Urban Environments as Spaces of Living in Transformation

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Theme 3: Accidental Nature

Introducing Urban Environments as Spaces of Living in Transformation

Eveline Dürr
Institute of Social and Cultural Anthropology, LMU Munich

Regine Keller
Department of Landscape Architecture, Technical University of Munich

The Urban Environments Initiative (UEI) hosted a virtual event in June 2020 to further explore urban related topics within an interdisciplinary framework (read summary here). From this experimental workshop, three core topics addressing up-to-date issues in urban research emerged and inspired a series of succinct position papers. Within these papers, workshop participants sketch out their contributions to their respective field of study and situate their work in the state of the art of scholarly debate. In what follows, we point out the ways in which the position papers advance our understanding of the urban and some of its manifold facets. First, we tackle the question of how we can conceive of, and describe, the urban texture per se. We then shift to the more political realm and scrutinize the ways in which imbalances and inequality become manifest in urban settings. Finally, we explore a far less studied research field by focusing on "unintended consequences," which—more often than not—shape the urban condition decisively. At times, the unintended, accidental, and unplanned results of an intervention turn out to be more important than the meticulously and thought-through planned project itself. It is therefore key to analyze how urban environments, their perception, and their planning develop a life of their own, and thus shape urban life in their own ways—beyond human control, but rather in interaction with all actors involved. This points to the need to re-think the urban in different terms and, in particular, to take into account more-than-human species.

1. Re-thinking the urban

Defining the urban is a challenging endeavor as disciplinary views reflect different emphasis on a range of complex urban features, such as the social fabric and lifestyle, the built environment and infrastructure or the ecological context. Without glossing over disciplinary views, we still seek to distil what makes the "urban" distinct and how we conceptualize urban "environments" in our research in different ways. What are constituent components of urban environments in our respective approaches and research fields? While the seminal works of Georg Simmel (1903) and Louis Wirth (1938) stress categories that we still consider relevant today, such as heterogeneity, anonymity or plurality, we need to extend these notions and include nonhuman actors as key players shaping urban life(styles) (Donna Haraway 2010; Anna Tsing 2015; Timothy Morton 2019). In light of the current COVID-19 pandemic, for instance, it becomes obvious that actors invisible to the human eye constitute a strong force in our daily life world. In this vein, the urban can be conceived of as a multi-species assemblage, that brings together a much broader range of "strangers" than

originally thought in conventional work on the urban (see also Farías and Bender 2011). This line of argument has consequences for re-thinking the urban in various disciplines and brings into view a much broader set of actors, agencies, and articulations. This also sheds new light on interactions and complicates, for instance, planning processes as well as social research, which are largely human centered and often ignore the presence and needs of nonhuman forms of life. Acknowledging the impact of more-than-human actors on the ways in which the urban is made and experienced may change how re-planning is approached, how the city is imagined, and who and what constitutes central parts of this imagination. With this in mind, Sharma suggests "to recognize the urban as an ecological formation" creating a "distinctive place of habitation" that is populated with "unseen inhabitants," more-than-humans and—at times—with "'unexpected neighbors.'" A relevant example are "rurban" elephants. Anindya and Srinivasaiah urge us to pay attention to the ways in which increasing urbanization profoundly changes the living space of nonhuman residents. Both authors also challenge us to seriously consider possibilities for a common future rather than to exterminate unwanted neighbors.

Another issue relating to the conception of the urban is the question of boundaries. Is it at all possible and meaningful to draw boundaries and ask where does the urban end and the rural begin – or better, where does the urban intersect with the rural? Or are metaphoric notions of cities more suitable, such as networks, metabolisms, organisms, and ecosystems? Are cities, their human and nonhuman dwellers in any case related to, and shape each other and the planet at once (see also Acosta et al. 2020)? This question leads us inevitably to the notion of infrastructure and physical/built environment. In this vein, we can see the urban through the lens of infrastructure and its logistical challenges (Mauch): "Transforming 'natural' features into streamlined ones, creating operational territories, new urban forms, and trans-regional infrastructures that aim at (though rarely achieve) the frictionless accumulation and circulation of commodities while driving processes of extended urbanization challenging city-centric 'urban age' discourses." Thus, urban worlds are dramatically shaped by logistics and planning processes. This also makes us think of the urban less in terms of an entity with borders and boundaries, but more as a transregional phenomenon, situated in, and shaped by, a global context. Conceiving of cities as global urban environments (Müller), leads us to the question of what role cities can and should play in the creation and mitigation of global environmental degradation. As cities host a wide range of resources in terms of materials as well as knowledge, cities might not only be seen as a "problem" in the global environmental debate but also, as part of the solution. For Ludwig, the architectural approach Baubotanik, which combines conventional construction engineering and botany, concrete and living plants, does not only reduce the ecological footprint of buildings but can actually help the environment to regenerate. In a similar vein, Pauleit stresses the approach of the urban planning concept Urban Green Infrastructure (UGI) to transcend the conventional distinction between "nature" and the built urban. Moreover, by rethinking urban structures not only in respect to environmental issues but to social challenges as well, the UGI opens avenues to transform urban spaces into areas that allow socially and ecologically more sustainable living conditions by considering both human and nonhuman forms of life.

Finally, studying eateries and practices of food consumption, Gora rejects a clear distinction between the urban and the rural, and instead points out how the production, distribution, and consumption of food create "collaborations between the urban and the

rural," and thus "mixes multiple environments together." Her pointed observation that "cultures eat ecosystems" leads us to questions addressing the unequal distribution of both the causation and costs of environmental destruction and its consequences.

2. The unjust urban

Issues of injustice and inequality in cities are pertinent topics that are inextricably linked to "environment" and need to be considered in an interdisciplinary perspective. Key questions in our debate center on forms of injustice and inequality that might be particular to urban contexts, in particular when we base our understanding of urban "environment" in what Anna Tsing (2015) calls the "ruins of capitalism." In tackling these challenges, it is important to reflect on one's own positionality as a researcher and to ask what our role is as scholars in these contexts. Who and what do we foreground in our research, what is made visible, and what remains hidden in our debates and why? How can we give voice to more silent, subtle, and invisible forms of inequality? Seeking a "just" relationship with the environment includes the ecological dimension without losing sight of the social and the political. By pointing to socioecological injustices, in particular degradation caused by prestigious waterfront projects (Choi) ask if it is possible to reclaim and improve both ecological and social dimensions at once. The notion of "reclamation" can help us design a new agenda for a more inclusive urban environmental justice. Further, a political ecology approach allows us to address inequality from a somewhat different angle (Adedeji). Power, capital, and hegemonic interest are key dimensions in analyzing the socio-ecological impact of urban infrastructure projects, ultimately leading to entrenching and exacerbating the socio-economic inequalities in urban space. This is evident in a range of urban projects, such as the redesigning and transforming of waterfronts, which tend to polish the urban image and beautify some neighborhoods to the detriment of others. This can be framed as environmental gentrification and intensifying segregation (Schlichting) and on the other hand "repurposes the environment once again as an instrument of capital creation." The (negative) impact of these infrastructural projects are often racialized, as evident when social privilege is at stake, for instance in American white suburbia (Gioielli), where infrastructure and mobility projects cater to mainly white residents, while furthering the stigmatization of non-white residents. Evidently, when reading these case studies, it is important to keep in mind that environmental injustices do not reside in the local but ultimately affect the planet as a whole.

3. Accidental nature

Finally, issues of un-/intended consequences of urban transformation, and/or transformation of the urban respectively, have inspired a number of presentations and contributions in the course of our discussion. How can we understand the emergence of "accidental nature"? What does it mean to consider something accidental—are our actions still based on the assumption that urban life is projectable and foreseeable to a large extent? We argue that the unplanned and unintended are integral dimensions of all interactions with the urban. This becomes evident in planning processes, when for instance the removal of materials for projects of dense urbanization lead to the creation of new lifeforms, as was the case in Abu Dhabi, where mangroves and other plants appeared as a kind of "spontaneous nature"

(Burt, Killilea, Rademacher). New forms of natural habitat emerge as a consequence of urban growth. The knowledge about spontaneous nature and the unexpected effects on urban structures as well as the creation of new habitats shows us how much research on these phenomena must be continued on an interdisciplinary level. While those approaches recognize and appreciate nature's self-will, Ludwig's advocates a more radical step. Inspired by living bridges in India made entirely from aerial roots that were bent by human imagination, he proposes to take the potential of plant growth seriously and to actually concede planning authority to "nature," effectively making it a co-designer in urban planning. In a next step, we can move from appreciation of accidentally created nature to actually take nature's agency seriously and to allow it to actively contribute to the built environment ...to make nature co-architect and city planner... That is to consciously work with the accidental or, as Ludwig puts it, with the uncertain "outcome."

We would like to thank all contributors for their time and effort in producing this collection of positions papers that interact with the themes of what is the urban, the unjust urban, and accidental nature. We are confident that each paper will push you to re-think the urban in a variety of ways and in many different regional contexts across our globe's various urban worlds.

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The City under Stress:
Waking to a Multispecies Urban

Avi Sharma
Center for Metropolitan Studies, Technical University Berlin

Urban theory began in the second cities of the world. Not New York but Chicago, not London but Manchester, not Europe's capital Paris but its second city Berlin. And it was grounded in fantasies about what modern cities could and should be. Urban theory was and remains aspirational, scaffolded by an imaginary city: a city where creativity blooms, physical and class mobility is accelerating, tolerance and secularism are in the very air. If classical urban theory was aspirational, though, it was also apocalyptic. Behind the treelined boulevards, dirty, crowded, dangerous streets were just out of view; creativity and tolerance were twinned with clannish behavior and ethnic chauvinism; transparent governance and global trade were threatened by corruption, rent seeking, speculative and informal economies. This dualism persists in contemporary research and practice, but now the cautionary twin lies far from the metropolitan core in Europe and North America in those parts of the world variously termed Southern, Developing, or Third. Of course, neither the aspirational nor the apocalyptic city has ever really existed.

