nate. 2014. "Urban Political Ecology: Environmental Imaginary, Governance, and the Non-Human." *Geography Compass* 8 (1):38-48.

> This paper explores three ways that UPE as a subfield had begun to engage with post-structural and post-humanist approaches. Firstly, through engagement with the research on urban governance. Secondly, through a renewed interest in the influence of environmental imaginaries and finally by examining the theoretical implications of engaging with non-human agency.

Lawhon, Mary, Henrik Ernstson, and Jonathan Silver. 2014. "Provincializing Urban Political Ecology: Towards a Situated UPE through African urbanism." *Antipode* 46 (2):497-516.

> The authors argue for the need to and the analytical potential of moving beyond the dominant Marxist geographical theorizing by engaging with more every day and situated approaches to urban theory. They demonstrate the potential of African Urban Theory to inform UPE methodology, theory and practice. In turn they argue for the potential of radical incrementalism to contribute to progressive change.

Zimmer, Anna. 2015a. "Urban political ecology 'beyond the West': engaging with South Asian urban studies." In *International Handbook of Political Ecology*, edited by Raymond L Bryant, 591-603. Cheltenham, U.K. & Northampton, USA: Edward Elgar.

> Zimmer picks up her earlier argument in Zimmer 2010 (cited under *General Overviews - Progress Reports in Urban Political Ecology*) to argue that UPE has paid insufficient attention to non-western cities. She demonstrates the possible insights to be gained from the South Asian urban studies literatures, pointing particularly to work on the *everyday state* and on urban heterogeneity.

Feminist, Queer and Decolonial Perspectives in Urban Political Ecology

A concern the politically emancipatory potential of careful analysis of socio-natural relationships and knowledge informs the papers in this section. It includes works which are not specifically in conversation with nascent field of UPE at the time they were written but which are influential to the development of intersectional thought in the field. Rocheleau , Thomas-Slayter, and Wangari's 1996 edited volume of Feminist Political Ecology includes a number of urban case studies and is a key foundation text of this vein of research. Their influence is felt in the overview offered by Elmhirst 2011.. Sultana 2011 is more accurately political ecology but she makes a key theoretical contribution in her argument for understanding how emotions and ideas of morality shape socio-natural relationships. While these early works integrating feminist theory and the concerns of political ecology were dominantly rural , Loftus 2007 offers the perhaps the first example of integration of a specifically urban political ecology perspective with feminist theory. An explicitly Urban Political Ecology scholarship continues to emerge through the work of Truelove 2011 and Doshi 2017. Doshi offers an important provocation to consider body as a political and material site in the reproduction of socio-natures. Gandy 2012 offers another way forward in his suggestion that queer theory and sexuality could allow theorists to further nuance their work and explore other dimensions of marginalization and the power of specific moralities in shaping urban natures. Shillington and Murnaghan 2016 take a different approach with queer theory, arguing for a queering (as

process) of binary understanding of nature/society and increased attention to how ageshapes socio-natural relationships. These papers remind scholars of the broader political potential of careful analysis and attention to difference and power. There has also been a recent engagement with the project of decolonizing, Loftus 2017 has traced the "decolonial moves" in the fields of political ecology and urban political ecology. While Simpson and Bagleman 2018 focus on the ways that Settler Colonialism is both an ecological and socio-political project and argue for the need for UPE to decolonize in order to critically engage with and avoid perpetuating these dynamics. In extending this project urban political ecologists, particularly those examining settler colonial contexts could strengthen their analysis by careful attention to the racist practices that have shaped cities in this context, as well demonstrated by the work of Pulido, Sidawi and Vos 1996. See also Heynen 2015 under *Progress Reports*.

Doshi, Sapana. 2017. "Embodied urban political ecology: five propositions." *Area* 49:125-128.
> This commentary piece argues for the need for UPE to pay more attention to the body as a political and material site. The author argues that an embodied UPE, drawing on feminist and postcolonial theory will both deepen our understanding of environmental politics and of spaces of transformation.

Elmhirst, Rebecca. 2011. "Introducing new feminist political ecologies." *Geoforum* 42 (2):129-132. doi: 10.1016/j.geoforum.2011.01.006.
> This introduction to a special issue considers how political ecologists may engage with feminist objectives and practices. Elmhirst 2011 considers a number of the challenges inherent in doing feminist political ecology and in doing so points to ways forward.

Gandy, Matthew. 2012. "Queer ecology: nature, sexuality, and heterotopic alliances." *Environment and Planning D: Society and Space* 30:727 - 747.
> Gandy 2012 proposes that interaction between queer theory and urban ecology may be fruitful for both fields. To do so he examines marginal urban spaces for their ecological and sexual significance in order to develop the conceptual idea of queer ecology. Doing so allows for critically engaging with intersections between sexuality, space and urban nature and in turn challenging heteronormative productions of and restrictions on urban space.

Loftus, Alex. 2007. "Working the Socio-Natural Relations of the Urban Waterscape in South Africa." *International Journal of Urban and Regional Research* 31 (1):41-59. doi: 10.1111/j.1468-2427.2007.00708.x.
> The author demonstrates the utility of feminist standpoint theory in contributing to a more critical UPE, particularly by exploring cross-cutting power relations beyond labor and capital. Loftus 2007 argues that feminist standpoint theory can highlight the epistemological underpinnings, the competing and different knowledges that shape the social relationships that (re) produce urban socio-natures.

Loftus, Alex. 2017. "Political ecology I: Where is political ecology?" *Progress in Human Geography* (online first). doi: 10.1177/0309132517734338.

Loftus 2017 engages with the both political ecology and urban political ecology in the progress report. It focusses on recent decolonial moves in the literature, offering ways for political ecologists to reframe their analysis to recognize both the situatedness of practices that reproduce urban socio-natures and the ways that these practices are connected to other processes and drivers of change.

