

Geologising Urban Political Ecology (UPE): The Urbanisation of Sand in Accra, Ghana

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Abstract: This paper makes a call for an urban political ecology (UPE) which engages more extensively with Earth's geological formations. As a material at the centre of global urbanisation process, sand is offered as a geological entry point. The paper presents an analysis of the urbanisation of sand, or the ways in which sand is brought into the urban realm, grounding this reading in Accra—a growing city on Ghana's Atlantic coast. Drawing from 14 months of ethnographic fieldwork, the paper charts the socio-natural politics through which sand is first unearthed from the edges of the city—an extractive processes otherwise known as “sand winning” in Ghana. By examining the forms of power which govern uneven revenue flows to communities, the displacement of farming groups, the widespread loss of farmland and a contested regime of governance, the analysis exposes the socio-natural politics through which the city's geological baseline is first unearthed.

Keywords: urban political ecology (UPE), geological, sand, cities, West Africa, Accra

The Ante-Lives of Urban Form

Our contemporary urban moment depends on sand.¹ Mixed with cement and water, sand makes up the concrete backbone of towns and cities across the planet, the infrastructure that connects them and the digital platforms that transcend them (Beiser 2018). This ubiquity has generated global demand, with sand and gravel constituting the largest volume of solid material extracted worldwide (UNEP 2014). Given this demand, sand has come to visibility in international policy circles, with a landmark UNEP report designating sand and gravels as the “unrecognised foundational material of our economies” (UNEP 2019:2). Reports surrounding the extraction and circulation of sand are also an increasing feature on global news platforms, with media coverage on the growing prominence of Indian sand “mafias” or Southeast Asia's transnational economies of illegally dredged sand (Al Jazeera 2017; Beiser 2017; Salopek 2019).

Despite this ubiquity, limited academic work within or beyond urban studies has engaged with this material, an omission which fundamentally limits our understanding of the contemporary city. Indeed, to exclude from our theories the material that forms the foundations of cities—ancient, modern and contemporary²—is to limit our understanding of a significant process shaping the planet's

material geographies. Indeed, more than just an extension to our repertoire of urban materials, I argue that to engage with sand serves to extend the reach of our theoretical frameworks that examine the production of the city. In particular, I contend that thinking with sand pushes us to think more closely with geological materiality, seeing the city more explicitly as, in part, a “sedimentary system” or a kind of “city-strata” (Zalasiewicz et al. 2017). In this paper, I take this geological impetus and deploy it to urban political ecology (UPE) more specifically, arguing for a rigorous dialogue between the geologic and UPE frameworks.

In recent decades, UPE has emerged as a critical tool for unpicking the contested processes through which natures become urbanised (Ernstson and Swynedouw 2019). Its growing application to diverse urban landscapes is testament to its conceptual capacity for grappling with the socio-natural politics of the city. Despite its proliferation, UPE has rarely engaged with the underlying geological production of the city, instead limiting its deployment to the ongoing flows of energies and matter that make-up just one dimension of the urban landscape. I argue that taking the geologic seriously serves to expand the scope of UPE analysis to consider elements in the production of the city’s material baseline. This, I contend, serves to expose the before lives—or ante-lives—of urban form and in doing so, renders visible the material struggles that undergird the making of the city. In this paper, I build a geological UPE grounded in the sandy realities of Accra, Ghana—a growing city in an urbanising region of West Africa. Drawing from 14 months of ethnographic fieldwork, the paper charts the socio-natural politics through which sand is first unearthed from the edges of the city—an extractive process otherwise known as “sand winning” in Ghana. By examining the forms of power which govern uneven revenue flows to communities, the displacement of farming groups, the widespread loss of farmland and a contested regime of governance, the analysis exposes the socio-natural politics through which the city’s geological baseline is first unearthed.

The paper is structured as follows. Firstly, I engage more specifically with the literature on UPE, elaborating upon what a geological UPE could offer, before turning to a discussion of the urbanisation of sand in Accra. From here, I examine the socio-natural politics through which sand is first extracted from plots of land at the edges of Accra. The paper concludes with a final call to geologise UPE, through sand, or otherwise.

Geologising UPE

In this paper, I argue that analyses of cities—as socio-natural formations—demand more thorough dialogue with geological strata. A geological dialogue is significant, given that cities may be understood, in part, as geological formations. For instance, we can think of the masses of iron ore which undergird the vast steel structures of contemporary urban form or the copper which constitutes the wired networks facilitating communication within and across urban nodes. We can also think with minerals like lithium which are being increasingly extracted for the production of carbon-free electric infrastructure. Drawing on this material reality, I argue that, as a way of examining the socio-natural

processes of the city, UPE offers a commanding tool for theorising the urbanisation of geological materials.

UPE is a powerful analytic for thinking through the city as a set of ongoing and interconnected socionatural transformations (Ernstson and Swyngedouw 2019; Heynen et al. 2006; Swyngedouw and Heynen 2004; Swyngedouw and Kaika 2003). Indeed, it provides “an integrated and relational approach that helps to untangle the interconnected economic, political, social, and ecological processes that go together to form highly uneven urban landscapes” (Heynen 2014:602). Its roots remain closely linked to Marxist urban theory, positioning cities as socio-natural entities borne out of the uneven relations of capitalism (Loftus 2012). Early landmark work in the field included Cronon’s (1991) analysis of the simultaneous production of Chicago the city and the Great West as an important agricultural hinterland, Gandy’s (2002) reading of New York City as a series of struggles surrounding the reworking of nature, and Kaika’s (2005) examination of the relationship between modernity, water and infrastructure. Today, a vast series of interrogations of socio-nature enliven debate, ranging from engagements with water and electricity, to food and alcohol (Lawhon 2013; Loftus 2012; Silver 2015). Together, these encompass vast spaces, from the city centre to the periurban, and in turn capture both the planetary conditions of contemporary urbanisation and its situated materialities (Agyeman and McEntee 2014; Bartels et al. 2020; Brenner and Schmid 2012, 2014; Lawhon et al. 2014). Together, they are testament to UPE’s growing relevance in analysing a multitude of urban forms in a variety of contexts and its ability to render visible the possibilities for eco-political struggle (Ernstson and Swyngedouw 2019; Heynen 2016).

Within UPE, both the geological more broadly and sand more specifically have disappeared into an analytical lacuna. This absence may be a product of the framework’s tendency to stress flows, circulation and ongoing transformations of energies and matter. Indeed, unlike water—which has become the most significant of flows to be analysed in UPE—once relatively stabilised as urban form, the geological foundations of cities no longer circulate in obvious ways and become a background material for flows to pass through and around. Yet, limited engagement with the geologic also reflects the broader absence of this realm in contemporary social sciences, a point which Clark and Yusoff elaborate. They argue that while we have seen a “willingness to take the nonhuman, inhuman or more-than-human into account” in our theorisations of social life, “[c]ertain types of loci of matter ... have turned out to be more amenable to inclusion in this expanding ethico-political register than others” (Clark and Yusoff 2017:14, 15). They contend that “[w]hile the fleshy exuberance of biological life and the ‘spooky’ indeterminacy of sub-atomic particles were roundly enrolled in efforts to reimagine collective life ... the basal depths and *lumpen* masses of the inorganic, the mineral, the geologic have proved rather more recalcitrant” (Clark and Yusoff 2017:15). This is a loss, Clark (2017:214) contends, writing that “interactions with the stratified composition of the earth’s crust have long played a constitutive role in social and political formations”.

Extending their critical analysis, Clark and Yusoff make a call for a “politicization of the geologic” and a “geologization of the political” (2017:17). In doing so, the

notion of “geosocial formations”—as the “minimal staging ground for earth science-social science encounters”—becomes a way of thinking through the interconnected, and indeed contested, processes of the social and the geological (Clark and Yusoff 2017:6).