Fundamental problems with the "Urban" as a category of analysis have been visible for years, and this is clear in the widely remarked proliferation of analytics, perspectives, definitions and terminologies within Urban Studies itself. Urban scholars struggle to explain how the urban is distinctive if its characteristics (fashion, taste, securitization, complex financial instruments, gender norms, for example) are to be found in far flung locations that are manifestly *not* cities. And where should one demarcate the boundaries of the urban in an age of vastly expanding conurbations – ones that depend on infrastructures, financial instruments, production and consumer networks that are outside of their extraordinarily fluid borders (Rickards et al. 2016: 1524)?

Something is missing in Urban Theory, and researchers and practitioners keep searching for something to fill the gap. And while it is impossible to reduce conceptual and methodological challenges of urban research to one problem, there is feature common to diverse urban perspectives: the sharp analytical orientation to humans–as objects of power, agents of change, authors of city and architectural plans and so on. But cities, of course, are not just spaces of human habitation and the urban is not just an agonistic field where humans (planners, engineers, managers, capitalists, activists, subalterns) create materially distinctive landscapes—aspirational, apocalyptic, or otherwise. If humans are the common thread to otherwise wildly different urban analytics, isn't it possible that *the missing piece to the urban puzzle is not actually human*? A more-than-human perspective offers us tools for thinking about urban ontologies, which productively revise fictions of an aspirational/apocalyptic urban dyad (Prakash 2008) without denying that cities are also a distinctive category of analysis.

More Than. Urban Political Ecology, Multispecies and More than Human Perspectives

In 1961, ecologists at the Technical University of Berlin embarked on an extraordinary journey that put in place fundamentally new ways of understanding the urban. Led by Herbert Sukopp, ecologists began to discover that (West) Berlin was home to an extraordinarily distinctive ecology, rich in biodiversity. The nature they discovered in Berlin was not distinct from the urban—it was an urban nature deeply tied to the particularities of place and space. And this was a revelation, because paradoxical though it may seem, peculiar ecologies can help us locate the city—and help us to distinguish cities both from one another, and from other kinds of human settlement. It was *different in Berlin* than it was in the countryside, and Berlin's political ecology was also *distinct from other cities*, which are themselves distinctive in *their own ways*.

In recent years, anthropologists (Eben Kirksey, Anne Rademacher, Bettina Stoetzer), geographers (Maan Barua, Matthew Gandy, Sandra Jasper), historians (Dorothee Brantz, Sonja Dümpelmann, Simone Müller) and others have helped us to understand the urban not as a triumph of culture and human creativity over nature, but as a particular kind of nature that is also a distinctive *place* of habitation.[1] The city was and must always be a multispecies space, a co-creation where the planned gives rise to spontaneity, and the informal calls forth planning; where different species negotiate space and resources with one another, with and against the built environment; in sympathy and antagonism with human actors.

As Maan Barua and Anindya Sinha (2020) have shown, the urban is fundamentally an "ecological formation" where lives are shaped not just by capital, infrastructure, flows, intensities, humans and so on but also by soil composition, water tables, proximity to the sea or mountains, the presence or absence of snakes, rats, cattle and dogs, mosquitos, cats, termites, fleas; the intensity of rainfall, the resilience of native tree species and the uncontrolled growth of neophytes. The urban as a category is a lively one.

This is not to say that "man" does not have a particularly potent role in the act of creation and the worlds that are created, nor is this—I hope—a provincially metropolitan perspective that elides the precarity and violence of vulnerable urban livelihoods. Multispecies urbanism brings into view cities as distinctive and dynamic life-worlds by making visible the range of actors, ecologies and environments that have always been central to the act of city formation.

What might that look like in practice? Dorothee Brantz (2010), Sonja Dümpelmann (2020), Matthew Gandy (2003), and Bettina Stoetzer (2018), for example, have all worked on plants and animals in urban environments. They have shown how they migrate, how they build habitats in concert and conflict with other species, how they are impacted by and resist planning and pacification, become sites of contestation, politics etc. A multispecies urbanism is useful because it shifts our vision to include other modes of urban creation and fields of political contestation and can alert us to the ways that urban nature itself helps us to *locate and site* the city—a contribution that softens the problematic metalogics of, for example, planetary urbanism on the one hand; and mitigates the ontological pull of the assemblage on the other.

On Waking

The goal of a just and sustainable city (a goal both aspirational and apocalyptic) is in my view praiseworthy. But it is only ultimately possible if we recognize that cities are both singular and plural, inhabited by many and created with and against a range of *more-than-human* actors. What are the different kinds of ecologies that we know are distinctive to the urban form? Where are they located? How might they help us to understand the connections between cities; to imaginatively engage with characteristics of the urban? And most importantly, how might this shift in vision make it possible to recognize the *value* of other than human life that occupies the urban *without simply reducing that value* to a question of human interest? "More than" shifts our view from human actors to a range of forces and agents and makes it possible for Barua and Sinha (2020) to see how, for example, cattle, feral dogs, macaques and elephants shape urban rhythms, spatial form, materiality, and consumption not just for and in relation to humans, but for and in relation to themselves and each other.

Rather than adding just another discourse to an already crowded urban field, I think that multispecies and more-than-human approaches go some way in resolving a problem common to the broad range of urban theoretical approaches—namely, the orientation to the human. Indeed, I am suggesting that we can *permanently rupture* the apocalyptical and aspirational dyad by recognizing that cities are not and have never been the sole creation of human agents—elite, subaltern, or otherwise.

This is not to say that multispecies or more than human perspectives are master keys that will unlock the urban puzzle. Simply to recognize the urban as an ecological formation, however, is to wake to a world of "unexpected neighbors" (Stoetzer 2018), of specificity and plurality, competing and coinciding interests. In simplest terms, these perspectives get us closer to seeing "actually existing" cities by recognizing the radical diversity that constitutes the urban in similar yet different ways across the globe (Brantz 2017). Not a city of, by, and for humans but a city inhabited by uncounted and often unseen inhabitants. To see the city might require little more than *waking* to a more-than-human world.

Notes

[1] There are many people making contributions across a variety of disciplines, and the following are chosen in part because of their connection to the Urban Environments Initiative and the Rachel Carson Center.

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The Elephant in the City: The Trialectics of Space in the Rurban Elephants of Southern India

Anindya Sinha

Frontier Elephant Programme, National Institute of Advanced Studies, Bangalore, India

Nishant M. Srinivasaiah

Frontier Elephant Programme, National Institute of Advanced Studies, Bangalore, India

Urbanization is at the forefront of the challenges that India and several other nations of the Global South confront in the twenty-first century. Our rapid urbanization is leading to severe environmental loss or degradation, seriously affecting the lives of most nonhuman species, with which we share our world. What remains overlooked, however, is the growing synurbization of our wildlife populations, whereby various urbanizing influences, primarily human activities, force individual animals to adapt to these altered socioecologies for their very survival. And although we are now concerned about the urbanization of nature, viewed as a transformative process, we continue to be silent about how urbanization alters nonhuman lifeworlds.

This essay reflects on the unusual lives of elephants in the plains of southern India, to whom we have brought home the city. The beginnings of their synurbization were innocuous enough, with transport infrastructures built through the forests, promising development to otherwise isolated human communities but these linear intrusions effectively began to fragment the coherent lives of elephant groups. The farming communities at the forest periphery now let their cattle and livestock graze the forests, competitively with the elephants, while the forest management built cemented waterholes to provide water to the drying forests and watchtowers to monitor the restless wildlife. Although the elephants became familiar with humans and their intrusions in the course of the forests opening up, they eventually decided to come out of the forests. Their movement was further expedited by our changing land use, especially the development of peri-urban agriculture around the shrinking forests.

Expanding agricultural fields, facilitated by the transition from dry-land cropping to water-fed agriculture, now provisioned these forest elephants with a staple source of rich human foods, triggering off urbanized wants and new opportunities in their lives; a process of urbanization, as defined for humans by Pitirim Sorokin (1928) and Talcott Parsons (1949), had begun. This synurbization has manifested through extreme behavioral adaptations displayed by individuals against increased risks of mortality, including often-maladaptive reformations in their social lives. The once-solitary adult males have now come together to form protective, stable associations against the farmers, who guard their fields. Elephants

often spend their days immersed in village water bodies to escape being driven away, at night they walk for miles to forage in crop fields and orchards.

The urban has, therefore, permanently altered the structure of the landscape and profoundly influenced the lives of its inhabitants, both human and nonhuman. Crucially, the essential nature of their relationship has transitioned from the human reverence for elephants to agonism, from peaceful coexistence to aggressive competition. The forests have been disrupted forever, urban environments, once dominated by humans alone, inexorably appropriated by the elephants for their own. As Chris Philo and Chris Wilbert (2000) point out, the orderly animal spaces, traditionally decided upon by people, have now been replaced by beastly places, which the elephants themselves have established – and all these dramatic synurbic transformations within the life span of an individual elephant!

Concordant with these bewildering changes have appeared other novel, human-devised, ethologizing infrastructures: obtrusive electric fences, deep elephant-proof trenches, prying camera traps. These intrusions have pushed the now-rurban elephants—those learning to adapt to rapidly humanizing environments—to further develop innovative, but ultimately maladaptive, behavioral strategies that seem to initially promise survival but lead inevitably to a losing battle with forces far beyond their control.

Living often up to seventy years in the wild, elephants have excellent memory and cognitive capacities. These are reinforced by collectively established cultural traditions, which allow them to access and navigate towards resources while avoiding threats as they migrate annually across their extensive home ranges. Close examinations of short-term decision-making by the rurban elephants and their life-histories in the long term could thus provide insights into their perceptions of changing spaces over time, and finally account for their conceptualization of urban spaces. Is it then possible for us to investigate the trialectics of perceived, conceived, and lived spaces in our elephants, so elegantly philosophized by Henri Lefebvre (1991) and Edward Soja (1996)?