Pulido, Laura, Steve Sidawi, and Robert O Vos. 1996. "An Archeology of Environmental Racism in Los Angeles." *Urban Geography* 17 (5): 419-439 doi:10.2747/0272-3638.17.5.419

Focusing on exposure to air pollution the authors trace the historical processes which have contributed to the racialized and polluted landscapes in Los Angeles. This research makes an important contribute to understanding race and class as social relations and theorizing how racist practices contribute to uneven and inequitable landscapes. It pre-dates UPE as a field but it and the later work by Puildo offers important insights for urban political ecologists.

Rocheleau, Dianne, Barbara Thomas-Slayter, and Esther Wangari, eds. 1996. *Feminist Political Ecology: Global Issues and Local Experiences*. New York: Routledge.

This edited volume it a foundational text in Feminist Political Ecology. In the introduction Rocheleau et al 1996 argue for the need to consider gender as a key variable, one that intersects with class, culture, race and other factors to shape resource access and control. The conclusion is also particularly useful for understanding the contours of this emerging field and the policy implication of feminist analysis.

Shillington Laura, J., and Murnaghan Ann Marie. 2016. "Urban Political Ecologies and Children's Geographies: Queering Urban Ecologies of Childhood." *International Journal of Urban and Regional Research* 40 (5):1017-1035. doi: 10.1111/1468-2427.12339.

In spite of increasing attention to everyday socio-natural relationships in UPE, little attention has been paid to actors who may be marginal because of age – the young and the old. This piece argues for the need to move beyond romanticized understandings of children that depend on binary understanding of nature/society in order to "queer both nature and children in cities" (p1017).

Simpson, Michael, and Jen Bagelman. 2018. "Decolonizing Urban Political Ecologies: The Production of Nature in Settler Colonial Cities." *Annals of the American Association of Geographers* 108 (2):558-568. doi: 10.1080/24694452.2017.1392285.

The authors frame Settler Colonialism as both an ecological and socio-political project. The identify two ways that UPE as a discipline can decolonize: first by avoiding with reproduction of colonial discourse in research and analysis, and secondly supporting indigenous actors who seek to disrupt the settler-colonial project and create socially, racially and ecologically just urban socionatures.

Sultana, Farhana. 2011. "Suffering for water, suffering from water: Emotional geographies of resource access, control and conflict." *Geoforum* 42 (2):163-172. doi: 10.1016/j.geoforum.2010.12.002.

> Drawing on extensive fieldwork in rural Bangladesh Sultana 2011, explores gendered relationships of water access. She argues for the need to understand how emotion and ideas of morality enters into nature-society relations and can influence issues of access and control of resources.

Truelove, Yaffa. 2011. "(Re-)Conceptualizing water inequality in Delhi, India through a feminist political ecology framework." *Geoforum* 42 (2):143-152. doi: 10.1016/j.geoforum.2011.01.004.

> While much of the early FPE research was explicitly rural, Truelove 2011, offers an important urban case study. She argues that understanding gendered and cultural water practices allows for a more nuanced understanding of the production of uneven and inequitable urban socio-natures.

Urban Political Ecologies of Drinking Water
As noted in the section **Key Early Works in Urban Political Ecology**, networked water supply, has been a central object of study for urban political ecologists. A useful overview of the first wave of this research can be found in Loftus 2009. This research usefully highlighted the macro-level decisions and politics of water infrastructures (see for example Swyngedouw 1997 cited under *Foundational Texts* and Kaika 2005 *cited under Foundational Texts*). Increasingly scholars have focused on the everyday negotiations between state and non-state actors that shape the urban socio-hydroscape. For example both Ranganathan 2014 and Truelove 2016, drawing from case studies in Bangalore and Delhi respectively, highlight how access to water and water infrastructures may be part of broader strategies of claim-making by state and non-state actors. Whilst many studies focus primarily on distribution and access, with their study, Rusca et al 2017 highlighted that water quality is also inequitable, adding an additional dimension to our consideration of the hydro-social cycle. Beyond their empirical contributions studies of networked water have also contributed to methodological and conceptual innovation in UPE. For example Keil and Debbané 2005 demonstrate the utility of discourse analysis and specific attention to scale when mapping the ways that environmental policies contribute to the reproduction of inequitable socio-hydroscapes (see also **Kaika 2005**). In turn Rattu and Véron 2016 note that while Foucaldian methods such as discourse analysis have been used within Marxists UPE studies, a well-articulated Foucauldian framework to approach UPE has been lacking, something which they endeavor to address. Ioris 2012 similarly argues that a neo-Gramscian strategic-relational approach can broaden the theoretical remit of UPE. Ranganathan and Balzs 2015 make a comparative gesture across the North – South divide and perhaps offer a way forward in more explicitly recognizing commonalities in the ways that power shapes urban environments globally. Studies of networked drinking water provide important insights for the study of other networked infrastructures including sanitation (see *Closing the loop: Urban Political Ecologies of Sanitation and Wastewaters*) and electricity (see *Urban Political Ecologies of Electricity*).

Ioris, Antonio A. R. 2012. "Applying the Strategic-Relational Approach to Urban Political Ecology: The Water Management Problems of the Baixada Fluminense, Rio

de Janeiro, Brazil." *Antipode* 44 (1):122-150. doi: 10.1111/j.1467-8330.2011.00848.x.

> Ioris 2012, forwards that a neo-Gramscian strategic-relational approach can extend the post-structuralist and materialist positions in UPE by focusing on the ways that power is enacted and the potential for political struggle. Particular focus is given to the socio-ecological and socio-spatial nature of the state, linking the state to the historical geographies of capitalist development. The author explores the tensions between state, society and nature in Rio de Janerio.