In this paper, I argue that cities demand to be understood, researched and theorised more explicitly as geosocial formations. To do so, I suggest, would more adequately position cities as, in part, geological formations, and allow us to examine the socio-natural politics through which geological strata become built form. Critically, in doing so, we attune ourselves to think with materials, spaces, histories and politics that we might not otherwise consider in our reading of the city's production. For instance, we might ask: what kinds of geomorphological processes give rise to which forms of urban materiality—here pointing to the “deep time” of earthly processes that extend beyond human timescales? How, and with what implications, is the geological materiality of the city first extracted from the earth's subterranean? Who and/or what is dispossessed in the process—and who/what accumulates through this mode of extraction? How is geological strata transformed into the materiality of the city? Who and/or what is involved in this process and what are the implications? What kinds of power structures undergird these processes? What kinds of histories condition these structures? And what kinds of scales do these processes operate on? This question of scale may invite a transnational analysis—akin to thinking through the metabolisms of a planetary urbanisation (Brenner and Schmid 2012)—or demand an analysis that looks at more local scales. In many cases, an analysis that contends with the geological production of the city will need to think across these scales, responding to the realities of city-specific materialities and exposing the multi-scalar nature of extraction, consumption, accumulation and dispossession therein.

In this vein, I suggest that engaging with the geosociality of the city holds different kinds of political potential. Indeed, if a geosocial analysis equips us “not only in the diagnosis of the current global environmental predicament, but in helping us think about social futures that engage with the geologic in ways other than at present” (Clark and Yusoff 2017:6), then a geosocial UPE offers scope for a reconfiguration of urban politics more specifically. This geologically attuned analysis, may, for example, force us to ask different questions in relation to urban justice. For instance, in the context of accumulation and dispossession derived from mining for the materiality of built form, what would it mean to confront the geological production of the city? Who and what might be involved? How might this intersect with existing demands within the city for better housing, sanitation and jobs? This potential for a radical geosocial politics of the city aligns itself with recent calls within UPE to bring the political centre stage—or indeed, “organize anew the articulation between emancipatory theory and political activism” in the current regime of the “anthropo-obscene” (Ernstson and Swyngedouw 2019:3). Yusoff (2018a:270) offers us significant language in this respect, nudging us to think along the lines of a “geologic commons”. What a “geologic commons” might look like, once grounded in cities, will need to draw upon analyses that take seriously the geological reality of cities.

With these positions in mind, as the “sedimentary medium that forms the most intimate link between humans and the urban geologies that we create” (Mendelsohn 2018:457)—and indeed one routinely harvested across the world for the purposes of city making—sand is deployed as a mode of examining the geosocial city. In this paper, I ground a geosocial analysis in the realities of Accra—a growing city on Ghana’s Atlantic coast. Indeed, here, sand remains central to the city’s expanding concrete fabric and is variously positioned as integral to the life of Accra more broadly (Dawson 2020). While specific, there is nothing unique about the significance of sand to the life of Ghana’s capital. Rather, as the opening of this paper suggests, the centrality of sand to the production of Accra should be understood as a microcosm of regional and global “cementification” processes (Choplin 2020) and in this way, the discussion offers a mode of engaging with both the sandy specificity and geosociality of cities more broadly.

The City’s Material Skeleton

In a vivid reading of Accra, Quayson (2014) calls the city a “variegated and contradictory metropolis”. The city has grown up around the Ga-Dangme peoples who arrived in the Accra plains from the east in about the 13th century onwards (Parker 2000). Initially settling to the north of the region, it was here that the state of Great Accra—as known by the Europeans—was formed. Following a military overthrow of the Ga state by the Akan Akwamu in 1677–1680, many Ga sought refuge at the coastal European forts, which would form the basis of the major towns of Accra. Following a series of Akan rulers, the Anglo-Danish Treaty of 1850 and the Anglo-Dutch Treaty of 1874 transferred all coastline forts and castles to the British, and in 1877 Accra would become the new capital of the unified British administration (Quayson 2014). In the early 20th century, Accra’s population doubled, from less than 19,000 in 1911 to more than 38,000 in 1921 (Parker 2000).

The expansion of cocoa exports contributed to the city’s transformation, which morphed into a colonial port city (*ibid.*). In the middle of the century, an urban masterplan was commissioned and submitted in 1958 to the then newly independent government. Entitled “Accra: A Plan for the Town”, the plan sought to implement a modernist concept of the city (Quayson 2014:82). Kwame Nkrumah’s independent government implemented this “colonial blueprint of town planning almost wholesale, only adding a strong nationalist emphasis of monuments and other development projects to reflect new priorities” (Quayson 2014:66). From here, writers have pointed to the significant spatial implications of structural adjustment and neoliberalism more broadly as they have played out in Accra from the 1980s onwards (Grant 2009; Yeboah 2003). Grant (2009) points to the spatial arrangements of Accra as a “globalizing city”, including foreign corporate space, global residential spaces and gated communities, land sales, remittances and building booms, alongside slums which remain prevalent across the city.

Today, the population of the Greater Accra Region³ is presently estimated at four million inhabitants,⁴ a significant percentage of which is located in the

Greater Accra Metropolitan Area (GAMA). Today, across the Greater Accra region, the city is both consolidating in emerging centres and expanding at its edges, giving rise to a shifting set of urban forms which bespeak Parker's (2000:17) descriptions of pre-colonial Accra as exhibiting a "renowned eclecticism". In downtown Accra, new hotels like the Kempinski cater to an internationally mobile elite, while large and diverse informal communities continue to grow. Meanwhile, developing alongside both old village centres and new highways, a diverse and indeed, contested peri-urban space surrounds an ever-morphing city, hosting both upscale residences and lower-income self-built housing (Barry and Danso 2014; Boamah and Walker 2016; Doan and Oduro 2012; Grant 2009; Stow et al. 2016; Yeboah 2008).

Constituting the bulk of the city's material skeleton, sand is widely extracted from the ground beneath Greater Accra and its surrounds. According to research at the Minerals Commission—the regulatory body for the management of Ghana's mineral resources—present estimates suggest that approximately 700–1000 trucks of sand are extracted per day, Monday to Saturday, in the Greater Accra region.⁵ This amounts to the equivalent of nearly 6 million cubic metres per year, enough sand to fill Dubai's Burj Khalifa almost six times. Beyond concrete dwellings, sand, I was told, is used for the construction of roads and commercial units. In an interview with an official at the Minerals Commission, the extent of this demand was emphasised: "One out of every ten people needs sand every day. They're thinking of how to build"—adding that "sand is life".

While demand for sand may be ubiquitous, the material qualities of sand are diverse. In fact, the only sense of uniformity derives from sand's qualifying scale, defined as loose grains of any hard material exhibiting a diameter between 2 and 0.0625 millimetres (Beiser 2018:6). The material makeup of sand differs immensely according to underlying rock formations and the relativity of geological processes (weathering, erosion and transportation). The most significant distinctions with regards to construction are found between marine sand, dredged river sand, and open pit sand.⁶ Marine sand, which is sourced from many of the world's beaches, is largely unsuitable for construction, given its corrosive properties that compromise the steel rebar in concrete structures. River sand, dredged from river beds, is considered high quality building sand, denoted by its strength, durability and workability. Open pit sand, while varying in quality, is sourced from open mines, extracted with earth moving equipment and transported directly onto loading trucks. Like many countries, Ghana's sand economy is multifaceted and comprises both authorised and more clandestine extraction practices from the nation's coastline, rivers and agricultural lands. The focus of this paper, however, is on open pit sand, which, in this context, is mainly used for concrete housing, foundations and smaller scale commercial buildings.