Over the last seventy years, the home range of an individual male Asian elephant in the wild, born into a herd in southern India, has changed from being a forest to an agricultural village, his food from natural forage to cultivated crops, his activities more nocturnal than diurnal; he is no longer solitary but a member of an all-male group. He has learnt to break electrified fences, looks to either side of the road for traffic before crossing a six-lane highway and spatio-temporally navigates to avoid interacting with humans. The perceived, organic world of the elephant, therefore, includes humans, infrastructure, and novel but stressful associations, almost in the everyday. The female elephants in this landscape have not, however, changed as much, protected as they are by their maternal instincts to keep their young away from the crop fields – the risks involved are forbidding.

The perceived space of an elephant born today would thus be very different from that of its mother or other older relatives. For a newborn elephant, interacting with humans is now a norm, crossing a railway track part of its routine and water bodies are not just for drinking, bathing or socializing but constitute important external refuge amidst humans. As elephants in our study landscape now display a strong affinity for forage, including human-origin foods, a weak affinity for the plentiful water now available, but a severe avoidance of

humans and their infrastructure, we can perhaps visualize dramatic changes in their conceptions of space over time, from that of a world when there were only forests with limited water sources, exclusively natural food and, most importantly, no humans.

The male rurban elephant of today cannot, however, afford to live in a fictional, conceived world. He needs to learn the nature of his habitations, the larger home range, the paths he must take to find his forage and the migratory routes through the hills. These are his lived spaces and he formulates them through his individual experience, social learning from his compatriots or the cultural traditions that pervade his society. Each experience, each learning is unique for the individual but collective learning also pervades the group. We can then only imagine how the lived space for every male elephant today must represent a constant struggle between a generationally determined, conceived space of an idealized, nonhuman existence and a currently perceived world of synurbic resource availability and impending threats, shaped by newly acquired knowledge of rapidly changing, spatial realities.

What then might urbanization entail for animals themselves and how can we evoke animals' geographies of the urban, with and against the grain of human design? It is imperative that we track these sentient and sensitive ecologies in ways that are attentive to nonhuman lifeworlds, not just as fundamental constituents of the urban, but to ecologize urban planning and governance in the days to come. We need to rethink, not only the urban, but the human, the animal, and our methods of governance, beginning from the ground up to include the broad assemblage of sentient actors that constitute urban spaces. The behavioural ecologies of the nonhuman, with typically human-dominated political ecologies, have thus come to represent one of the most diverse challenges—and opportunities—for lively engagements in the urban of today. Our common worlds and entwined futures are here and now.

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What is the Urban… Logistically Speaking?

Felix Mauch
Munich Center for Technology in Society, Technical University of Munich

In contemporary capitalism, making is inseparable from moving. The world is bound up in supply chains, moving commodities from mines and farmland to factories and supermarket shelves. Within these networks, logistics sets the rhythm. The science, technology, and art of efficiently managing the mobility of things and people is increasingly proving to be an omnipresent phenomenon (Tsing 2009). For advocates and critics alike, logistics is "trans, inter, and post. It cuts edges, crosses boundaries, and most certainly works outside the box". And it is about (just-in) time as it is most certainly about (seamless) space (Cowen 2014).

Logistics therefore, both materially and metaphorically, is inextricably tied to urbanization. As a managerial rationality and a material practice for reorganizing global space in service of expanding the total circuit of flows, it is fundamentally dependent on cities and their infrastructures to keep the constant movement of commodities going. The systems that coordinate the circulation of goods, ideas, and capital into integrated networks—from roads and railways to loading docks, warehouses, cold storage, and fulfillment parks—shape built environments, by creating operational landscapes of connectivity and transmission, designed according to a paradigm of efficiency and control (Chua et al. 2018). From whichever perspective you look at it, one thing is becoming more and more evident: urban worlds and tissues are made by logistics.

At the same time, cities can be major obstacles to circulation. They entail spheres of heterogeneity, social complexity, and unruly environments with which logistics has to deal. This friction between visions of unimpeded flow and the messy realities on the ground is a starting point for the reflections that follow: How is the urban produced and reproduced logistically? What kind of infrastructures and ecologies result from this? Who becomes mobilized and immobilized by processes of logistical urbanization? And what forms would such a development take? Is there such a thing as a comprehensive logistics city?

With regard to the latter, one might consider the historical genesis of major transit ports such as Singapore, Dubai, or Aden to be, among others, illustrative examples; vast agglomerations of key infrastructural services to manage the mobility of things between sites of production and consumption, shaped by the constant motion of goods, capital, and migratory labor. Urban life and livelihoods are entirely dependent on being the hinge of global trade routes, which are fundamentally tied to legacies of colonial planning and regulation. Over the course of the long nineteenth century, these logistics cities *avant la lettre* emerged as peri-urban formations, designed to enable a wider region in governing economic services. Theirs was a telos of efficiency, seeking to "improve" trade by minimizing the city's intrinsic messiness as well as optimizing spatial interaction. Zoning maps plotted warehouses, communications centers, procurement offices, and freight facilities next to each other, interspersed with residential zones, naval defensive works, cropland, and traversed by large-scale transport infrastructures.

As an alternative to Europe's industrial metropolises, the colonial logistics city eschewed manufacture and production. It was instead dedicated to the facilitation and synchronization of commodity flows, thereby enabling a unique kind of globality, in which the material network of distribution systems made the otherwise mysterious abstractions of capitalist forces very concrete. While the logistical gaze stretched borders and circumnavigated imperial regulation by supporting the establishment of highly secured *free trade* and *special economic zones*, urban rhythms and everyday life were recoded according to the logics of interoperability and the cost-efficient provision of operational territory.

But to shift back more towards the conceptual: As recent theoretical contributions from urban history and STS emphasize, the analysis of space and spatial relationships allows not only for a more nuanced understanding of the *city*—but the *urban* itself (Rodger and Rau 2020). That is to say, the fine grain of socio-economic, political, and envirotechnical characteristics, the means by which they overlap, and how they align through synergies of actually heterogeneous components. Logistics nests itself in exactly these interfaces. Between the protocols and calculations of management and the contingencies of things on the ground, it lies down a murky and slack mediating layer that allows the former to exist in the latter. This is enabled through a set of specific planning efforts that employ elements of architecture, infrastructure, terraforming, and landscaping. In this manner, I would argue, the growing importance of logistics (cities) forms an integral part of what is nowadays intensively discussed as "planetary urbanism" (Brenner and Katsikis 2020).

According to this approach, the popular claim that we now live in an "urban age" because the majority of the world's population lives in cities is a somewhat misleading premise for understanding the urban. For cities are neither isolated manifestations nor universally replicable expressions of a universal condition, but embedded within wider, territorially uneven and constantly evolving processes of urbanization at all spatial scales; encompassing both built and unbuilt spaces, across land, water, sea, and atmosphere. Take Singapore as an example. Both historically and from a contemporary perspective, its politics of incorporating productive territories in neighboring Malaysia and the Indonesian archipelago has been indispensable to urban development. In the island-state metropolis, vital resources including primary products, labor, energy, and increasingly sand are withdrawn from the wider region. Such co-existence of the logistics city with extra-urban territories of high-intensity extraction and agro-industrialization not only sheds light on the role played by hinterlands in the production of urbanity (Ghosh and Meer 2020), but also invites consideration of maritime logistical infrastructure—sea lanes, shipping corridors, and dredged canals—as urban phenomena. Which, in return, raises the question: to what extent is logistical urbanization pushing even beyond the city? And how does it engender ecologies, materialities, and subjects along the supply chain?

For all its material impact, however, this logistical quality of cities like Singapore and others goes largely unnoticed in the metropolitan imaginary. This is precisely because banal operational functionings tend to be overlooked and made invisible by more spectacular elements such as iconic high-rise starchitecture, waterfront development, or nostalgic port romanticism. A closer look, on the other hand, reveals that logistics is amongst the clearest distillations of how capitalism operates: transforming "natural" features into streamlined ones, creating operational territories, new urban forms, and trans-regional infrastructures that aim at (though rarely achieve) the frictionless accumulation and circulation of

commodities while driving processes of extended urbanization challenging city-centric "urban age" discourses.

To summarize: Firstly, the *logistics city* stands out as a different urban form for the ways in which it stitches together diverse urban spatialities and regions across the Global North and South, continuously reconfiguring connections according to the demands of supply chains neither constrained by sovereign rule nor national borders. Conceptualizing *logistical urbanization* as an irruptive, uneven and relational historical process whose dynamics extend far beyond sites of agglomeration, secondly, adds a critical perspective to mainstream city-centric "urban age" discourses. Finally, the fact that logistics is anything but smooth, but rather entrenched in histories of violence, exploitation, and dispossession, should not be overlooked. With its roots in military tactics, it more often than not produces splintered landscapes of connectivity, altering as well as reinforcing patterns of socio-spatial inequalities, colonial legacies, racialized hierarchies of labor, and the externalization of environmental costs to regional hinterlands. A sustainable city would be something different.

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Global Urban Environments: Approaches and Perspectives

Simone M. Müller
Rachel Carson Center for Environment and Society, LMU Munich

Send it on a Caribbean Cruise

In the 1980s, there were four things a city could do with its urban waste "burn it, bury it, recycle it, or [...] send it on a Caribbean Cruise," said New York City Mayor, Ed Koch, mockingly. Philadelphia sent its municipal incinerator ash to destinations in the Bahamas, Panama, and Haiti. New York to Belize, Cuba, and Mexico. Baltimore deliberated about the Dominican Republic. Los Angeles, finally, had its eye on Guatemala and the Philippines. From Europe, these particular garbage cruise lines traveled across the Mediterranean from Lisbon to Angola, from Paris to Morocco, or from Naples to Nigeria. Cities all over the northern hemisphere seemed to be lining up for the "next big thing" in municipal waste disposal: its export to the Global South. This globalization of a city's waste metabolism, however, not only marked the externalization of municipal hazards wrapped in new challenges for environmental justice, but also created one of two forms of what I call *global urban environments*. Global urban environments signify both the worldwide reach of urban hinterlands facilitated through cities' entanglement in international networks of trade, infrastructure, and communication, in addition to a seemingly global universality of environmental challenges cities are facing. Their study invites urban and environmental historians to join forces to assess and extrapolate the role and importance of cities in processes of global environmental transformation.