Keil, Roger and Anne-Marie Debbané. 2005. "Scaling discourse analysis: experiences from Hermanus, South Africa and Walvis Bay, Namibia". *Journal of Environmental Policy & Planning*. 7 (3): 257-276 doi:10.1080/15239080500339786

> Drawing on discourse analysis to examine urban water policy, this paper explores the ways that scale influences applications and outcomes of environmental policy processes. The authors map the multiple and intertwined processes of power across scales that produce environmental policies and shape urban environments. This paper demonstrates the utility of discourse analysis for mapping how power (re)produces particular socio-environmental configurations and politics.

Loftus, Alex. 2009. "Rethinking Political Ecologies of Water." *Third World Quarterly* 30 (5):953-968. doi: 10.1080/01436590902959198.

> This paper provides a useful overview of research into the political ecologies of water. The author then mobilizes research from South Africa to demonstrate how legacies of differentiated technologies and apartheid continue to shape the highly unequal waterscape in South African cities.

Ranganathan, Malini. 2014. "Paying for Pipes, Claiming Citizenship: Political Agency and Water Reforms at the Urban Periphery." *International Journal of Urban and Regional Research* 38 (2):590-608. doi: 10.1111/1468-2427.12028.

> This article explores market oriented water reforms in Bangalore (India) that required that even those without formal land tenure make significant contributions towards extending the piped water infrastructure to the city's periphery. Ranganathan 2014 argues that this is not an example of stakeholder buy in but rather an insurgent claim on recognition and benefits from the state.

Ranganathan, Malini, and Carolina Balazs. 2015. "Water marginalization at the urban fringe: environmental justice and urban political ecology across the North–South divide." *Urban Geography* 36 (3):403-423. doi: 10.1080/02723638.2015.1005414.

> Ranganathan and Balazs's piece is particularly notable for challenging any assumption that water poverty is a distinctly 'Southern' phenomena. The authors draw on two case studies located in the urban peripheries of Bangalore and Exeter, California to examine water access, state practice and issues of agency.

Rattu, Paola, and René Véron. 2016. "Towards a Foucauldian Urban Political Ecology of water: Rethinking the hydro-social cycle and scholars' critical engagement." *Foucault Studies* 21:138 - 158.

> The authors draw on Foucauldian thought to argue for theoretical broadening of Urban Political Ecology approaches to water. The authors suggest that while

Marxian UPE of water tends to focus on examples of inequality, a Foucaldian UPE of water may usefully illuminate how power operates in cases where there are no apparent inequalities or contestations.

Rusca, Maria, Akosua Sarpong Boakye-Ansah, Alex Loftus, Giuliana Ferrero, and Pieter van der Zaag. 2017. "An interdisciplinary political ecology of drinking water quality. Exploring socio-ecological inequalities in Lilongwe's water supply network." *Geoforum* 84:138-146. doi:10.1016/j.geoforum.2017.06.013.
This article makes a unique contribution by focusing on water quality (and not quantity or access as is common). Taking an interdisciplinary approach they consider both the microbiological and chemical qualities of water, as well as the political processes that underpin inequalities in water quality across the city of Lilongwe. See also Karpouzoglou et al 2018 under *Challenging "methadological cityism" in Urban Political Ecology*.

Truelove, Yaffa. 2016. "Incongruent Waterworlds: Situating the Everyday Practices and Power of Water in Delhi." *South Asia Multidisciplinary Journal* 14.
Drawing on long term engagement with one slum settlement in Delhi Truelove 2016 demonstrates the ways that nodes and networks of state and non-state governance actors are continually reconfigured enabling authority to be exercised in relation to water. Further, she reveals how access to water is embodied, negotiated and social differentiated in the everyday.

Other Urban Waters – the Urban Political Ecology of Non-Potable Water
While significant attention has been paid to networked water provision as it represents an important sphere and technology through which nature is tamed and commodified in the city, other forms of urban water have been neglected until recent years. Riverscapes have received particular attention and the research highlights that these spaces are both important sources of water but also landscapes that figure into political imaginaries and aspirations. Follman 2016 for example maps how multiple political, social and ecological processes have shaped the Yamuna River in Delhi (India), while Rademacher 2011 how aspirations for political stability intersect with ideas or imaginaries of ecological stability to influence the restoration of the riverscape through Kathmandu (Nepal). This research has also highlighted how these waterscapes figure into process of subject formation; for example, Grove 2009 in his study of an urban watershed in Ohio (USA) (as well as Follmann 2016). The composite nature of these other urban waters is highlighted in Cornea et al 2016 who point out that these sites are both sources of water for particular for particular purposes but also (potential) urban land, and are incorporated into social relations in multiple ways. While most of the studies understand urban water to be a welcomed socio-natural resource, Batubara et al 2018 extends this focus to examine the infrastructure that seeks to keep (flood) water out of the city. See also Saguin 2017 under the section *Challenging "methadological cityism" in Urban Political Ecology*.

Batubara, Bosman, Michelle Kooy, and Margreet Zwarteveen. 2018. "Uneven Urbanisation: Connecting Flows of Water to Flows of Labour and Capital Through Jakarta's Flood Infrastructure. *Antipode* (online first): 1-20. Doi:10.1111/anti.12401
This article traces the political ecology of uneven urbanization in Jakarta. Using flood infrastructure as a lens they trace the urbanization processes through and

beyond the city limits. In doing so they demonstrate how flood infrastructure is
linked to and reproduces urban inequalities.

Cornea, Natasha, Anna Zimmer, and René Véron. 2016. "Ponds, power and
institutions: The everyday governance of accessing urban water bodies in a small
Bengali town." *International Journal of Urban and Regional Research* 40 (2):395 -
409. doi: 10.1111/1468-2427.12377.
> This case study explores the everyday governance of the urban pondscape in
> West Bengal. The authors explore how multiple types of social power and
> complex networks of actors may shape access to and use of the pond as a
> composite resource. By examining ponds and not the more common piped water
> infrastructures the article further demonstrates the conceptual potential of
> exploring other urban waters.