A significant volume of sand is directed towards building Accra's concrete homes, which, given their association with prestige, accomplishment and adulthood, are desired across all income brackets in Ghana (Yeboah 2003). In recent research, Choplin (2020:1981) argues concrete desires span the West African urban coastal corridor, where both the emerging middle class and millions of poorer people "dream of a house with four concrete walls and a sheet metal

roof". Indeed, despite the challenges of raising funds to acquire land and build a house, Asante et al. (2018:1226) observe that when it comes to building a concrete home in Accra, "many low and middle income earners continue to devise ways to break the odds". Large cement conglomerates, like Dangote, which produce and distribute cement throughout the region have contributed to this "cementification" process in West Africa (Choplin 2020:1980). Once a material "linked to the figure of the white European colonial who constructed out of cement and clinker", concrete has been re-appropriated and is now "perceived to be a local material, produced in Africa" (Choplin 2020:1981, 1984). Despite its limited suitability to a humid tropical climate, cement blocks are preferred to the use of local materials like clay and wood, because of the perception of concrete's modernity and durability (Choplin 2020; Oppong and Badu 2012). This was often relayed to me by those aspiring to build a house in Accra, expressing the appeal of modern cement homes that signified a particular kind of urban living, as opposed to building with mud or other materials typically associated with village life. The sandcrete block—made of a high volume of sand, alongside cement and water, is widely used across Ghana, Nigeria and many other sub-Saharan African countries, constituting 90% of urban housing in Ghana specifically (Awolusi et al. 2015; Darko 2007; Sholanke et al. 2015). Compared to the higher quality and more expensive blocks, which include gravel derived from quarried stone, sandcrete is an affordable alternative.

While the political-economies and imaginaries of both cement and concrete have received scholarly attention across diverse settings (see, for example, Elinoff 2017; Gastrow 2017; Harvey 2010; McDuire-Ra and Chettri 2020; Zeev 2019), sand has not. It is my suggestion that sand has been largely ignored in urban studies because of its relative unrecognisability as urban form. Indeed, its raw materiality is not necessarily "urban" in the sense that traditional urban studies may have dealt with materials and objects of the city. Indeed, sand only appears urban once it becomes concrete. The fact that sand is without brand may have also contributed to its invisibility, in addition to the fact that sand is often extracted beyond the traditional boundaries of the city, and indeed, at the limits of the periurban, where studies of the city may not necessarily engage (Bartels et al. 2020). Meanwhile, while some sand travels across international borders—as it routinely does in Southeast Asia—in many places, given the costs of transport, sand is extracted close to points of consumption. This limited transnationality may have rendered it less visible to researchers. Yet sand is an integral part of the urban built form and as I show, occupies a significant role in the life and politics of the city.

Shifting with the Sands

In Greater Accra, open pit sand is unearthed from plots of land at the city's edges. Seeking to minimise transportation costs, sand is extracted as close to the expanding city as possible and forms one dimension of Accra's dynamic peri-urban landscape. Though not exclusively, the north-western sandpit frontier falls within the Ga South municipality, not far from the growing town of Ashalaja (see

Figure 1). This is where I conducted the majority of my fieldwork. The spaces from which sand was extracted were called “sandpits” or “pits”. Though varying in size, sandpits from which sand was unearthed tended to be modest in scale, approximately the size of a football pitch. Within a few days, or even within the space of a day, the sand which lay beneath the earth would be exhausted and the contractor (see below) would be forced to move elsewhere. Thus, the sandpit was an ephemeral space, which, along with the city’s edges, had shifted over time. This was a geography that became apparent as I moved with drivers—or “tippers”—who transported sand from pits to various selling points, including sand stations, concrete block factories or construction sites.

The relationship with tippers was formed by spending significant time with a community in Awoshie Junction (see Figure 1), where I was conducting research on competing claims to space. Here, among diverse activities and spaces was a sand station, which hosted sand trucks, sand itself and a labour union. Over time and after various introductions, I was able to join the tippers as they moved from station to pits across the Greater Accra region. Once this relationship was solidified, I joined approximately 15 trips from station to the pit, and around 35 trips from the pit back to Awoshie Junction. In order to engage in more grounded fieldwork at the pits, with the help of a research assistant, I approached a sand mining company—Piam—as they operated on a plot of agricultural land near Hobor (see Figure 1). Following initial confusion at my interest, they kindly allowed me to spend time with them. Over the course of months, I spent around

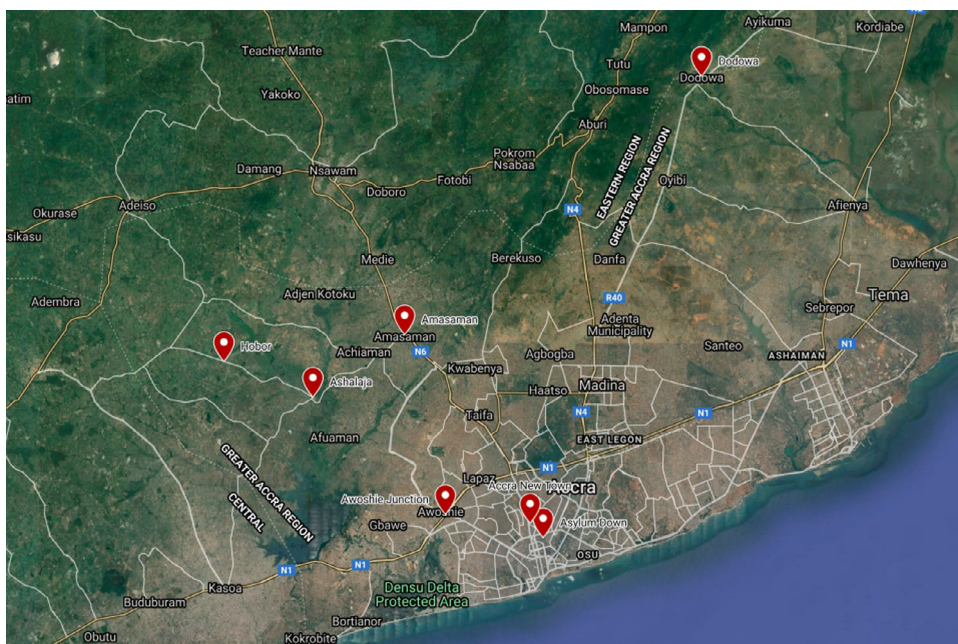


Figure 1: Fieldwork area (source: Google Maps 2020) [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

20 full days at different pits and visited an additional 15 pits with the tippers, as stated above.

Piam was a licensed contractor, who bore the responsibility of acquiring land for temporary use, transporting machinery to site, bulldozing the land to unearth the sand and moving the sand from ground to truck, with tippers proceeding to sell it to consumers. Working with sand demanded engaging with knowledge of earth sciences I was not familiar with. This required additional research into geological processes and a lot of patient answers from Piam employees. With some prior knowledge of contestations surrounding the extraction of sand, I avoided sensitive questions at the outset, instead focusing on extraction processes and labours. Over time, I was able to ask potentially more inflammatory questions surrounding loss of farmland and environmental degradation.

The leading figure in Piam's grounded work was Mr Osei, who became an important interlocutor, detailing important industry dynamics. Now in his 60s, he had operated in the industry for a significant length of time, often recalling working with his father when he was younger. He explained that, back then, "we were getting stones and gravels from Asylum Down and New Town"—areas which are now considered to be close to the centre of metropolitan Accra (see Figure 1). Grounded observations and informal interviews at sandpits were supplemented by interviews with members of local government at the Ga South Municipal Assembly (GSMA), politicians and elders in this area, as well as members of the Minerals Commission and Environmental Protection Agency in Accra—which acted as central regulatory agencies for mining and the environment respectively. I now turn to unpack the socio-natural politics through which sand is extracted from the land.