Global Urban or Global Environmental?

Combinations of global, urban, or environmental themes—making it primarily global urban or global environmental—have in the past decade emerged in both urban and environmental history as thriving new themes that re-scaled scholarly occupation. Urban historians—once obsessed with the scale and identity of one particular city, or street even—turned to study cities as nerve centers of long-distance connections. In environmental history, its planetization took off after 2008 with the first mentioning of the *Anthropocene*, the study of which has since seen an excessive boom.

In both fields, this re-scaling was as much a response to historiography as it was one to real-life challenges and their political framings. From an environmental perspective, land formations, wind patterns, and geophysical phenomena had never paid attention to borders; neither did volcanic eruptions, earthquakes, or tsunamis. With Bhopal in 1984 and Chernobyl in 1986, scholars had also come to understand that human-made environmental catastrophes could not be territorially contained. From an urban perspective, the past decade brought the advent of the urban age. In 2007, the United Nations announced that for the first time in human history, more than 50 percent of the world's population lived in

cities. With this putative crossing of an imaginary threshold, the city became the "universal form of human settlement" and the "urban question" moved to the center of intellectual life. The simultaneous globalization of both urbanization and environmental degradation has made cities both "front lines" where planetary environmental crises were most dramatically experienced as well as techno-social arenas in which potential responses were pioneered turning cities into the key governance entities to usher in global (environmental) transformation.

Studying Global Urban Environments

Both fields of inquiry, global urban and global environmental history should be brought together through the study of *global urban environments*. The historical study of cities' global metabolism and the universality of challenges due to planetary environmental degradation can bring important insights into the global reach of cities, the interplay of global and local responses to environmental degradation, and the role cities can play in global environmental transformation. Key to studying global urban environments is the analysis of the quality and nature of connections between urban centers and the global environment.

First, we need to understand the qualitative shifts in global urbanity in its changes over time. New York City's export deal with Belize, Philadelphia's with the Bahamas and Panama, Los Angeles' with Guatemala, Naples' with Nigeria, or Lisbon's with Angola. The story of cities' expanding radius for waste disposal in the 1980s exemplifies the possible reach and structure of global urban environments and illustrates how international trading, infrastructure, and communication networks allowed cities to impact and extract from environments hundreds and even thousands of kilometers from their urban core. The observation of city's global metabolism, however, is not a phenomenon unique to the late twentieth century. Similar dynamics were already at play more than a hundred years earlier facilitated through railroads, steamships, and telegraphs. As William Cronon showed in *Nature's Metropolis*, Chicago was already in the nineteenth century heavily dependent on grain, lumber, and cattle from destinations many hundred miles distant. Similarly, Jim Clifford traced how the origin of many consumer goods in nineteenth-century London, such as soap, candles, bread, margarine, marmalade, leather shoes or wooden furniture, originated from raw materials imported from Canada, the United States, Jamaica, Peru, Brazil, Spain, West Africa, India, Ceylon, and New Zealand. In fact, the continuous growth of London's industrial economy and population, according to Clifford, relied heavily on environments outside of Britain. While the technologies of steamship, railroad or telegraphy certainly made global trade in natural resources easier and faster, we can find similar patterns already with the ancient Romans relying on a relatively long-distance timber trade in the Mediterranean or similarly the Dutch importing wood for their cities from the Baltic region in the sixteenth century. If we want to understand the role cities take on in creating, let alone, mitigating global environmental degradation, we need to understand the quality and historical changes of global urban metabolism and cities' respective relationships to their "hinterlands."

Second, we need to historicize and deconstruct the notion of a global universality of environmental problems that cities face. On the one hand, the global waste trade exemplifies how structural similarities played out in cities in industrialized countries in the

1980s. New York City, Baltimore, Philadelphia, Los Angeles, Rome, Naples, Paris or Frankfurt all had the same, or at least very similar waste disposal problem. They all faced the challenges of limited disposal sites, of growing opposition to opening up new disposal sites, and of rising disposal costs based on the two previous aspects mentioned. On the other hand, these cities solely represented the Global North while creating a waste problem for localities in the Global South. Their export schemes of municipal solid waste down South rather became an expression of the ruptures of global connectivity and global environmental justice than of the universality of a global waste crisis. In the context of global urban history, scholars from the Global South in particular, such as Ananya Roy and Aihwa Ong, have written against the totalizing tendencies of global metropolitan studies, arguing for greater attentiveness to the rich diversity of what they call "worlding cities." They argue that frameworks like capitalism, colonial history, and postcolonialism elide the heterogeneous experiences of places and people. In their line of argumentation, we could discuss the international trade with urban waste as a symbol for a plethora of urban waste crises and an epiphenomenon of global universality. At the same time, what brings these waste crises into existence and determines their build-up and their solution, is their entrenchment in specific local dynamics.

Conclusion

Climate change, sea-level rises, long-range atmospheric transport of pollutants on the one hand and massive urban growth in addition to growing urbanization on the other hand put before us that cities in their global environmental entanglement, *global urban environments*, are important objects to study. The question of what role cities can and should play in the creation and mitigation of global environmental degradation offers a unique opportunity for urban and environmental historians to join forces and to participate in important societal debates beyond the academic ivory tower. Historicizing cities' global metabolism and deconstructing the universality of environmental challenges can bring important insights into the quality of cities' global reach, the interplay of global and local responses to environmental degradation, and through that the role cities can actually play in global environmental transformation.

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The Imposition of Uncertainty

Ferdinand Ludwig
Department of Architecture, Technical University of Munich

Today, buildings are considered to be environmentally friendly if they cause as little damage to the environment as possible and have the smallest possible ecological footprint. This is often measured by their energy consumption: the lower the energy consumption, the better. As a result, buildings largely cut themselves off from their environment. With maximum insulation and minimum surface area, interaction with the immediate environment is reduced to the bare minimum.

Our present global environmental crisis calls for a rethinking of this approach. We can no longer limit ourselves to creating buildings that are less impactful on the environment; we must instead create buildings that help reverse the current trend and ultimately, contribute to the regeneration of the environment. Especially in the urban context, this means maximizing interaction. Every surface of a building must be multipurpose and facilitate ecological and social processes. Facades and roofs must not only provide habitats for flora and fauna, but buildings must also play an active role in improving the water balance and microclimate of a city, and to this end they must be dynamic. Accommodating processes in turn means allowing change, driven by the growth of plants as well as the adoption of human and nonhuman users. For classically trained architects, this can be viewed as an imposition, in which they seem to lose their authority over design. However, design is in fact becoming more important than ever. Moreover, it is necessary to design processes instead of finished objects.

"Baubotanik" is an architectural approach that proactively addresses this challenge. The German neologism Bau-Botanik combines aspects of construction engineering and botany and is understood as a form of architecture that creates buildings through the interaction of technical joining and plant growth. In particular, the growth of trees or their parts is manipulated and they are combined with non-living components in such a way that they merge into a plant-technical hybrid (Ludwig 2016).

In Baubotanik, the architect becomes a co-designer who, together with the tree, creates a building. It will never be "finished," even if desired stages of development will be reached sooner or later. How it will look in the future depends on events and factors that cannot be controlled. Forecasts are possible but limited to rather general statements. And the further one tries to look into the future, the more blurred the picture becomes. For architecture, which in principle is always designed in contrast to nature and constructed as durable as possible, this is an imposition; neither the size nor the proportions of a building can be precisely determined by the human designer. Moreover, its appearance changes with the seasons. In autumn the building first becomes colorful and then loses its leaves, in winter it is bare, gnarled or a filigree, in spring it sprouts again, perhaps blossoms, and in summer it is densely leafy, perhaps barely recognizable as a building.

A practical example that proofs the potential of the Baubotanik approach are the living root bridges of the Khasi, a people living on mountainous terrain in the state of Meghalaya,

located in Northeast India. Formed without contemporary design tools, living root bridges are an exceptional example of vernacular architecture that uses the manipulation of tree growth as a building technique. By crossing canyons and rivers, the bridges link homes, fields, villages, and markets. They provide an alternative to often unsuitable contemporary technologies and materials and can be seen as a highly specific solution for rural connectivity in Meghalaya's geography and climate characterized by high humidity, heavy rains, torrential rivers, and steep, densely forested hillsides. Living root bridges can last for centuries, growing stronger with time in a process that combines periodic human maintenance with natural growth processes (Middleton, Habibi et al. 2020). And the process of creation is characterized in particular by the fact that it takes a very long time; in many cases, those who have started such a project do not even get to cross the bridge during their lifetime. It represents a particularly slow form of architectural production, but also an almost unbelievable example of creative action driven by foresight and thinking beyond one's own lifetime. During their whole lifetime, living root bridges are intrinsically linked with their surroundings, ensuring slope stability and benefitting the ecosystem in various ways. They produce their own building material on site and absorb CO_2 over their entire lifespan. Thereby they go far beyond the established concept of sustainable design, which aims to satisfy fundamental human needs today without compromising the capacity of future generations to meet their own (Brundtland 1987). In fact, they represent an outstanding example of regenerative design and development (Kubba 2009).

How can this example serve our contemporary cities? Living root bridges, which often take several generations to become usable, are admittedly no direct answer to the pressing ecological and social questions of our time. But we should still perceive of the concept as an example to follow. Today we are confronted with environmental problems that will affect not only us but future generations. We have to address these problems with exactly that kind of intergenerational approach that the Khasi people of Northeast India have practiced for hundreds of years. Regarding the actions we take now, we need to think one or multiple generations ahead. And there is another crucial point: the ever-changing living root bridges, which are constantly undergoing transformation through nonhuman and human activity, are often more durable than steel or concrete bridges that are supposedly constructed for "eternity" (Ludwig, Middleton et al. 2019). In a time in which not only the climate but also many social systems are undergoing fundamental change, a static approach—as proposed by conventional architecture— can hardly provide safety. Only if we accept and, in fact, appreciate uncertainty as the basis of our design practice can we cope with the environmental crisis.