Follmann, Alexander. 2016. *Governing Riverscapes. Urban Environmental Change
along the River Yamuna in Delhi, India*. Stuttgart: Steiner.
> A monograph length exploration of the governance of the Yamuna River in Delhi
> (India). Follmann 2015, understands the riverscape to be a socio-ecological
> hybrid and demonstrates how understanding shifting discursive framings on the
> environment and the Yamuna underpin process of environmental change in the
> production of Delhi as a world class city.

Grove, Kevin. 2009. "Rethinking the nature of urban environmental politics: Security,
subjectivity, and the non-human." *Geoforum* 40 (2):207-216. doi:
10.1016/j.geoforum.2008.09.005.
> Grove 2009 seeks to bring UPE into conversation with critical geopolitics and
> post-structural political ecology to consider subject-forming dimensions of
> environmental politics. This broadened analytical lens is applied to the case study
> of the Big Darby Creek watershed (Ohio) and efforts aimed at local economic
> development and conservation of this socio-natural landscape.

Rademacher, Anne M. 2011. *Reigning the River: Urban Ecologies and Political
Transformation in Kathmandu*. Durham & London: Duke University Press
> Based on extensive ethnography in Kathmandu (Nepal) Rademacher 2011
> examines the contested histories and social processes that have shaped
> riverscape restoration in the city. This work is unique in that it captures the ways
> urban natures are may be reproduced during times of violence and (civil) war. In
> doing so the author demonstrates the multiple ways in which politics and culture
> shape and are shaped by the urban environment.

Closing the loop: Urban Political Ecologies of Sanitation and Wastewaters
Sanitation infrastructures – drains and sewerage –have received only very limited
attention from those engaging with an explicitly urban political ecology approach. Yet
if we are concerned with the ways in which water is tamed, commodified, and flows
through our cities we need to pay attention to the final part of the loop, disposal. This
is eloquently argued by both Zimmer 2015 and Karpouzoglou and Zimmer 2016.
Sanitation provided through modern sewerage systems and through other socio-
technical configurations is also somewhat of a black box for UPE analysis. However,
Desai et al. 2015 interrogate intersections between embodied experiences of

sanitation and the materialities and politics of infrastructure. While limited in number these studies demonstrate both the need to pay more attention to disposal (see also *Discards and Pollution: Urban Political Ecologies of Externalities*) as part of metabolic processes of urbanization and to the everyday politics and situated knowledge that shape configurations of sanitation and wastewater.

Desai, Renu, Colin McFarlane, and Stephen Graham. 2015. "The Politics of Open Defecation: Informality, Body, and Infrastructure in Mumbai." *Antipode* 47 (1):98-120.
   This paper focusses on the intersections of everyday embodied experience of open defecation with the materialities of infrastructure and informality in Mumbai. The authors examine the micro-politics of access to, control of, and the provisioning on sanitation infrastructures in Mumbai's informal settlements. In understanding these practices as spatial and temporal improvisations Desai et al. 2015 offer an analytical tool to interrogate how practices emerge, take shape and allow people to cope.

Karpouzoglou, Timothy, and Anna Zimmer. 2016. "Ways of knowing the wastewaterscape: Urban political ecology and the politics of wastewater in Delhi, India." *Habitat International* 54 (2):150 - 160.
   The authors argue in spite of a concern with the politics of the waterscape in UPE, till now the importance of wastewater has been overlooked. Drawing on fieldwork in Delhi they examine the repeated exposure of poor citizens to the hazards of wastewater and suggest that this arises not just from poor service delivery but also from what knowledge of wastewater disposal and (mis)management is seen as legitimate and valid.

Zimmer, Anna. 2015. "Urban Political Ecology in Megacities: The Case of Delhi's Waste Water." In *Urban Development Challenges, Risks and Resilience in Asian Mega Cities*, edited by R.B. Singh, 119-139. Springer.
   Zimmer 2015 extends the UPE of water to consider specifically waste water service provision. Focusing on the provision of waste water services in informal settlements she explores the politics and practices of which services resident receive, who provides them and the day-to-day negotiations for the same.

Discards and Pollution: Urban Political Ecologies of Externalities
Since Véron 2006 argued that urban political ecologists should pay more attention to the ways that production and management of serve to constitute the city there has been a significant increase in the study of pollution and discards broadly considered (for air pollution see also Pulido et al 1996 under * Feminist, Queer and Decolonial Perspectives in Urban Political Ecology*). A number of researchers have focussed on socio-technical arrangements for dealing with waste. Tuçaltan 2017 examines the development of heterogeneity of socio-technical configurations in Ankara. While both Demaria and Schindler 2016 and Leonard 2012 focus on the politics and protest that surrounds these processes, highlighting the intensely political and contentious nature of waste and supposed solutions to it. A number of scholars have examined the production of multi-scalar policy arrangements and practices around waste, including Baabereyi et al 2012 who explores the differentiated municipal solid waste management service in Accra. Cornea et al 2017 examines the diverse action repertories of state and non-state actors who enact policy in West Bengal. Both

Myers 2005, and Bjerkli 2015 focus on the reformed and renewed waste systems. Each of these cases consider multiple scalar forces that shape on-the-ground realities. Somewhat surprisingly explicit engagements with labour and labouring have been rather limited in both Marxist and second wave UPE, however the study of wastes and discards (including food waste see *Urban Political Ecologies of Food*) have been notable exceptions. For example, Parizeau 2015 examines bodily wellbeing of informal recyclers in Buenos Aires while Amazu 2018 examines the intersectional struggles of workers in e-waste recycling industry in Agbogbloshie-Accra (Ghana). While limited these studies of waste have demonstrated the conceptual and theoretical rich potential of studying waste wither through the socio-technical configurations, policy, labouring or following a single waste stream as in Njeru 2006. Somewhat surprisingly the Urban Political Ecology of discards and pollution research has focussed dominantly on cities of the Global South; arguably there is significant scope and need to examine the production of discards and pollution within the metabolic processes that (re)produce cities of the Global North.