Geological Riches

On our first meeting, not far from a cluster of villages at a road junction beyond Hobor, I joined Mr Osei as he directed the earth moving equipment across the pit. As the sand was bundled into heaps, Mr Osei shared his geological knowledge of Greater Accra, narrating the uneven quality of sand deposits in the region. I would learn that, owing to different kinds of geomorphological processes, areas around Amasaman and Ashalaja were endowed with high quality sand, in reasonably deep deposits. As a member of the Minerals Commission confirmed, the sand on this side of Greater Accra was offered up in thicker deposits over a wider area, compared to "Dodowa side", where "the nice sand is [only] in pockets" and where "there is more gravel than sand". Together, their accounts reflected the geological realities of the region, where, broadly speaking, the west of the region hosts sandy, yellow and pale soils, compared to the east, where soil types tend toward sand, clay, humus and rocks. Formerly grouped together as the Ga District—and now split into several districts that span north, west and north-west from the metropolitan area to the boundaries of the Greater Accra region—these areas have become important sources of sand supply for construction in the peri-urban areas of Accra (Tagoe 2005). GSMA's Director agreed, announcing, "this area is the most heavily won for sand. It began becoming more

intense around the 2000s onwards, when development increased and so did the demand for sand”.

This geological knowledge—which was shared among state agencies and the sand industry—remapped Greater Accra into zones of potential geological bounty, bespeaking Yusoff’s (2018b) reading of geological knowledge as an act of (imperial) power. However, knowledge alone was not enough to turn geological processes into geological riches. Rather, the distribution of profits was shaped by those who owned the capital and those who owned the land in which sand was embedded—in turn reflecting existing inequalities across the broader regional society. Indeed, I would learn that Piam was owned by a wealthy businessman, who belonged to one of the more influential land-owning families in this part of Greater Accra. I was told that extracting sand had provided a generous income to him and his family, highlighting the ways in which those with existing wealth and capital were able to benefit from the extraction of sand. Wealth was not distributed evenly throughout the company however, with many of the employees on low incomes—and those, like Mr Osei, who were much older and more experienced, would have spent considerable years working in the company before a higher salary was negotiated. Besides Piam, revenue was distributed to those who owned the land in which the sand was embedded, which I discuss below.

At present, sand is governed by Ghana’s 1992 Constitution, which stipulates that every mineral in its natural state is vested in the president on behalf of, and in trust for the people of Ghana. Mineral rights are granted to private parties, endowing them with rights to mine the minerals in the ground, thus distinguishing between mineral rights and “surface rights” to the land. According to the Minerals and Mining Act 2006, sand is classified as an industrial mineral, subjecting it to a specific set of governing rules.⁷ The Act stipulates that a holder of a mineral right must pay an annual ground rent to the owner of the land or successors and assigns of the owner. In practice, given that sand mining involves frequent movement between sandpits and thus the occupation of land over short time spans, a “land fee”, as opposed to annual ground rent, is paid to the owner of the land, which is directly dependent on the volume of sand extracted from the land. This was calculated according to the number of tipper trucks which left the site with loads of sand. Significantly, I would learn that the land fee was not an evenly distributed flow of capital, but mirrored unequal relations of landed assets in Greater Accra.

In Greater Accra, given their regional indigeneity, a significant proportion of land belongs to Gas, and the land is governed by the Ga customary system. In this system, “land belongs to a vast family of which many are dead, few are living and countless numbers are still unborn” (Ollenu 1962:4). Indeed, customary law dictates that allodial titles are held in trust by family heads, that members belonging to a lineage may be granted usufructuary rights, and that land may be automatically inherited by descendants. However, today, broadly speaking, landowning is shifting from communal usufruct rights to non-customary leases shaped by market land values (Lefore 2012). Prompted by increasing demand for land, the designation of land as a “social good” is increasingly being replaced by its commercialisation, where individuals pay a fee determined by the market

(Oduro and Adamtey 2017). Thus, while in the past, “strangers” acquired land through the presentation of drinks and a small sum of money to the head of the family,⁸ now “plot leaseholds are being sold for amounts that reflect the economic value of the land” (Gough and Yankson 2000:2497).

This shift in land relations is set in the context of increasing concerns regarding the role of family heads as land custodians. Compared to Stool or Skin Lands—which are systems of traditional land governance operating in other parts of Ghana (and indeed in some places of Greater Accra)—in the 1992 constitution, Family Lands are “implicitly inferred ... as private property” and “devoid of extensive government regulatory mechanisms” (Ministry of Lands and Forestry 2003:13, in Andrews 2017:28). In this respect, “Family Heads enjoy a great deal more freedom than Chiefs in how they wish to allocate or dispose of their lands and the proceeds from said allocation or disposal” (Andrews 2017:28). Thus, the extent to which the money from land transactions flows into the extended family varies and is subject to much dispute and controversy (Barry and Danso 2014; Bartels et al. 2018; Gough and Yankson 2000; Oduro and Adamtey 2017). In effect, Greater Accra is undergoing what Bartels et al. (2018) call “de facto privatisation”, where in some cases, by retaining land revenues and making decisions without consent from the elders, traditional land custodians act as both private owners and private managers of land.

Existing research has suggested that revenues from the sale of sand seldom flow into the broader community (Oduro and Adamtey 2017). Rather, money often stays within elite landowning groups, mirroring broader inequalities in the distribution of landed assets. My findings supported this existing work, with Piam explaining that they paid the land fee directly to the landowner and while they could not be certain where this money would flow, they suggested that, like the sale of land leases, it would remain in these same hands. In this sense, mirroring shifts in land relations more broadly, sand destined for the city was commodified and subsequently privatised. In an analysis of geology and race, Yusoff (2018b:3) writes that “geology is a mode of accumulation, on the one hand, and of dispossession, on the other, depending on which side of the colour line you end up on”. In this context, sand’s geologic mode of accumulation and dispossession is more aptly shaped by one’s position with respect to customary institutions. Revenues extracted from sand seldom flow to the wider community but rather remain with Family Heads.

In this vein, by examining who benefits from the extraction of sand, we render visible the terms on which the city’s material skeleton is founded. In Greater Accra, sand destined to become the city is extracted from land which is increasingly commodified and revenues flowing from the extraction of sand are largely privatised. While the broader economies of sand include a wider set of labours—ranging from road repairs to the provision of food for tippers—writ large, the extraction of sand benefits those with both power over the capital and the land in which the resource is embedded. In this sense, a geological UPE has exposed the inequalities that undergird the city’s built form. Uneven geologic relations were also evident through the displacement of farming groups by the twin

endeavours of residential development and sand winning, an issue to which I now turn.

Sand and City Reign Supreme

In peri-urban Accra, land is often rented or share-cropped to both migrants and members of landowning families for the purposes of farming (Allen and Frediani 2013; Frimpong Boamah et al. 2020; Nyantakyi-Frimpong et al. 2016). As land values rise at the city's creeping edges, however, zones of farmland are increasingly detaching from customary tenure and shifting to regimes of de-facto privatisation. The effect has been the transformation of vast tracts of agricultural lands into residential plots. While technically, both migrant and indigenous farmers could buy these leases, their value is often beyond the affordability of many, with Oduro and Adamtey (2017:92) finding that the value of the customary "drink money" demanded representing the land's market value. In this light, Oduro and Adamtey (2017:92) point to the growing vulnerability of farm households in peri-urban Accra, arguing that "increased demand for land for non-agricultural purposes has now made it increasingly difficult for farmers—including those who belong to land-owning families—to gain access to land under these customary arrangements". The result has been the continued displacement of farming groups to the peripheries of the region, where land may be available under usufruct rights for members of land owning families or at a lower rental cost for both members of families and migrants. In this process, those most vulnerable to displacement have been those region's small-scale farmers, with limited income and insecure tenure (Anaglo 2011).