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Urban Transformation for Climate Adaptation via Green Infrastructure—What Does It Mean?

Stephan Pauleit

TUM School of Life Sciences, Technical University of Munich

Urbanization is a major trend of the twenty-first century. This trend provides opportunities and causes social, economic, and environmental challenges, such as an unsustainably high ecological footprint, low environmental quality in often poorly planned and built urban settlements, and climate change, which will severely impact urban areas.

Urban green infrastructure (UGI) is considered as a promising approach to successfully address these challenges by the development of networks of green and blue spaces that provide multiple benefits to human society and enhance urban biodiversity. Green infrastructure emerged as a planning concept in the US in the 1990s in response to the challenges of ecological fragmentation and degradation of sprawling cities. It is considered as a natural life support system for environmental, social, and economic sustainability (Benedict and McMahon 2002). The concept marks a shift from a conservationist approach that separates nature from urban. Moreover, UGI may include the entire range of green and blue spaces from natural and near-natural forests and wetlands, the many different kinds of human designed green spaces such as parks, gardens, and tree plantings in streets and derelict lands, and even incorporating the technical greening of buildings through green façades and green roofs (Cvejic et al. 2015).

The principles of multifunctionality, connectivity, integration and social inclusion were highlighted as being central to UGI in the EU funded research project GREEN SURGE (2013-2017), within which I was a member of the research group working on UGI planning (see. table 1). None of these principles is entirely new but I believe it is the consideration of all of these together, which makes UGI innovative.

1. **Green-grey integration—combining green and grey infrastructure**
   UGI planning seeks the integration and coordination of urban green spaces with other infrastructure, such as transport systems and utilities.
2. **Connectivity—creating green space networks**
   UGI planning for connectivity involves creating and restoring connections to support and protect processes, functions and benefits that individual green spaces cannot provide alone.
3. **Multifunctionality—delivering and enhancing multiple functions and services**
   UGI planning aims at combining different functions to enhance the capacity of urban green space to deliver multiple benefits—creating synergies, while reducing conflicts and trade-offs.

4. **Social inclusion—collaborative and participatory planning**
   UGI planning aims for collaborative, socially inclusive processes. This means that planning processes are open to all and incorporate the knowledge and needs of diverse parties.

Table 1: Core principles of Urban Green Infrastructure planning (Hansen et al. 2017a)

I became acquainted with the term of UGI in the early 2000s when working as an academic in the UK. With a background in the German approach to landscape planning and landscape ecology, and after having been involved in a European Union funded scientific network that explored "green structure planning" (Werquin et al. 2005), I was first hesitant to use this new term because it seemed to adopt a reductionist perspective on green and blue spaces as engineered solutions. Indeed, the risk of pursuing a technocratic approach to planning by UGI should not be ignored and has been rightly highlighted by some scholars (e.g. Lennon 2015).

However, despite this potential limitation, I became convinced that urban green infrastructure offers a perspective on urban landscapes that can promote collaboration between disciplines, notably ecology, environmental sciences, architecture, urban planning, engineering of technical infrastructures, social sciences, and not least policy-makers, in the quest for more integrated planning, design and management of urban areas. Urban areas have been conceptualized as complex systems where social, ecological, and technological processes are inextricably linked and innovations in any of these three domains drives urban change (McPhearson et al. 2016). In my view, UGI is particularly well equipped to address such complexity and to offer various perspectives for practical applications.

Our research has focused on consolidating and further developing UGI as a concept for the strategic planning of UGI in addition to exploring its potentials for climate change mitigation and adaptation. Both strands of enquiry have resulted in extensive guidance for urban planning and landscape architecture (Hansen et al. 2017a, 2017b, Lang 2018).

Even in densely built inner city areas, UGI has the capacity to offset the negative impacts of climate change by reducing heat stress and storm water runoff. However, results showed that by 2050, an increase from a current 9% to 20–25% projected crown cover would be required to maintain current thermal conditions on hot summer days (Zölch et al. 2016). Adding this amount of green will require a complete rethinking of open spaces and their above and belowground uses. New mobility concepts will be needed to strongly reduce space demand for car-based mobility as well as a change of engineered infrastructures towards hybrid green, blue, and grey infrastructures.

In conclusion, I believe that the concept of UGI can contribute to the transformation of urban areas towards more sustainability, the well-being of humans, plants and animals and climate resilience. It has the potential to transcend the separation of nature and urban, green and grey, and thus to relieve the tensions between the compact and the green city model. To fulfill this promise, UGI forces us to fundamentally rethink urban structures regarding their open spaces and their functions. To make this happen, new approaches to

governance of urban areas are necessary that are able to overcome sectorial silos within administrations, while also deeply engaging with the public.

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"Urban Soup": Food, Cities, and Environments

L. Sasha Gora
Humanities & Social Change Center, Ca' Foscari University of Venice

Somewhere between winter's last roar and spring's early optimism, I go in search of lunch. A couple of blocks from my office, I settle on soup, an obvious choice. A neon sign announces "URBAN/SOUP." I stand in line and order the "Creamy Coconut Carrot."

But what makes soup urban? According to this eatery, glass does. Glass jars and no spoons. Before closing in 2019, this Munich-based business peddled "#healthyfastfood" and a "smart way for takeaway."

Served in three sizes—tasting, medium, and hi-top—customers order soup in slender jars with screw top lids. They sip their soups—either there or to go—and then return or recycle the jars.

I take mine to go, return to the office, and drop in to see a colleague. As we chat, I attempt to drink the last bits of thick puree with the same concerns as someone trying to coax ketchup out of a glass bottle. She asks if I need a spoon. "But the whole concept of URBAN/SOUP is spoonless," I answer, even though I'm clearly not getting any closer to the last fifth of my soup without one.

"If this soup is urban," she asks, "what is rural soup?"

This begs the question: What is the urban? As a cultural historian who primarily studies food, my research centres on restaurants, asking: how do we relate to environments through the foods we eat and the stories we tell about them? Focusing first on North America and now Venice, Italy, I study restaurants and their politics, their culinary practices, ecological relationships, and cultural contributions.

So how does food conceptualize the urban? Foodways, a popular term, refer to "the eating habits and culinary practices of a people, region, or historical period" (Merriam-Webster). Encompassing production, distribution, and consumption, the term generally charts what people eat and what it means. Another common term is food system, and whether scholarship talks of foodways or food systems, two adjectives commonly appear: urban and rural.

In his seminal book *Nature's Metropolis: Chicago and the Great West*, historian William Cronon complicates what his title might suggest. The book, he explains, is neither a history of Chicago nor the Great West, "rather a history of the relationship between those places" (1991, xiii). Tracing the American tendency to see city and country as separate to transformations in the nineteenth-century, he complicates this neat division, rallying, instead, for a reflection "on how tightly bound together they really are" (Cronon 1991, xiv). Nowhere is this interconnection more obvious, I believe, than in studies of food.

There are countless ways cultures have sold and consumed food, from market stalls to taverns, but the very first restaurants emerged in an urban environment: eighteenth-century Paris. Historian Rebecca Spang traces the first restaurants to places offering consommé, a

healthful soup: "In the beginning, in the last twenty years of the Old Regime, one went to a restaurant (or, as they were more commonly called, a 'restaurateur's room') to drink restorative bouillons, as one went to a café to drink coffee" (Spang 2000, 2). Just as I sipped soup from a glass jar more than two and a half centuries later.

Restaurants evolved to serve an abundance of dishes. But they also serve much more than food. They are venues for cultural representation and negotiation. Places of power. Restaurants map which plants and animals are considered food and for whom. They map how one urban environment connects to others, both near and afar.

Returning to the question of how food conceptualizes the urban, food embraces complexity and collapses any simple binaries that isolate the urban from the rural. Like the plate of an enthusiastic diner at a buffet spread, one dish overlaps with the other. Rice bumps into salad. Bread brushes up against pie. Although cultures of consuming food do often differ in urban environments than rural ones (the former hosting many more places to eat out, for example), the ingredients themselves connect these environments.

Mango pureed into a smoothie (or even a soup) cannot be separated from where those flowers blossomed into fruit. This takes Jenny Price's lead. A writer based in Los Angeles, she looks for encounters of nature in mass-produced culture, in shopping malls, on busses, and in mango body whip (a thick skin cream) (1999, xv). She highlights urban environments because, as she writes, "a Nature Out There says powerfully little about the ways people *use* nature every day" (Price 1999, 163). Eating is one of the most direct ways we interact with environments by literally digesting them. Restaurant menus are historical archives, environmental records. And like Price, I seek out restaurant kitchens, wine glasses, and dinner plates as moments of encountering environmental transformations. Moments that are collaborations between the urban and the rural. Eateries document how cultures eat ecosystems and how one glass jar of soup mixes multiple environments together.

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Reclamation as a New Agenda for Urban Environmental Justice

Young Rae Choi
Department of Global & Sociocultural Studies, Florida International University

In the geographies of coasts and oceans, reclamation refers to a spatial practice that converts coastal wetlands or shallow seas into dry land or enclosed reservoirs. Throughout early history, reclamation had been closely associated with agriculture, for which it meant to turn unproductive land, swamps, and river banks into useful farming and irrigation resources. The seemingly unfitting English word "re-clamation" is thought to be derived from this embedded notion of "improvement." Over time, the scope of reclamation expanded to include water management and the provision of urban lands. Frederick Haynes Newell, founding director of the U.S. Bureau of Reclamation, wrote: "There is involved in the idea of reclamation not merely the better use of lands otherwise practically valueless, but in connection with this the creation of opportunities for homes" (Newell 1909, 658). Today, urban reclamation takes precedence over agricultural reclamation (Figure 1).