Amuzu, David. 2018. "Environmental injustice of informal e-waste recycling in Agbogbloshie-Accra: urban political ecology perspective." *Local Environment* 23 (6):603-618. doi: 10.1080/13549839.2018.1456515.
>   Amuzu 2018 explores the diverging interests and strategies of power amongst actors in the informal electronic waste recycling sector in Ghana. He highlights how inter-sector struggles for power rely on practices of misrecognition, disrespect, exclusion and the abuse of freedom and rights. However, local resistance to the inequities of the industry and state aggression towards informal actors have begun to emerge.

Baabereyir, Anthony, Sarah Jewitt, and Sarah O'Hara. 2012. "Dumping on the poor: the ecological distribution of Accra's solid-waste burden." *Environment and Planning A* 44:297-314.
>   This paper examines the ways that a tiered system of municipal waste collection ensures that the environment of the rich is privileged while the poor are exposed to hazards and risks of solid-waste. The authors suggest weak civil society, combined with the ability of wealthy households to obtain private services or co-opt municipal ones results in little pressure on the municipal governments to extend services to the poor.

Bjerkli, Camila Louise. 2015. "Power in waste: Conflicting agendas in planning for integrated solid waste management in Addis Ababa, Ethiopia." *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography* 69 (1):18 - 27.
>   The author draws on two case-studies in Addis Ababa, the planned integrated waste management system and renewed inform waste market. She explores how state aspirations for modernity conflict with the interests of informal actors and how empty political promises have stymied true engagement between these actors and the city administration.

Cornea, Natasha, René Véron, and Anna Zimmer. 2017. "Clean city politics: an urban political ecology of solid waste in a small city in West Bengal, India." *Environment and Planning A* 49 (4):728 - 744. doi: 10.1177/0308518X16682028.

Using the implementation of a segregation at source waste management project in West Bengal as a lens the authors demonstrate how diffuse forms of power and different governmentalities are applied within and between different state and non-state actors. The research points to the complex nature of everyday environmental governance involving multiple actors and diverse action repertoires.

Demaria, Federico, and Seth Schindler. 2016. "Contesting Urban Metabolism: Struggles Over Waste-to-Energy in Delhi, India." *Antipode* 48 (2):293 - 313.
   This paper explores a waste-to-energy initiative which developed a metabolic configuration consolidating waste into a single value chain ending at the plant and producing an arrangement where where the spaces in which waste is collected and processed become a commodity frontier. Drawing on a unique case and drawing on UPE, industrial ecology and ecological economics the authors make a contribution to the theoretical and empirical development of the field.

Leonard, Llewellyn. 2012. "Another political ecology of civil society reflexiveness against urban industrial risks for environmental justice: The case of the Bisasar landfill, Durban, South Africa." *Singapore Journal of Tropical Geography* 33 (1):77-92. doi: 10.1111/j.1467-9493.2012.00448.x.
   Leonard 2012 demonstrates the need for historical depth to inform the analysis of contemporary situations by exploring the legacies of class and ethnic/race based discrimination and civil society contestation over urban landfill infrastructure. He demonstrates that there are different understandings of the risks of the landfill shaped in part by understanding of the site as either resource, nuisance or potentially both.

Myers, Garth. 2005. *Disposable Cities: Garbage, Governance and Sustainable Development in Urban Africa*. Hampshire (UK) & Burlington (USA): Ashgate.
   Myers 2005 draws on case studies in Dar es Salaam, Zanzibar and Lusaka to examine the management of solid waste as part of the United Nation's Sustainable Cities Program. Analysis is multi-scalar and multi-sited allowing for consideration of how particular situated histories intersect with the largely top-down interventions of the UN's supposedly 'participatory' program for environmental management.

Njeru, Jeremia. 2006. "The urban political ecology of plastic bag waste problem in Nairobi, Kenya." *Geoforum* 37:1046 - 1058.
   Using a case study of plastic bag waste Njeru 2006 highlights the interconnections between urban waste problems and cultural, political and economic processes. This article represents a relatively early engagement with the analytical potential of engaging with both Global South case studies and with solid waste through a UPE framework.

Parizeau, Kate. 2015. "Urban political ecologies of informal recyclers' health in Buenos Aires, Argentina." *Health & Place* 33:67-74.
   In her study of informal recyclers health Parizeau 2015 argues that an analysis of bodily wellbeing is consistent with UPEs focus on the multiscalar effects of urbanization. She finds that the health outcomes of recyclers are significantly

effect by the economic crisis that formed uneven health landscapes in Buenos Aires that result from the intersections of government intervention, economic change and socio-culture value judgements and practices of distancing.

Tuçaltan, Gül. 2017. *Metabolic Urbanization of Waste in Ankara.* Delft: Eburon.
    This monograph explores the historically produced and transformed socio-technical responses to waste in Ankara (Turkey). Drawing on UPE to consider the heterogeneity of socio-technical configurations of waste management in Ankara, Tuçaltan 2017 considers the coexistence of both authorized and un-authorized responses to waste governance. She further demonstrates the political potentials and limitations embedded in waste in a hereto understudied city.

Véron, René. 2006. "Remaking urban environments: the political ecology of air pollution in Delhi." *Environment and Planning A* 38:2093-2109.
    Véron 2006 examines the motivations for and implications of Delhi's air pollution policies, paying particular attention to the role of public interest litigation and the environmental activism of the middle-class. By exploring a movable and difficult to privatize resource, air, his analysis challenges us to understand spaces and scales as dynamic rather than fixed and clearly defined.