Today, the transformation of agricultural land into residential plots is often first interposed by the extraction of sand. As a peri-urban politician explained to me, "sand winning is a normal thing that happens before a place is developed". Enticed by the lucrative gains of potential land use beyond agricultural leases, traditional authorities and family heads are leasing land to sand winners on a short-term basis and then to developers on a longer-term basis (Oduro and Adamtey 2017). In this sense, sand winning can be understood as part of the unfolding of a de-facto privatised land regime in the Greater Accra region. Indeed, unearthing sand at the city's edges remains part of the broader practice of "flattening" diverse tenure forms and weaving agrarian land systems into the unfolding city (Ghertner 2015:554). Thus, sand winning can be positioned as another dimension to the peri-urban processes—and significantly, a practice that takes place ahead of even the first building blocks coming to visibility in the landscape.

The loss of farmland to both sand winning and residential development in Greater Accra was a concern widely prevalent throughout my fieldwork and one expressed in existing literature on sand winning in Ghana more broadly (Jonah et al. 2015; Peprah 2013; Salifu 2016). Set within the government's current campaign, "Planting for Food and Jobs (PFJ)" (Ministry of Food and Agriculture 2019), the media was active in reporting the loss of farmland to sand winners and estate developers, exposing widespread concern for both the livelihoods of farmers and access to food more broadly (African Independent 2017). In

particular, a large commercial pineapple farm, Golden Exotics, gained considerable media attention following its complaints about sand winners in the municipality (Citi FM 2018). Members of the EPA also shared these concerns, with an expert at a regional branch in Greater Accra explaining to me, “this area used to have a lot of farming ... tomatoes, okra and more. But now, because of development, you have to take food from the hinterland and that increases the costs because of transport and also reduces the quality”.

Regular access to nutritious, high quality food in Accra is marked by deep inequalities, with research estimating that on average, families spend 54% of their income on food (Maxwell et al. 2000, in Codjoe et al. 2016), suggesting the likelihood of a significantly higher figure for some of the poorer groups in the region. These concerns reflect a growing recognition of the significance of food security in sub-Saharan African cities more broadly (Battersby 2013). I suggest that the extraction of sand to build the city presents its own challenges to food security across the region, at times magnifying existing vulnerabilities experienced by rural farm households and many of the region’s urban inhabitants. Here, while the sale of land for residential development presented the ultimate displacement of farm households, the extraction of sand presented a premature erasure of some of the region’s most marginal inhabitants, exacerbating already existing food insecurities and presenting growing challenges to the social reproduction of the city. In this way, sand is extracted in the context of the uneven power dynamics that characterise the unfolding urban vista more broadly. Yet in doing so, it both re-produces and re-works existing vulnerabilities across the city, thereby giving rise to its own set of geosocial politics.

Governing Geologies

Owing to its lucrative potential, Ghana’s geology has been extensively studied (Schlüter 2006). In the past, gold dominated the landscape of extraction. Now, despite gold constituting 49% of the nation’s export value, vast maps pasted on the walls of the Minerals Commission boast the country’s diverse subterranean riches—diamonds, bauxite, manganese, among others—which together account for 64% of exports, 10% of GDP, 18% of government revenue and 2% of employment (EITI 2019). This geology, however, is geographically uneven. Unlike the Ashanti Region, which is endowed with prized minerals, Greater Accra is devoid of any significant geologies. Despite the absence of prized rocks, the geology of Greater Accra retains a role in the wider region’s economy (Tagoe 2005). Indeed, for the regional state, mining, including sand mining, is positioned as an important industrial activity in “functional rural areas”: areas which sustain livelihoods of over 300,000 people and are expected to more than double by 2037 (Greater Accra Regional Spatial Development Framework 2017). This view was reiterated at the Minerals Commission, with representatives highlighting the significant role that sand winning played in both the urban and national economy, announcing current efforts to calculate the percentage of sand as part of Ghana’s GDP. Despite the somewhat celebrated developmental role of sand, the Commission was well aware of the challenges that sand winning posed to the

environment and the security of those living among the shifting pits. This was perhaps most ardently expressed with respect to illegal sand mining, which was an area of significant public interest and one to which I now turn.

As detailed earlier in the paper, the extraction of sand and gravels is governed by the 1992 Constitution and the Minerals and Mining Act 2006, which classifies sand as an industrial mineral. The law requires that sand mining operators acquire a restricted license granted by the Minerals Commission. In a long description, a member of the Commission detailed the lengthy process of acquiring licenses, including the production of a site plan by a licensed surveyor, site inspections and publishing site particulars in local papers. In this context, illegal sand winning is defined by operating without a license, trespassing onto land or failing to compensate owners or land users. Many illegal operators work in the night and may employ land guards⁹ to protect the land, which may suggest the forced acquisition of land. Yet, the most perceptible characteristic of illegal sand winning is the visible lack of reclamation. A Task Force¹⁰ employee explained, “if you want to trace illegal sand winning, you look for places that haven’t been reclaimed. And there’s usually sand left. In fact, about 60% of the sand is left, because they did in the night, in a hurry. It’s a hit and run job”.

Adding that around 30-35% of sand mined in the region is illegal, he explained that most of this activity is carried out by young men. “We are suffering unemployment”, he continued. “Young men want money in their pockets and there is a lot of unemployment in peri-urban areas”—a sentiment echoed in conversations with various governing bodies in the region, as well as those working in the sand industry. Critically, the anxious desires to build across the city meant that there was always a market for sand, whether illegally sourced or not. This encouraged both winners and tippers to take the risk of either selling or buying illegal sand, knowing that the sand would soon be out of their hands and would be difficult to trace its source thereafter.

In media reports, illegal sand mining gained considerable traction as a “menace” to be eradicated. Often compared with gold *galamsey*¹¹ or termed sand *galamsey* itself, the media expressed concern at the nationwide degradation of farmland, loss of crops without compensation, pollution of water bodies and the violent means through which some illegal sand winners were acquiring land (Business Ghana 2017; Ghana Web 2017a, 2017b; Joy Online 2017). In 2014, Ghana Web reported on an MP’s parliamentary plea for the government to take action, appealing that “[a]lmost every corner of this country has some negative story to tell about sand winning in recent times. Forests have been pulled down, coastal soils massively scooped and savannah areas degraded through sand winning” (Ghana Web 2014). Following the MP’s plea, the Speaker of Parliament set up a committee to investigate the activities of sand winning across the nation (Ghana Web 2017c). Like sentiments expressed in both the media and interviews, the report detailed the consequences of illegal sand winning and the lack of coordination among regulatory institutions, including the Minerals Commission, EPA, local governments, security agencies, the Water Resources Commission and traditional authority.

I discussed attempts to govern illegal sand winning with members of the Task Force at the Minerals Commission. In the past, the Task Force had prepared workshops for sand winners, inviting elders, security agencies, and other regulatory bodies, like the Forestry Commission, seeking to educate these groups on best practice. The Task Force shared stories of having been attacked out on duty, attempting to make arrests alongside the police. "I have been attacked on about five occasions", one member said. "I was with four policemen, but they are well armed and they are more than you". They suggested that the areas close to Amasaman, including Ashalaja, have been home to high concentrations of land guards and illegal sand winning. This coupled with a vast road network has presented serious challenges in governing illegal sand winning in this region of Greater Accra.