Figure 1. Palm Jumeirah reclamation project in Dubai, United Arab Emirates (copyright: Young Rae Choi).

In recent decades, urban reclamation has gained a notorious reputation in numerous shores around the globe. Contrary to its original meaning of value creation, these places witnessed reclamation causing "a complete destruction" of marine habitats, fishing villages, and seascapes (Chancellor 2017). The coastal reclamation boom has been particularly rampant in developmentalist economies. While population growth is often conveniently

offered as an excuse, what their reclamation projects envision to accomplish are far from affordable housing. Instead, they are about upscale ocean-view condos, luxurious waterfronts and marinas, urban amenities such as parks and museums, and artificial beaches. Along the way, already vulnerable human and nonhuman communities become further marginalized and displaced. Moreover, this controversiality of reclamation is doubled when a project claims to build a sustainable city, as a pioneering model for our urban future. How can such a city ever claim sustainability when it is built upon devastation—and thereby rendering the lives of original residents irreversibly unsustainable?

Thus far, this dimension of injustice associated with urban reclamation has been rarely addressed either in urban justice literature or advocacy. Grievances have instead come from local communities, conservation organizations, or scientific groups. It demonstrates the limits of how we have perceived the urban: an isolated island within a given space and time. As Neil Brenner and Christian Schmid have inspired us, however, the urban no longer has an outside (Brenner and Schmid 2014; 2017). Cities can only survive by being connected to their external world in terms of resources and spaces. If this planetary urbanization thesis expands the spatial horizon of cities, reclamation urges us to rethink their temporal horizon: before and after the cities as part of the urban. Redefining the urban with this extended spatial and temporal scope, urban justice faces a new set of questions: Are the locations, grounds, and materials consumed to build cities justly provisioned? Do the cities built on the sea maintain equitable relationships with their surrounding environment and people? If not, how can we create such relationships?

With these research questions in mind, I introduce Songdo City in South Korea. In the 1980s, the Incheon metropolitan city government planned Songdo, a suburban fishing village area with vast tidal flats, as a supporting town of the Incheon International Airport. Since then, the 17.7 km^2 project grew to 53.3 km^2 as it earned more titles from the Incheon Economic Free Zone and International City to Ubiquitous City and Eco City. As of 2020, all of the eleven reclamation districts have been grounded, i.e., walled off from the sea. Six districts have even turned into a busy business and residential area, while the other five districts are under construction in varying stages (Figure 2).

Figure 2. A Wetland Protection Area (2.5 km^2) in Songdo surrounded by the Districts 8 & 9 and the Incheon Bridge (copyright: SisaIN).

The Incheon Free Economic Zone Authority financially compensated local fishers at least twice: 1,265 households in 1995 and another 510 fishermen in 2013. Some of them were even promised parcels of reclaimed land. Yet, the compensation scheme never reached most tidal-flat fishers, who do not own a boat and have no official record of fishing as a livelihood. Nonhuman residents—the endangered black-faced spoonbills as a representative species—were simply driven out or buried over. The Authority designated three small areas as "alternative habitats," which yet have further shrunk or disturbed by ad-hoc development projects. Nevertheless, Songdo's roadmap to Smart Eco City has not been challenged enough to fundamentally question its criteria. As long as Songdo adds more carbon emission reduction facilities such as solar panels, green space, LED lightings, and bike trails, it will be deemed as a model city (*Smart Eco City* 2018).

The case of Songdo suggests how researchers can approach reclamation as a new agenda for urban environmental justice. First, the city government emerges as a key actor in rationalizing contradictory economic growth and environmental protection practices taking place simultaneously. Second, the city residents appear as a black box demanding in-depth research: what explains their silence to ongoing socioecological injustice—is it because their financial stakes are bound up with reclamation, or because they are not informed of the severity of the issue? How would it affect work for raising their awareness and accountability? Lastly, given that such urban injustice precedes the creation of a city, researchers who travel across the cities risen from reclamation have important roles to play: documenting changes, sharing their observations, and facilitating inter-city and inter-country conversations to prevent another regrettable project.

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Socio-Ecological Metabolisms of Eko Atlantic City, Lagos, Nigeria: An Unjust City?

Joseph Adeniran Adedeji
Department of Architecture, Federal University of Technology, Akure, Nigeria

What is the city and what forces frame its identity? Developmental mega-city projects can illuminate our understanding and guide a re-thinking of the actual meaning of the city. An evaluation of the process of recovering the ocean space to construct the 10-million square meter Eko Atlantic City (EAC) in Lagos, Nigeria, can help us redefine the city with the lenses of political ecology and social justice. The EAC is a large-scale urbanisation project that leaves a plethora of questions in inquisitive minds, especially given the project's lopsided proceeds destined for the upper class. It has been christened a climate change adaptation project, but the larger quest borders on adaptation for whom? The discourse in the paper is structured in three parts to answer the following questions: 1) what is the socio-ecological inclusiveness of this oceanscape before the inception of EAC; 2) what are the dominant narratives in the literature on the Urban Socio-Ecological Metabolisms (USEM) that continue to trail the conception and birth of EAC; and 3) to what extent has EAC charted the course for a new urban vocabulary beyond neoliberalism to produce a new USEM framework. Attempting to solve these puzzles becomes necessary as the socio-ecological gaps between socio-economic groups widen with attendant disorder out of the supposed pursuit of order in urban environments.

Based on the thermodynamic roots of inequality (Smerlak 2016), this development project was approached with the lens of socio-ecological competitive exclusion. The thermodynamic roots of inequality posit that "economic stratification is measured by the entropy of the wealth distribution," and "precariousness is the thermodynamic force conjugate to upward economic mobility" (40). I examined the USEM at EAC from a neo-Marxist perspective using Marx's approach to analyzing the dynamic internal relationships between humans and nature (Pinceti, Bunje, and Holmes 2012; Bahers, Tanguy, and Pinceti 2020) through politically-driven flow of capital and energy, and the effects on the socio-ecological milieu.

Throughout the paper, by metabolism, I mean "the processes of environmental transformation brought about through the labour process, in which human capacities and non-human potentials are combined in the production of new environmental forms" (Groves 2009, 208). According to de Molina and Toledo (2014, 84), metabolism has five components: appropriation, transformation, circulation, consumption, and excretion. In the case of EAC, the appropriation of nature (the Atlantic Ocean space), which had hitherto served the common needs of all, with its eventual transformation into a climate adaptation city circulated to only the excessively rich very low percentage of the Lagos populace suggests the involvement of metabolic kineticism. This 'consumption of nature' leads to the

excretion of worst byproducts in the environment, which disproportionally impacts the lower class.

Accordingly, I begin by positing that environmental production processes are often accompanied with energy dissipation effected by kinetic losses and gains. I argue that EAC provides us with a redefinition of the city as an urban metabolism engine characterized by socio-ecological kinetic frictions. This kineticism portends that the city is made up of social (human) and ecological (nonhuman) molecules in rapid flows with attendant socio-ecological collisions. The outcomes are social and ecological imbalances, instrumentation of climate change stories to aggravate social inequality, and heated polities

Lagos' coastline is a composite network of interconnected lagoons, inland lakes, rivers, wetlands, channels, islands, and peninsulas with a population of over 14 million people in the metropolis area only (World Population Review, 2020). The city is characterized by urban poverty, coastal slums, land use pressures, climate change, and its over 100 years of coastal erosion and ocean surge. EAC is a modern world-class city politically praised as being eco-friendly at the brink of the Atlantic Ocean but separated from it with the Great Wall of Lagos, which is a sea wall 8.5km in length and 12.5m in width. The area in question, known as the Bar Beach was an inclusive socio-ecological place for both nonhuman and human nature. Along with a rich biodiversity sheltering important fish and marine mammal populations, the Beach was an important site of cultural, religious, spiritual, and recreational activities (Eko Atlantic 2012). In order to make way for the EAC, not only was this site evicted of its nonhuman residents but millions of poor masses were displaced for its construction following the project's creation in 2008. Today, the EAC has become an exclusive urban enclave with a daily flow of 150,000 commuters and housing for only 250,000 inhabitants.

Once the EAC was planned, socio-ecological metabolisms were set in motion at the Beach. The eviction and the construction events are perfect illustrations of political ecology linking "the condition and change of social/environmental systems," and showing "the organization of these systems and how they work to metabolize the biophysical environment for human use" (Pinceti et al. 2012, 199). The humans benefitting from the project are the upper-class elite who not only forcefully evicted the weak and helpless lower-class majority but bulldozed the nonhuman nature at the Beach to the point of extinction. This class dominance of the majority lower class by the minority upper class attests to the commodification of nature at the Beach and created socio-ecological imbalances and tensions that normally trail this kind of capitalist urbanisation. The EAC is indeed a privatisation of general public goods of the Atlantic Ocean by a very rich minority who acted without any recourse to socio-ecological justice.

Dominant narratives (Ajibade 2017, Crispin 2019) are unequivocal on the negative effects of the far-reaching re-engineering of the Atlantic Ocean at EAC on the USEM of the cityscape. They debunked the politically motivated acclaimed benefits of the project as climate change adaptation. Rather, the overriding arguments forecast the project as a means of mass disruption to the ecological systems of the oceanscape, reducing its biodiversity and diminishing its aquatic resources. It is deemed that the EAC project will

lead to an excessive increase in carbon footprints and an increased ocean surge, which will adversely impact neighbouring communities. Indeed, it has aggravated the suffering of the poor masses residing in this oceanscape (Thomas and Warner 2019). Specifically, during a lethal ocean surge in 2012, the death casualty at one of the neighbouring low-income estates was 16 while about 1500 residents were displaced in addition to the disasters in many other adjoining estates (Ajibade 2017). To what extent then has EAC demonstrated the conquering of nature by humans? EAC is only a relocation of the ocean surge and associated coastal erosion downstream and worsens the socio-ecological menace of Greater Lagos.