Urban Political Ecologies of Food
While many people still associate food production (and in turn food waste) with rural landscapes, urban political ecologists have highlighted: firstly that food production is increasingly urban and industrial; secondly that urbanization relies on the transformation of food systems to support it; thirdly that urban consumption of food relies on material and symbolic transformation of food products; and finally that processes and outcomes of the circulation of food through cities is spatial and economically uneven and inequitable. Coplen 2018 in particular challenges rural bias in understanding food systems to demonstrate that the socioecological relationships of agrifood are decidedly urban. Adopting a concern with actual material flows and metabolic principles, several researchers have paid attention to the ways that food materials— including Saguin 2014 on fish, Yates and Gutberlet 2011 on organic waste, and Lawhon 2013 on alcohol—are transformed and circulate through urban metabolic processes. Studies of food have also highlighted the potential sites and epistemologies of change that challenge the capitalist production of socio-natures. For example, Jarosz 2011 examines urban community supported agriculture whilst Agyeman and McEntee 2014 demonstrate the potential of UPE analysis to contribute to the US American Food Justice movement.

Agyeman, Julian, and Jesse McEntee. 2014. "Moving the Field of Food Justice Forward Through the Lens of Urban Political Ecology." *Geography Compass* 8 (3):211 - 220.
    This article argues that the Food Justice movement (*a social movement in the USA*) could be strengthened by engaging with UPE focus on process and outcomes. Doing so they argue would allow the movement to more effectively highlight both the causes and the symptoms of unjust food access.

Coplen Amy, K. 2018. "The labor between farm and table: Cultivating an urban political ecology of agrifood for the 21st century." *Geography Compass* 12 (5):e12370. doi: 10.1111/gec3.12370.
>   Coplen 2018 explores the political economy of agrifood through the lens of urban political ecology. In doing so she positions labor as central to understanding the transformation of socioecological relationships of the food system; one that is increasingly decentered from the rural agrarian landscape that many imagine to one that spaces that are decidedly urban and/or industrial.

Jarosz, Lucy. 2011. "Nourishing women: toward a feminist political ecology of community supported agriculture in the United States." *Gender, Place & Culture* 18 (3):307-326. doi: 10.1080/0966369x.2011.565871.
>   The motivations of female urban farmers involved in community supported agriculture is the focus of this article. Jarosz 2011 draws from Foucauldian ideas of the ethics of self-care to inform a feminist political ecology of the social relations of caring practice in urban farming communities.

Lawhon, Mary. 2013. "Flows, Friction and the Sociomaterial Metabolization of Alcohol." *Antipode* 45 (3):681-701. doi: 10.1111/j.1467-8330.2012.01028.x.
>   Alcohol is understudied to be a sociomaterial hybrid in order to understand its flow and circulation as a power-laden and dynamic process. This conceptualization allows analysis to move beyond binaries of negative or positive impacts and policy debates on control to a more nuanced understanding of the complex ways that alcohol flows shape sociability and harm in often indeterminate ways.

Saguin, Kristian. 2014. "Biographies of fish for the city: Urban Metabolism of Laguna Lake aquaculture." *Geoforum* 54:28 - 38.
>   Saguin 2014 follows bighead carp from Laguna Lake aquaculture production to urban consumption in order to understand the material and symbolic transformation of this resource. In doing so he is able to highlight the complexities of the urban metabolism of fish and of the flows of socio-natural materials more broadly between the city and its resource frontiers.

Yates, Julian S., and Jutta Gutberlet. 2011. "Reclaiming and recirculating urban natures: integrated organic waste management in Diadema, Brazil." *Environment and Planning A* 43 (9):2109-2124. doi: 10.1068/a4439.
>   Integrated organic waste management as a system to support waste processing and food production is examined as a recirculation of urban natures. The authors highlight the potential for conflict and exploitation in this process and the limits of this system as an alternate to existing models of waste management.

Producing Nature in the City: Urban Political Ecologies of Green Spaces
Urban green spaces represent a particularly visible and obvious landscape of power in cities, and in popular thought is often the only approximation of the "natural" in the city. Parks and other green spaces are deeply embedded into the everyday social life of a city and may represent spaces of deep conviviality and contestation (similarly to the waterscapes of *Other Urban Waters – the Political Ecology of Non-Potable Water*). Careful analysis of these spaces and urban natures through the

lens of urban political ecology have highlight how processes of producing this 'nature' in the city is often highly political, contested and may result in the dispossession of existing users of spaces set to be greened (see also Gandy 2002 under *Foundational Texts*). These studies have also effectively highlighted the embedded and contextual nature of environmental values, as in Zimmer 2016, and how issues of access and use may intersect with these values. In turn the need to consider how those configurations intersect with macro-scalar concerns with justice and equity. For example, Heynen et al 2006 complicates environmental justice arguments for equitable canopy cover by pointing out that in low income neighborhoods of Milwaukee many trees are understood to be a nuisance. Heynen 2003 demonstrates the complex justice questions that come with urban planting initiatives, where equitable local distribution may degrade the ecological benefits of building up existing forestry islands, a strategy that may offer the greatest benefit at larger scales, even if it compounds local inequality. While green spaces can be part of imagining the urban as more natural and sustainable, these configurations of nature can be used deliberately in attempts to limit or control urbanization, as Keil and MacDonald 2016 explore in Ontario (Canada). Conceptually UPE analysis of green spaces (including Gandy 2002 and Robbins 2007, both cited under *Foundational Texts*) offer clues about how to understand socio-material artefacts that neither flow nor are obviously networked are part of urbanization processes.

Heynen, Nik. 2003. "The Scalar Production of Injustice within the Urban Forest." *Antipode* 35 (5):980-998.
> The importance of considering the scalar dynamics of the nature/society dialectics and the policy and political tradeoffs these may bring about are highlighted through this paper on the urban forestry initiatives in Indianapolis. While local justice oriented initiatives seek to extend the benefits of tree presence to all, Heynen 2003 suggests that this dilutes the ecological potential of tree-plantation where greater efficacy is achieved through building up existing green space.