In this context, ground patrols operating through local government agencies formed an important element in a strategy for controlling illegal sand winning and land guard activity, which together, were both seen to present a security threat to the nation. At each of my visits, the frontage of Ga South's building was busy with movements of military personnel and vehicles, reflecting the central government's directive for local governments to work with the military to secure the wider region. As the Ga South security liaison explained, "Just the other day we made an arrest of 75. They are carrying weapons and they are not afraid to use them. They present a security threat to these areas, because of the safety of the roads and [the fact] they are armed. So we are working with the military". The use of the military to secure regions was articulated to me by a member of the Bureau of National Investigation (BNI)—the body responsible for collecting intelligence on issues considered paramount to the internal security of the nation, including financial crime, sabotage, espionage, hijacking, terrorism, piracy and drug trafficking. In the context of illegal sand winning, the BNI was responsible for gathering information and generating policy for the National Security Council to implement, including the deployment of the military where needed. The BNI official explained that "police have become common to people, but when the military comes in, it has force. It is well armed". The military, working alongside both the state intelligence and the local government, regularly moved through the region, making arrests and impounding pay loaders and earth moving machines. The location of these illicit activities at the edges of the municipality seemed to highlight the limits of the state's capacity to govern its territory and the local state was anxious to shore up its power throughout these peri-urban zones. The grounded presence of the military was thus an important dimension in securing the edges of the metropolitan region and signified an attempt by the local state to bring these zones into the realm of "governable" urban space (Watts 2004).

For the BNI official, significant improvements in the security of the district had been made and for a member of the local state, the growing number of businesses in the municipality was a product of this security. Following a meeting at a newly constructed mall in the southern, most densely populated part of the municipality, the local state official looked out across the enterprises in business: fast food outlets and restaurants, international cosmetic brands and commercial

banks. Pausing for a moment, he turned to me and said, “private and commercial buildings are springing up across the municipality. This mall wasn’t here. But it’s because the place is peaceful and people feel safe to do business”. These businesses were vital in generating internal revenue for the municipality—a pursuit the local state had been recognised for, having been awarded the title of “Best Performing Assembly on Internally Generated Funds Innovation (IGF)” (Ga South Municipal Assembly 2018). In this way, securing a region free from illegal sand winning was paramount to securing economic development—and indeed political clout—in the municipality more broadly.

Thus, in the eyes of the state, the extraction of sand was contentious. While it represented developmental gains and offered significant contributions to the regional and national economy, the industry was positioned as a threat to both environmental sustainability and the security of both the city and the nation. Significantly, a threat to security was seen as a threat to economic prosperity. The city could not grow without sand—but its extraction had to be managed. As such, sand became embroiled into a much broader politics of securing space, of neutralising potential frictions in the name of securing investment in a present and future Accra.

Yet the discourse of security which took hold in the public sphere tended to overlook the realities of mining—a reality which offered a more complicated picture of illegal sand winning. Firstly, as I discussed, illegal sand mining was driven, in part, by high levels of peri-urban employment. This was reiterated in conversations with young men working for Piam, who explained that it was tough to find work in these areas, and that both “guarding” land and illegal sand winning offered instant money that was extremely hard to come by. This was a reality that some state members did highlight, including those at the municipality office, yet was something far less discussed in the media. The reality of illegal sand mining was also complicated by an often ambiguous distinction between “legal” and “illegal”. In an extended interview, the Head of Mining at the EPA explained that while the Minerals Commission issued an operating license more broadly, permits were site specific. Following the issuing of a license, the company is provided with a set of waybills, which they hand over to customers at the point of sale. However, the Head of Mining explained that when questioned, contractors “will flag the permit, but if you look closely, you’ll see it’s for a different site. Mostly they just show the waybill ... I go and check the site with the GPS and I know it’s a wrong site”. With these practices in mind, he concluded that “there’s a thin line between illegal and legal sand winning”. Finally, those at Piam suggested that some illegitimate sand winners—in many senses of the term—would pay lower level members of the state and/or the police to ensure that the situation would not be reported.

In this way, looking beyond the narratives that dominated the headlines revealed illegal sand winning’s relationship to broader issues facing Greater Accra. Indeed, illegal sand winning was not a simple security issue to be resolved through military maneuverers or arrest on site, but rather one that required engagement with issues of unemployment, regulation and a broader spectrum of governing practices.

The Geosocial City and a Geological Commons

Today, sand is being extracted at unprecedented scales. Following its unearthing, it is mixed with cement and water and transformed into the concrete scaffolding of cities across the planet. This is a reality widely under-observed in the academy and points to a broader occlusion of the geological in both urban studies and the social sciences more broadly. In this vein, the paper makes a call for a more rigorous dialogue with the geological strata that undergird the making of an expanding urban materiality. In this respect, I argue that cities demand to be seen, researched and theorised more explicitly as geosocial formations (Clark and Yusoff 2017; Mendelsohn 2018). I extend this line of thinking to UPE more specifically, arguing that while it offers a powerful analytic to analyse the socio-natural politics through which geological processes become enlisted into the city's formation, its limited engagement with sand—or geological material more broadly—reflects its underlying biases towards analyses of flows and ongoing socio-natural exchanges. I suggest that UPE could be usefully extended by stretching its boundaries to consider the geological more closely. This would enable us to deal with the multiple kinds of materials, extraction processes and production practices, upon which urban built form fundamentally relies for its realisation. In doing so, a geological UPE invites conversation across the divergent ways of doing UPE, rendering possible an analysis that accounts for the both the planetary scales of capitalist extraction that undergird the initial unearthing of geological materiality (Arboleda 2020), the national networks of uneven development in which cities are materially constituted, and the micro-political contestations which remained situated in particular environments as urban materials come into being. To be able to think across these scales and indeed largely divergent ways of examining the city's material formation, accounts for the multi-scalar, multilocational and multi-procesural nature of urban material production, and in turn, allows us to ask more critically where, who and what is impacted, transformed, lost or gained, in the worldly regimes of urbanising nature. Meanwhile, to see the politics of accumulation, dispossession and change taking root across such scales, ultimately marks some tentative steps in developing a “geologic commons” (Yusoff 2018a) befitting of our increasingly global urban moment.

With these positions in mind, I have used sand—as the “sedimentary medium that forms the most intimate link between humans and the urban geologies that we create” (Mendelsohn 2018:457)—as a mode of geologising UPE. In the first instance, the analysis exposed the uneven distribution of revenues that flow from sand's extraction. As I reiterated, in most cases, revenues flow to both those with the land and those with the capital, exposing the inequalities upon which the city's geological baseline is made. While many forms of labour were implicated in the extraction economy—from those operating machines to those selling food and equipment—their wages paled in comparison to the revenues exacted by those with land and capital. Uneven geologic relations were further extended through the displacement of farming groups by the related processes of residential development sand winning. In this context, I argued that sand winning may be best understood as part of the unfolding of a de-facto privatised land regime in Greater Accra. The displacement of farming groups and consequent loss of

farmland was a shared concern among inhabitants and the state alike, who anxiously pointed to reducing food supply, increasing prices and a further reinforcement of food inequalities in Greater Accra. In doing so, the analysis rendered visible a story of displacement which features less in our theoretical renditions of urban displacements, exposing a new dimension to the spatial politics of the city. Finally, the analysis unpacked the politics of governing sand, exposing the uneasy position of sand in equations of development. Engaging more explicitly with illegal sand winning, I unpacked the public discourse surrounding the “menace” and its intersection with state-driven understandings of security and growth. In turn, I drew attention to the often-overlooked forces that undergird unauthorised sand extraction, including unemployment, ambiguous distinctions between legal and illegal extraction and low level corruption.

Together, the points of analysis presented here expose the uneven lines of accumulation, dispossession and inequality that shape the losses and gains flowing from sand extraction, alongside sand’s intersection with a politics of development, security and future prosperity. In turn, the analysis has rendered visible a set of struggles in the production of the city with which any urban justice agenda must grapple. In this context, a radical geosocial politics of the city would make demands for a redistribution of the benefits flowing from existing extraction practices, articulate methods of fostering more sustainable urban food production, develop ways of protecting the most vulnerable in a changing regional landscape and consider the forces of unemployment and modes of governing that drive unauthorised practices. In many ways, these demands speak to existing social justice claims made upon the city, yet critically, they speak to an otherwise occluded mechanism of urban exclusions: namely, the urbanisation of geological materials. In Greater Accra and across Ghana more broadly, protests surrounding sand winning are increasingly visible in the public sphere (see e.g. Ghana Web 2017b, 2017d). In this light, future research should engage more closely with the emerging politics of urban material baselines.