The embodied and operational energy dissipation along with socio-ecological frictions that accompanied the creation of the EAC, destined for rather affluent inhabitants from the beginning, theoretically suggests energy dissipation of urban socio-ecological metabolisms. The ruling class represented by a collaboration of Federal Government of Nigeria and Lagos State Government through authoritarian brutality, hired the multinational capitalist South Energyx Nig. Ltd in 2008 to evict the hitherto inclusive ecosystem services and residents of these coastal areas. Through the instrument of governmentalities, the state political apparatus was used to enforce the marketization of this Atlantic coast by an elite upper class without any alternative inclusiveness for the poor masses and non-self-defensible nature of the ocean space required in a true democracy. This legitimisation of socio-ecological coercive oppression implies an all-inclusive neoliberal practice of capitalist ideology. The lopsided power relations in this political economy not only present EAC as an unjust city but as the epitome of radical gazetted class distinctions. Such class-based urban governance has its roots in colonialism with its attendant socio-spatial segregation of the elites from the common populace.

The foregoing suggests that the components of an USEM framework for EAC are currently influenced by the tenets of capitalism, neoliberalism, authoritarianism, class differentiation, socio-spatial segregation, and socio-ecological disorganisation. To overturn this overtly exclusive enterprise, the project demands pushing for an intellectual reasoning into suggesting strategies for framing a truly democratic and inclusive urban governance at EAC.

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New York's Post Industrial Waterfront: A Lesson in Environmental Gentrification and Environmental Inequality

Kara Murphy Schlichting
Department of History, Queens College, City University of New York

In 2011, Mayor Michael Bloomberg announced that New York City had six boroughs: Manhattan, the Bronx, Brooklyn, Queens, Staten Island, of course, but he counted the city's 520-mile long waterfront as well. Bloomberg encouraged New Yorkers to imagine this space as a single unit of public space (Barrett 2016; New York City Department of Planning 2011). In the twenty-first century, the industrial past had finally given way to a reconfigured shoreline of green amenities.

Figure 1. The East River at Brooklyn Bridge Park, 2019. *Source*: Caroline Culler, "View of Brooklyn Bridge Park from Manhattan Bridge," photograph, 28 June 2019. (https://commons.wikimedia.org/wiki/File:View_of_Brooklyn_Bridge_Park_from_Manhattan_Bridge.jpg)

But what of the city's postindustrial waterfronts that have not gentrified? The South Bronx shoreline along the Harlem River is one such space. While Bloomberg's administration courted environmental gentrification on the East River waterfronts of Queens and Brooklyn, the South Bronx did not experience a similar transformation. The concept of political ecology posits that there is an essential relationship between political, economic, and social factors and environmental issues. Building on this framework, I examine environmental gentrification, or the lack thereof, as a function of political ecology (Swyngedouw 1996). Postindustrial interpretations of the Harlem River's environment reveal the importance of ideas of nature—both polluted and reclaimed—in the rebuilding of New York's waterfront.

Figure 2. The Harlem River, 1973. *Source*: Chester Higgins Jr., "*HARLEM RIVER—ON LEFT. BRONX ON RIGHT*," Photograph from DOCUMERICA: The Environmental Protection Agency's Program to Photographically Document Subjects of Environmental Concern, compiled 1972–1977, National Archives and Records Administration via Wikimedia Commons (https://commons.wikimedia.org/wiki/File:HARLEM_RIVER-HARLEM_ON_LEFT._BRONX_ON_RIGHT_-_NARA_-_548427.jpg)

Industrialization disconnected the South Bronx from its waterfront in the mid-nineteenth century. After one hundred years of commercial shipping and industry along the Harlem, the decline of New York's manufacturing economy, containerization, and the shift of port operations out of the urban core left swaths of the waterfront empty or in junk yards and nuisance industries; on the South Bronx shoreline, abandonment and deterioration accompanied this seismic economic shift (City of New York Economic Development Administration 1972). During the fiscal crisis of the 1970s, city and state planning and economic development offices surveyed the Harlem looking for potential reinvestment sites on the river. Yet these surveys reveal that green redevelopment was unimaginable to city planners and consultants tasked with addressing derelict postindustrial environments (New York City Planning Commission 1971; New York State Department of Transportation and Energy 1981a). Ecological consideration is remarkably missing from government reports, suggesting that environment was invisible to those surveying the South Bronx along the river. In fact, studies of this area frequently didn't even include the shore, but stopped two blocks short of it.

Of the reports from the 1970s and early 1980s, only one state survey offered a comprehensive overview of Harlem River ecology, yet it also paradoxically exacerbated the denial of the river as a natural environment and the disconnect between riverine nature and the abutting community. A century of landfill and dumping had decimated the Harlem's ecosystem (City of New York Economic Development Administration 1972). In 1981, the State Department of Transportation's Rail Division declared the only resources of any historic nature on the Harlem waterfront were the bulkheads, riprap, boat slips, and buildings that stood as a "record of man's exploitation of his environment." The river had

been "so altered by intense residential and commercial development that it preclude[d] any meaningful discussion. Flora of the area [was] practically non-existent with the exception of a few trees generally found in urban areas and shrub growth" (New York State Department of Transportation and Energy 1981b, 1). Researchers resolved there was not sufficient evidence of flora or maritime life to recommend ecological preservation or even remediation. The material nature of the Harlem had been negated by human impact; the tacit assumption behind the state report was that nature could not coexist with the level of industrial development—even after industry left the area.

Communities along the postindustrial Harlem continue to endure waterfront degradation in the twenty-first century. The South Bronx shore hosts four power plants, two waste transfer sites, an oil storage facility, and a medical waste incinerator. Activist Raymond Figueroa, who leads canoeing trips on the river, explained that his tours "involve launching [covertly] because there are no canoe or kayak launches… in this … section of the South Bronx…[it] is a concentration of industrial facilities that are actually blocking the community's access to the waterfront. He calls this lack of access "an environmental justice issue. You look at…Brooklyn Bridge Park…where there [is] access, there are opportunities for access to the waterfront. That is not the case in this community which is sharing a disproportionate burden of environmental justice burdens in terms of waste management facilities sitings, industrial sitings, and the configuration of transportation infrastructure" (Figueroa 2017). Green amenities increasingly characterize the East River; Brooklyn Bridge Park abounds with lawns and native flora. Along the Harlem River fences, concrete, and industrial sites, not a rebuilt coastal ecosystem, dominate the shore.

Historian Ann L. Buttenweiser marks the 1990s as the crucial turning point when waterfront redesign became "cannon" for Manhattan (Buttenweiser 1999). This timeline does not fit the coastal history of the South Bronx. In 1991, New York State offered a developer a ninety-nine-year lease for an abandoned waterfront railyard. A waste transfer station, a fossil fuel power plant, a newspaper printing and distribution centers, a trucking shipping center went up—these are the spaces Figueroa spoke about. Barretto Point Park, on the far side of this industrial complex, opened in 2006 as the area's only waterfront park. In 2015, a pedestrian bridge spanning the Bronx Kill, an arm of the Harlem, to Randall's Island, marking the second opportunity to access green space for South Bronxites (Marton and Peterson 2015; New Yorkers for Parks 2014). The island was the path of least resistance, offering park access without having to address Harlem River accessibility (City of New York Economic Development Administration 1972). The longstanding erasure of nature and public access from the riverfront stands in stark relief with the neoliberal environmental gentrification of twenty-first century Brooklyn—this is the environmental injustice Figueroa saw when he paddled the Harlem.

Environmental gentrification signals a rethinking of urban coastal nature by politicians and planners: under New York City's dominant political ecology, nature-as-amenity repurposes the environment as a tool of capital creation (Banzhaf and McCormick 2012). The city's engines of wealth and power in the early twenty-first century rediscovered the value of "green" waterfronts. But only for certain parts of the city—for certain populations and districts that interest large-scale developers. The Harlem remains largely unreachable and degraded. The paradox of environmental injustice in the era of environmental gentrification remains unresolved on the postindustrial waterfront.

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White Suburbia is Destroying the Planet

Rob Gioielli
Blue Ash College, University of Cincinnati

Major American cities are defined by their unique form of low-density sprawl. Metropolitan areas extend sixty to seventy kilometers from the city center, most homes are single family structures on large lots, and the primary form of mobility is the automobile. In much of urban America it is impossible to go anywhere without a car, truck or gas-guzzling SUV. There is too little public transit, too narrow of sidewalks, and few bike lanes. This makes American sprawl tremendously energy and carbon intensive. Suburban communities have per-household carbon usage that it is two to three times higher than those in the central cities in the United States or comparative households in Europe (Jones and Kammen 2014). The sprawling American metropolis is one of the country's biggest contributors to climate change, which makes it one of the world's biggest challenges to creating a low-carbon future.

What has driven this sprawl over the past half century and what continues to drive it today is not an American "love affair" with the automobile, or passion for the "independence" of suburban living. The primary engine behind sprawl is racism: in particular, the near ceaseless work by whites to maintain their racial privilege through spatialized isolation from people of color. The result of this has been that in the United States, race and carbon dependence are intricately wrapped together, and any attempt to reckon with the causes of climate change must also deal with the way that systems of white supremacy and privilege are inscribed into the country's metropolitan landscapes and ecological systems.

Although American racism has always had a significant spatial component, over the past half century it has shifted and expanded in new and important ways. After the legal, political, and policy achievements of the Civil Rights Movement in the 1960s, the more overt forms of segregation or apartheid became both socially unacceptable and prima facie illegal. But over the course of the 1970s, a new racial regime emerged that focused on suburban opposition to institutions or forms of infrastructure that could possibly allow African Americans and other people of color (specifically Latin Americans) to live in the suburbs in large numbers. After the U.S. Supreme Court placed a significant limit on metropolitan school desegregation in 1974, suburban whites focused their attention on housing and mobility (Milliken v. Bradley).