Heynen, Nik, Harold A. Perkins, and Parama Roy. 2006. "The Political Ecology of Uneven Urban Green Space: The Impact of Political Economy on Race and Ethnicity in Producing Environmental Inequality in Milwaukee." *Urban Affairs Review* 42 (1):3-25. doi: 10.1177/1078087406290729.
> Using mixed methods inequitable urban tree canopy cover in Milwaukee along income, racial and ethnic lines is demonstrated. However, not all canopy cover is equally perceived as beneficial and tree presence intersects with patterns of home ownership and other social, political, and economic factors. The authors argue that greater public intervention into urban forest on private land is needed to address inequity in urban forest presence going forward.

Keil, Roger, and Sara Macdonald. 2016. "Rethinking urban political ecology from the outside in: greenbelts and boundaries in the post-suburban city." *Local Environment* 21 (12):1516 - 1533.
> Keil and MacDonald 2016 engage with UPE in order to examine the role of greenbelts in regulating urban expansion. The specifically investigate the Greater Golden Horseshoe greenbelt in Ontario (Canada) and argue that this greenbelt rather than acting as a hard border is a space of negotiation between the city and

the countryside. It is they suggest a landscape of new metabolic relationships of water, mobility, food and culture.

Zimmer, Anna, Natasha Cornea, and Rene Véron. 2016. "Of parks and politics: The production of socio-nature in a Gujarati town." *Local Environment*. doi: 10.1080/13549839.2016.1157157.
> This paper challenges notions of park creation as purely positive environmental projects and demonstrates that they are deeply political and ideological projects. Utilizing a case-study of a park in a small-town in Gujarat the authors demonstrate how such sites may be an integral part of city-making processes and expressions of the local geographies of power.

Sustainability and Climate Change through the lens of Urban Political Ecology

Using an Urban Political Ecology lens to interrogate climate change adaptation and mitigation initiatives is a relatively new area of focus in the field. Thus far analysis has focused primarily on how climate resilience initiatives shape infrastructural spaces in modern cities, and in doing so respond to what Silver 2017 sees as a pressing need. Castán Broto and Bulkeley 2013 point out that often such initiatives are experimental and occur in relatively "uncharted policy territories" (p1935) . Castán Broto and Bulkeley 2013, Edwards and Bulkeley 2017 and Mee et al 2014 all examine how policy initiatives and "experiments" (Castán Broto and Bulkeley 2013) in climate adaption and resilience in the housing sector. While Rice 2014 examines how carbon the materiality and discursive representations of carbon shape the production of environmental policy and (re)produces inequality in urban environments.

Castán Broto, Vanesa and Harriet Bulkeley. 2013. "Maintaining Climate Change Experiments: Urban Political Ecology and the Everyday Reconfiguration of Urban Infrastructure." *International Journal of Urban and Regional Research* 37 (6):1934-1948. doi: 10.1111/1468-2427.12050.
> The authors draw on case studies of climate change experiments in housing in Mexico and India. They argue that maintenance needs to be understood as a crucial process in the reproduction of innovation in and through these experiments. Further, that maintenance is a continual process of "remaking the experiment materially and discursively" (p1934).

Edwards, Gareth AS and Harriet Bulkeley.2017 "Urban political ecologies of housing and climate change: The 'Coolest Block' Contest in Philadelphia". *Urban Studies*. 54(5):1126-1141. Doi:10.1177/00420980156179707
> Edwards and Bulkeley 2017, draw on Urban Political Ecology to situate housing as part of the metabolism of the city. They examine a climate change adaptation initiative in Philadelphia and suggest that climate change action on housing has changed the ways that housing infrastructures are "embedded in the circulations of the city" (1126) and that this has implications for how housing is governed and who benefits from these actions.

Mee, Kathleen J., Lesley Instone, Miriam Williams, Jane Palmer, and Nicola Vaughan. 2014. "Renting Over Troubled Waters: An Urban Political Ecology of

Rental Housing." *Geographical Research* 52 (4):365-376. doi: 10.1111/1745-5871.12058.

> The authors seeks to examine the socio-natural relations of housing tenure in Australia through the lens of water. Water is understood to be one of a suite of resources for adaptation to climate change. Thus the authors examine how the material practices and discourses of adaptation intersect with the socio-cultural conditions of rental house provisioning to "render water useful, troubled, or troublesome" (354).

Rice Jennifer, L. 2014. "An Urban Political Ecology of Climate Change Governance." *Geography Compass* 8 (6):381-394. doi: doi:10.1111/gec3.12134.

> This paper uses insights from UPE to highlight the "socio-material politics of urban climate governance" (p381), focusing on local educational initiatives and greenhouse gas inventory processes. She argues that these initiatives erase social and spatial differences in carbon emissions and displace responsibility for climate change onto individuals from high-intensity developments.

Silver, Jonathan. 2017. "The climate crisis, carbon capital and urbanization: An urban political ecology of low-carbon restructuring in Mbale." *Environment and Planning A: Economy and Space* 49 (7):1477-1499. doi: 10.1177/0308518X17700393.

> This paper examines urban carbon governance and the restructuring of the waste system in Mbale, Uganda. Urban Political Ecology is used to grapple with the ways that carbon capital shapes flows of urban resources and addresses a relative lacuna in the subfield on the ways that the climate crisis shapes the (re)production of unequal urban socio-spatial relations and opens up new spaces of contestation and inequality.