On final conclusion, this paper has sought to geologise UPE, exposing the socio-natural politics through which sand becomes the city. Engaging with the extraction process more specifically, the paper has analysed just one of many facets in the urbanisation of sand and in doing so, exposed a politics to the city otherwise unseen in current renderings of the analytic—or indeed urban studies more broadly. To move forward with a geological UPE, I contend, prizes open space to consider new kinds of urban struggles and a potential constitution of a radical geosocial politics of the city. A future research agenda should engage with the broad spectrum of geological materials upon which our cities fundamentally rely, exposing the material politics embedded in our built environments.

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Endnotes

¹ Formed over thousands of years through erosion processes, sand is defined as loose grains of any hard material exhibiting a diameter between 2 and 0.0625 millimetres (Beiser 2018:6).

² See Beiser (2018) for a historical analysis of the rise and fall of concrete cities.

³ The Greater Accra Region is one of 16 administrative units in the country and comprises 16 districts itself. In this paper, my use of the term Greater Accra refers to this specific geography.

⁴ See <https://worldpopulationreview.com/countries/ghana-population>

⁵ These were figures provided to me during an interview with an official of the Minerals Commission who had conducted recent, unpublished research in Accra.

⁶ Broadly speaking, given its rounded edges from extensive erosion, which make it difficult to mould together, desert sand is unsuitable for construction.

⁷ Sand winning is governed more specifically by local by-laws under the Local Governance Act 2016. In the GSMA where much of my research took place, by-laws regulate the process of obtaining a specific permit from the district, issuing fines for winning from an unauthorized pit and monitoring regulations pertaining to land reclamation.

⁸ A small fee (adobe) was paid annually and there was no gender differentiation in this administration (Gough and Yankson 2000).

⁹ Land guards were present across the region and involved the employment of mostly young men to protect land from other interested parties in a context in which claims to land were often contested.

¹⁰ The Task Force at the Minerals Commission were responsible for collecting information, patrolling sand mining areas, educating individuals on how to mine legitimately and providing a link between sand mining activities on the ground and the central government.

¹¹ Galamsey means to "gather and sell" and refers to small-scale gold mining in Ghana.

References

- African Independent (2017) Tensions boil as developers take over farmland in Ghana. 30 June <https://www.africanindy.com/business/tensions-boil-as-developers-take-over-farmland-in-ghana-10046907> (last accessed 18 January 2020)
- Agyeman J and McEntee J (2014) Moving the field of food justice forward through the lens of urban political ecology. *Geography Compass* 8(3):211–220
- Al Jazeera (2017) India's line in the sand. 6 July <https://www.aljazeera.com/programmes/101east/2017/07/india-line-sand-170706085315219.html> (last accessed 18 January 2020)
- Allen A and Frediani A (2013) Farmers, not gardeners. *City* 17(3):365–381
- Anaglo J N (2011) "Understanding the Influence of Livelihood Features on Cassava Value Chains." Unpublished PhD thesis, University of Greenwich
- Andrews E (2017) "Navigating Land Rights Institutions in the Greater Accra Region of Southern Ghana: An Actor Network Theory Approach." Unpublished PhD thesis, University of Ottawa
- Arboleda M (2020) *Planetary Mine: Territories of Extraction Under Late Capitalism*. London: Verso

- Asante L A, Gavu E K, Quansah D O P and Tutu D O (2018) The difficult combination of renting and building a house in urban Ghana: Analysing the perception of low and middle income earners in Accra. *GeoJournal* 83:1223–1237
- Awolusi I G, Soyngbe A A and Oyeyipo O O (2015) An appraisal of the quality of sandcrete blocks used for construction in the Lagos metropolis. *Journal of Building Performance* 6(1):40–49
- Barry M and Danso E K (2014) Tenure security, land registration, and customary tenure in a peri-urban Accra community. *Land Use Policy* 39:358–365
- Bartels L E, Bruns A and Alba R (2018) The production of uneven access to land and water in peri-urban spaces: De facto privatisation in greater Accra. *Local Environment* 23(12):1172–1189
- Bartels L E, Bruns A and Simon D (2020) Towards situated analyses of uneven peri-urbanisation: An (urban) political ecology perspective. *Antipode* 52(5):1237–1258
- Battersby J (2013) Hungry cities: A critical review of urban food security research in Sub-Saharan African cities. *Geography Compass* 7(7):452–463
- Beiser V (2017) He who controls the sand: The mining “mafias” killing each other to build cities. *The Guardian* 28 February <https://www.theguardian.com/cities/2017/feb/28/sand-mafias-killing-each-other-build-cities> (last accessed 18 January 2020)
- Beiser V (2018) *The World in a Grain: The Story of Sand and How It Transformed Civilization*. New York: Riverhead Books
- Boamah E F and Walker M (2016) Legal pluralism, land tenure, and the production of “nomotropic urban spaces” in post-colonial Accra, Ghana. *Geographical Research Forum* 36:86–109
- Brenner N and Schmid C (2012) Planetary urbanization. In M Gandy (ed) *Urban Constellations* (pp 10–13). Berlin: Jovis
- Brenner N and Schmid C (2014) The “urban age” in question. *International Journal of Urban and Regional Research* 38(3):731–755
- Business Ghana (2017) Illegal sand winners destroy farmlands in Gomoa East. 1 June <http://businessghana.com/site/news/business/146712/Illegal-sand-winners-destroy-farmlands-in-Gomoa-East> (last accessed 18 January 2020)
- Choplin A (2020) Cementing Africa: Cement flows and city-making along the West African corridor (Accra, Lomé, Cotonou, Lagos). *Urban Studies* 57(9):1977–1993
- Citi FM (2018) Pineapple producing firms Golden Exotics, struggles with land guards. 20 February <https://citifmonline.com/2018/02/pineapple-producing-firm-golden-exotics-struggles-with-land-guards-audio/> (last accessed 19 January 2021)
- Clark N (2017) Politics of strata. *Theory, Culture, and Society* 34(2/3):211–231
- Clark N and Yusoff K (2017) Geosocial formations and the Anthropocene. *Theory, Culture, and Society* 34(2/3):3–23
- Codjoe S N A, Okutu D and Abu M (2016) Urban household characteristics and dietary diversity: An analysis of food security in Accra, Ghana. *Food and Nutrition Bulletin* 37(2):202–218
- Cronon W (1991) *Nature’s Metropolis: Chicago and the Great West*. New York: W.W. Norton
- Darko E (2007) “The Prevalence of Sandcrete Blocks in the Housing Industry of Ghana.” Sunyani Polytechnic
- Dawson K (2020) “Shifting Sands in Accra, Ghana: The Ante-Lives of Urban Form.” Unpublished PhD thesis, London School of Economics and Political Science
- Doan P and Oduro C (2012) Patterns of population growth in peri-urban Accra, Ghana. *International Journal of Urban and Regional Research* 36(6):1306–1325
- EITI (2019) “Ghana Extractive Industries Transparency Initiative.” <https://eiti.org/ghana> (last accessed 18 January 2020)
- Elinoff E (2017) Concrete and corruption: Materialising power and politics in the Thai capital. *City* 21(5):587–596
- Ernstson H and Swyngedouw E (2019) Politicizing the environment in the urban century. In H Ernstson and E Swyngedouw (eds) *Urban Political Ecology in the Anthro-obscene: Interruptions and Possibilities* (pp 3–22). London: Routledge