For the former, they opposed any attempt to place social housing in suburban communities because of the explicit threat that these developments were being built to provide poor and working-class African Americans equal access to the suburbs. To avoid charges of racism, they shifted tactics, emphasizing how it was not about race, per se, but protecting the "character of the community" from the perceived threat of poor and criminal central city residents. These arguments tapped into longstanding racial narratives that portrayed Black people as a particularly insidious criminal threat, as well as more recent arguments that the Black poor, instead of being the victims of centuries of slavery and

institutionalized racism, were actually an irredeemable "underclass" (Katz 1997; Muhammad 2011). Most importantly, these arguments were validated by the courts. Suburban districts used a variety of land use planning tools, particularly zoning and construction restrictions, to limit the development of social housing specifically but also any form of multi-family housing generally. Although to both proponents and opponents, the racial intention of these regulations were usually clear, local governments in the U.S. have significant power to set land use policies. These guidelines drew strength from the emerging environmental movement, which provided a new set of tools for governments to preserve open space, protect watersheds and create new parks, all of which also had the effect of limiting density and leaving little space for social or affordable housing.

Efforts to stifle Black mobility were equally as important and focused on limiting access to suburban spaces via mass transit. The majority of American suburbs were developed around the automobile, and robust bus and rail connections were few and far between. As urban transit systems finally began to modernize during the 1970s, they looked to expand into the broader metropolitan area. But they were usually met with stiff opposition from suburbanites, who claimed that mass transit would allow an "undesirable element" to access their communities, particularly those who they believed were looking to commit crime in more well-heeled suburban districts. Where suburban transit systems do exist, they have shoestring budgets and provide only the bare minimum of service. This made rail and especially bus systems the transit of last resort for most Americans, which helped naturalize the car as the only legitimate form of metropolitan mobility.

Opposition to social housing and mass transit worked in tandem to reinforce the American metropolis as a distended, low-density, automobile-dependent landscape. Communities built around the automobile, what Chris Wells calls "car country," are extraordinarily hard to retrofit for other forms of mobility, driving up costs and making suburbanites additionally hostile to transit (Wells 2012). Even when a combination of civil rights advocacy and Black desire for better housing, employment and educational opportunities began to "open up" previously all-white suburbs in the 1970s and 1980s, whites would immediately stigmatize any community that had more than a very small Black population. This led to a "second white flight" farther out into the "exurbs," far-off communities where residents commute as long as two hours by car to jobs in other parts of the metropolis.

The result of all of this is that the American metropolis is a constantly expanding and morphing racial petroscape, where decisions made to maintain racial inequality and white privilege reinforce carbon intensive forms of urban development and mobility, while delegitimizing anything that would help cities move along a more sustainable path. Social housing and multi-family housing, buses and trains, even sidewalks and bike lanes, are all racialized and, thus, considered a vital threat to the suburban "way of life." This has created a pernicious feedback loop. Suburban whites are so fearful of Black crime and Black poverty that they support disinvestment from the social welfare state and criminal justice policies, which further leads to increases in poverty and murderous levels of police brutality. To whites already predisposed to see Black people as a threat, mass incarceration and high arrest rates in Black communities are not evidence of systemic racism but further proof that they need to maintain the white fortress of suburbia, however tenuous it may be.

An understanding of the ways that racial inequality has led to carbon intensiveness is important for considering both the present challenges to sustainability in US cities as well as paths forward. For urban environmental scholars, the instinct is to connect sustainability practices to other forms of environmental legislation, policy or social movements. But this perspective often ignores how the material reality of a city and the policies that sustain it are fully embedded within their social and cultural context. Structures of inequality, and especially the work to defend or reinforce them, play a significant role in shaping urban energy and sustainability regimes. The origins or primary cause of a specific practice might be far afield from its ultimate environmental consequence. This makes it vital for urban environmental scholars to try and see, and understand, the whole city.

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Unexpected Nature? Proliferating Mangroves on the Coast of Abu Dhabi

John Burt
Environmental Studies, New York University—Abu Dhabi

Mary Killilea
Environmental Studies, New York University

Anne Rademacher
Environmental Studies, New York University

For the past several years, natural scientists Mary Killilea and John Burt and anthropologist Anne Rademacher have been thinking about how spaces of nature emerge, and how societies engage them, in coastal cities around the world. Our starting point, and the focus of our presentation at the UEI's recent *Spaces of Living in Transformation* workshop, was the rapid proliferation of mangrove forests in coastal Abu Dhabi.[1] Since urbanists in the social sciences and humanities usually associate urban growth with degraded and dwindling natural habitats, noting the expansion of this biodiversity-rich forest, and learning that some of it was unplanned, struck us as an important opportunity to explore the scientific contours of the phenomenon while asking the social question: *what do societies identify as "nature" in cities, and when and how is that nature considered commensurate with forms of nature beyond the city?* In the present case, we sought to understand the drivers of mangrove forest expansion in the context of rapid urban growth while also addressing whether and how newly emergent mangrove areas were socially understood as "natural."

The case of rapid mangrove proliferation in coastal Abu Dhabi relates to several critical questions shared across the fields of ecology and environmental humanities. First, while the particular vulnerability of coastal cities in the era of climate change is well noted (IPCC 2020, Paprocki 2018), the issue of coastal habitat augmentation—particularly to the extent that it is in part unplanned—is barely recognized outside of the natural sciences, where it is increasingly gaining attention (Burt et al. 2012; Forman 2016; Mayer-Pinto et al. 2018). Second, while coastal cities are documented to contain the majority of city dwellers worldwide, they are rarely studied as co-productive[2] of ecological processes. Indeed, the vitality of one, the city, is almost always assumed to indicate the withering, or even absence, of the other, nature (Rademacher et al. 2019). Our work seeks to better understand if and when certain forms of urban nature might be enhanced by anthropogenic infrastructure and processes and, in turn, how city residents understand and encounter what can appear to them to be "spontaneous" nature spaces.

By using the term, "spontaneous," we simply mean to emphasize our interest in the ecological outcomes of industrial processes that seem to add to nature rather than deplete it. New mangrove areas in Abu Dhabi, for example, perform key ecological functions like

habitat provision, carbon mitigation, or coastal resilience while also serving as points of interface between city residents and a certain forest type (Friis and Burt 2020). In an era when "urban nature" operates largely as a shorthand for relatively manicured and managed urban parks, the proliferation of dense coastal mangrove forest in Abu Dhabi suggests to us a need to better understand the co-productive relationships between urban processes and urban flora and fauna, and the ways that urban social communities, whose everyday lives are often highly detached from active encounters with nonhuman life, cultivate new ideas of nature and attributions of meaning to it (Choy 2011; Jasanoff and Martello 2004; Günel 2019; Tsing 2015).

Consider some details of the Abu Dhabi case: In early March 2019, an Abu Dhabi *Gulf News* headline read, "Let Red Foxes Enjoy Natural Food from Mangroves" (Kader 2019). The article, one of several covering a recent proliferation of urban wildlife sightings in Abu Dhabi's expanding coastal mangrove forest zone, described encounters with red foxes—and with them, delight, surprise, and growing popular concern for these seemingly spontaneous forests and the species they nurture. This was in many ways the very opposite of more conventional assumptions about the relationship between coastal mangroves and rapid urban development: the red fox, along with the hundreds of fish, bird, and marine species that depend on mangrove forests, have proliferated precisely because a significant part of the coastal zone has become host to new forest areas.

While mangrove proliferation in Abu Dhabi cannot be attributed to a single cause, several transformations in Abu Dhabi's environment are important to note (Burt et al. 2019;Burt and Bartholomew 2019; Sale et al. 2011). As urban populations beautify their gardens and parks with highly irrigated green spaces, the well-fertilized freshwater runs off into the hyper-saline coastal areas, reducing saline stress and providing more optimal conditions for growth of mangroves and other plants. These, in turn, serve as habitat for innumerable resident and migratory species. Mangroves also expand due to ever-higher average temperatures in tropical latitudes.

As water dispersed plants, mangrove seeds often travel further than those dispersed by wind or animals, so mangrove expansion in rapidly transforming urban regions tends to happen more quickly when compared to terrestrial plants (Saintilan and Rogers 2009; Yagoub and Kolan 2006). As a consequence, urban citizens, visitors, and scholars have observed a largely unexpected and seemingly spontaneous effect: coastal mangrove forests have expanded, and with them have come sightings of a vast array of animal species and new opportunities to encounter them first-hand.

The new and seemingly "spontaneous" appearance of this, the only evergreen forest type in the Arabian region, challenges many scholarly and popular assumptions about the automatically destructive relationship between dense urbanization and some forms of natural habitat. In fact, in many parts of the subtropics, growth of mangroves is a common, ecologically complex *feature* of urbanization. New mangrove areas differ significantly from conventional "novel ecosystems"[3] insofar as they can be partially unplanned, and so unexpected, accompaniments to urban growth and development, rather than deliberately engineered ones.[4]

Notes

[1] Not through restoration plantings, but rather through natural processes. A rapid increase begins in 1999, according to Yagoub and Kolon (https://link.springer.com/article/10.1007/BF02990747).

[2] We use "coproduction" in the sense used by Rademacher, Cadenasso, and Pickett (2019).

[3] A novel ecosystem, as defined by Richard Hobbs and his colleagues, is "a system of abiotic, biotic, and social components (and their interactions) that, by virtue of human influence, differs from those that prevailed historically, having a tendency to self-organize and manifest novel qualities without intensive human management." (https://www.ser.org/news/311030/Whats-Wrong-with-Novel-Ecosystems-Really.htm)

[4] Ecologists are increasingly recognizing the complex tradeoffs that urbanization's mangroves involve. Though nurtured by urbanization's wave, mangrove forest proliferation more generally can exclude other important species (e.g. saltmarshes). Thus while there may be perceived benefits from an anthropogenic/aesthetic lens as well as value for *different* species, there are also costs that need to be considered. As an example, we point to Botany Bay, Sydney. See also Branoff (2017).

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