Challenging "methadological cityism" in Urban Political Ecology
Angelo and Wachsmuth 2015 pointed out that while understanding urbanization as a socio-natural process is at the core of Urban Political Ecology, much of the scholarship in UPE has been bound by "methodological cityism" where the urban becomes a site and not a process. A number of scholars have responded explicitly or implicitly to this critique and provide good examples of how urbanization as a process that extends (often far) beyond city boundaries can be examined critically. Kitchen 2013 for example examines forestry within an urbanised region in Wales. Saguin 2017 explores the relational nature of the production of socio-ecological risk and hazard from flood infrastructure that extends far beyond the city in order to serve the needs of Manila (see also Batubara, Kooy, and Zwarteveen 2018 under *Other Urban Waters – the Political Ecology of Non-Potable Water*). Vij et al 2018 and Karpouzoglou et al 2018 both examine how urban expansion in Indian cities are shaping peri-urban spaces and access to resources like water and land. Rice and Tyner 2017 use Urban Political Ecology as a lens to understand how re-ruralization of Cambodia under the Khmer Rouge had profound effects on urban space as well. Understanding the urban as a process and site brings with it methodological and analytical challenges, but the papers in this section provide important clues about how to address these challenges.

Angelo, Hillary, and David Wachsmuth. 2015. "Urbanizing Urban Political Ecology: A Critique of Methodological Cityism." *International Journal of Urban and Regional Research* 39 (1):16-27. doi: 10.1111/1468-2427.12105.

> The authors suggest that engaging with Lefebvrian framework would allow UPE to explore urbanization as a process which extends beyond the city. In doing so they suggest that the city can become not just the site but rather the object itself of research, exposing the ways that global urban processes shape the reproduction of socio-natures and the was that urbanization itself produces space as rural or urban, material as social or natural.

Karpouzoglou, Timothy, Fiona Marshall, and Lyla Mehta. 2018. "Towards a peri-urban political ecology of water quality decline." *Land Use Policy* 70:485 - 493.

> Focusing on a case study of peri-urban Ghaziabad (India) the article traces the politics of water quality decline. The find that water quality decline is primarily caused by industries, whose presence in these peri-urban areas result from a reconfiguration of land use that ignores the social and environmental impacts on the poor in favor of elite interests.

Kitchen, Lawrence. 2013. "Are Trees Always 'Good'? Urban Political Ecology and Environmental Justice in the Valleys of South Wales." *International Journal of Urban and Regional Research* 37 (6):1968-1983. Doi: 10.1111/j.1468-2427.2012.01138.x.

> Differentiated from other studies of urban forests planted for aesthetic uses or carbon capture, Kitchen 2013 explores the case of Coed y Cymoedd, an urban industrial forest in an urbanized region of Wales (UK). The author highlights the need to take into account socially determined spatial and temporal effects when ascribing value to socio-natural resources such as trees. Further, to account explicitly for tensions between production and consumption practices.

Rice, Stian, and James Tyner. 2017. "The rice cities of the Khmer Rouge: an urban political ecology of rural mass violence." *Transactions of the Institute of British Geographers* 42 (4):559-571. doi: 10.1111/tran.12187.

> Rice and Tyner 2017 demonstrate how the re-ruralization of Cambodia under the Khmer Rouge to support export oriented rice production also transformed urban sociospatial practices. They contradict narratives of the regimes anti-urban bias by demonstrating that Cambodia's cities were repurposed and urban social-spatial structures transformed to logistically and administratively support the regimes economic aims. They demonstrate the need to look beyond city limits to understand processes of urban change.

Saguin, Kristian. 2017. "Producing an urban hazardscape beyond the city." *Environment and Planning A* 49(9):1968-1985

> This paper productively engages with the calls to urbanizing urban political ecology but argues that while doing so the city should not be lost as a conceptual anchor. Focusing on the relationship between the "non-city" (in this case the Laguna Lake) and the "city" (Manila) highlights the relational processes that extend the urban beyond city boundaries.

Vij, Sumit, Vishal Narain, Timothy Karpouzoglou, and Patik Mishra. 2018. "From the core to the periphery: Conflicts and cooperation over land and water in periurban Gurgaon, India." *Land Use Policy* 76: 382 - 390.

> Vij et al 2018 demonstrate the how the demand for water and land to aid urban expansion in Gurgaon result in the periurban areas being systematically undermined. They argue that these process breed both conflict and cooperation, often co-occurring within the same relationships. The research highlights the need for more research on the politics of periurban change and the potential for an UPE of the periurban.

Urban Political Ecology of Electricity

There has been surprisingly little engagement with energy systems or electricity infrastructures through an explicitly Urban Political Ecology lens. However, Silver 2016 has convincingly argued that energy infrastructures, like water, are key sites through which the political economy of power shapes cities. While Silver 2014 does not adopt an explicitly Urban Political Ecology approach in his earlier paper he does build on many of the key ideas of Urban Political Ecology and as such is included here. While analysis of electricity infrastructures is a nascent concern for Urban Political Ecologists it is appears to be a potentially fruitful area for further growth of the subfield.

Silver, Jonathan. 2014. "Incremental infrastructures: material improvisation and social collaboration across post-colonial Accra." *Urban Geography* 35 (6):788-804. doi: 10.1080/02723638.2014.933605.

> While not explicitly an UPE paper, Silver 2014 builds on many key ideas in UPE and offers a way for UPE link micro scale practices to wider processes that reconfigure urban space through a focus on the incremental. Examining the shifting social and material configurations of electricity infrastructure in Accra serves to reveal the ways that residents are generating conditions of possibility and new infrastructural conditions in the city.

Silver, Jonathan. 2016. "Disrupted Infrastructures: An Urban Political Ecology of Interrupted Electricity in Accra." *International Journal of Urban and Regional Research* 39 (5):984 - 1003.

> Focusing on moments of infrastructural failure, the times when the lights go out in Accra, this article explores the interconnected socio-natural process that produce energy disruption and interruption in Accra. Analysis is multi-scalar connecting international capital, greenhouse gashouse emissions, urban sprawl, informality and changing energy practices amongst other factors with the everyday experience of infrastructural disruption.