- Frimpong Boamah E, Sumberg J and Raja S (2020) Farming within a dual legal land system: An argument for emancipatory foodsystems planning in Accra, Ghana. *Land Use Policy* <https://doi.org/10.1016/j.landusepol.2019.104391>
- Gandy M (2002) *Concrete and Clay: Reworking Nature in New York City*. Cambridge: MIT Press
- Ga South Municipal Assembly (2018) GA South judged as best performing assembly on IGF innovation. 26 September https://gsma.gov.gh/news/Ga_South_Judged_as_Best_Performing_Assembly_on_IGF_innovation.html#:~:text=GA%20South%20Municipal%20Assembly%20has,Volta%20Serene%20Hotel%20in%20Ho (last accessed 18 January 2020)
- Gastrow C (2017) Cement citizens: Housing, demolition, and political belonging in Luanda, Angola. *Citizenship Studies* 21(2):224–239
- Ghana Web (2014) MP worried over illegal sand winning. 27 June <https://www.ghanaweb.com/GhanaHomePage/NewsArchive/MP-worried-over-illegal-sand-winning-314504> (last accessed 18 January 2020)
- Ghana Web (2017a) Residents of Yaakoko demonstrate against illegal sand winners. 30 April <https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Residents-of-Yaakoko-demonstrate-against-illegal-sand-winners-533629> (last accessed 18 January 2020)
- Ghana Web (2017b) Sand winning is as dangerous as galamsey—GWLC. 6 August <https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Sand-winning-is-as-dangerous-as-galamsey-GWLC-566830> (last accessed 18 January 2020)
- Ghana Web (2017c) 85% of sand winning activities illegal—Parliamentary report. 20 June <https://www.ghanaweb.com/GhanaHomePage/business/85-of-sand-winning-activities-illegal-Parliamentary-report-550349> (last accessed 18 January 2020)
- Ghana Web (2017d) Residents turn funeral into demonstration against illegal sand mining. 30 April <https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Residents-turn-funeral-into-demonstration-against-illegal-sand-mining-533635> (last accessed 18 January 2020)
- Ghertner D A (2015) Why gentrification theory fails in “much of the world”. *City* 19(4):552–563
- Gough K V and Yankson P W K (2000) Land markets in African cities: The case of peri-urban Accra, Ghana. *Urban Studies* 37(13):2485–2500
- Grant R (2009) *Globalizing City: The Urban and Economic Transformation of Accra, Ghana*. Syracuse: Syracuse University Press
- Greater Accra Regional Spatial Development Framework (2017) “Regional Spatial Development Framework Strategies and Policies Report.”
- Harvey P (2010) Cementing relations: The materiality of road and public spaces in provincial Peru. *Social Analysis* 54(2):28–46
- Heynen N (2014) Urban political ecology I: The urban century. *Progress in Human Geography* 38(4):598–604
- Heynen N (2016) Urban political ecology II: The abolitionist century. *Progress in Human Geography* 40(6):839–845
- Heynen N, Kaika M and Swyngedouw E (2006) Urban political ecology: Politicizing the production of urban natures. In N Heynen, M Kaika and E Swyngedouw (eds) *In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism* (pp 1–20). London: Routledge
- Jonah F E, Adjei-Boatend D, Agbo N W, Mensah E A and Edziyie R E (2015) Assessment of sand and stone mining along the coastline of Cape Coast, Ghana. *Annals of GIS* 21(3):223–231
- Joy Online (2017) Sandy Gold: The bloody race to win sand in Ghana. 17 May <https://www.myjoyonline.com/opinion/sandy-gold-the-bloody-race-to-win-sand-in-ghana/> (last accessed 18 January 2020)
- Kaika M (2005) *City of Flows*. New York: Routledge
- Lawhon M (2013) Flows, friction, and the sociomaterial metabolization of alcohol. *Antipode* 45(3):681–701

- Lawhon M, Ernstson H and Silver J (2014) Provincializing urban political ecology: Towards a situated UPE through African urbanism. *Antipode* 46(2):497–516
- Lefore N R (2012) "The Politics of Land (and) Violence in Ghana." Unpublished PhD thesis, University of Virginia
- Loftus A (2012) *Everyday Environmentalism: Creating an Urban Political Ecology*. Minneapolis: University of Minnesota Press
- Maxwell D G, Levin C E, Amer-Klemesu M, Reul M T, Morris S S and Ahiadeke C (2000) "Urban Livelihoods and Food and Nutrition Security in Greater Accra, Ghana." Research Report 112, International Food Policy Research Institute
- McDuié-Ra D and Chettri M (2020) Concreting the frontier: Modernity and its entanglements in Sikkim, India. *Political Geography* <https://doi.org/10.1016/j.polgeo.2019.102089>
- Mendelsohn B (2018) Making the urban coast: A geosocial reading of land, sand, and water in Lagos, Nigeria. *Comparative Studies of South Asia, Africa, and the Middle East* 38 (3):455–472
- Ministry of Food and Agriculture (2019) "Planting for Food and Jobs." <http://mofa.gov.gh/site/business/pfj> (last accessed 18 January 2020)
- Ministry of Lands and Forestry (2003) "Emerging Land Tenure Issues." http://www.hubrural.org/IMG/pdf/cilss_praia9_ghana_rapport_national.pdf (last accessed 2 February 2021)
- Nyantakyi-Frimpong H, Arku G and Inkoom D K B (2016) Urban agriculture and political ecology of health in municipal Ashaiman, Ghana. *Geoforum* 72:38–48
- Oduro C Y and Adamtey R (2017) The vulnerability of peri-urban farm households with the emergence of land markets in Accra. *Journal of Science and Technology* 37(1):85–100
- Ollenu N A (1962) *Customary Land Law in Ghana*. London: Sweet and Maxwell
- Oppong R A and Badu E (2012) Evaluation of stabilised-earth (TEK) block for housing provision and construction in Ghana. *Journal of Science and Technology* 32(2):104–118
- Parker J (2000) *Making the Town: Ga State and Society in Early Colonial Accra*. Oxford: James Currey
- Peprah K (2013) Sand winning and land degradation: Perspective of indigenous sand winners of Wa, Ghana. *Journal of Environment and Earth Science* 3(14):185–194
- Quayson A (2014) *Oxford Street Accra: City Life and the Itineraries of Transnationalism*. Durham: Duke University Press
- Salifu B (2016) "Implications of Sand Mining on the Environment and Livelihoods in Brong Ahafo Region." Unpublished PhD thesis, Kwame Nkrumah University of Science and Technology
- Salopek P (2019) Inside the deadly world of India's sand mining mafia. *National Geographic* 26 June <https://www.nationalgeographic.com/environment/2019/06/inside-india-sand-mining-mafia/> (last accessed 18 January 2020)
- Schlüter T (2006) *Geological Atlas of Africa: With Notes on Stratigraphy, Tectonics, Economic Geology, Geohazards, and Geosites of Each Country*. New York: Springer
- Sholanke A B, Fagbenle O I, Aderonmu A P and Ajagbe M A (2015) Sandcrete block and brick production in Nigeria: Prospects and challenges. *IIARD International Journal of Geography and Environmental Management* 1(8):104–120
- Silver J (2015) Disrupted infrastructures: An urban political ecology of interrupted electricity in Accra. *International Journal of Urban and Regional Research* 39(5):984–1003
- Stow D A, Weeks J R, Shih H, Coulter L L, Johnson H, Tsai Y, Kerr A, Benza M and Mensah F (2016) Inter-regional pattern of urbanization in southern Ghana in the first decade of the new millennium. *Applied Geography* 71:32–43
- Swyngedouw E and Heynen N (2004) Urban political ecology, justice, and the politics of scale. *Antipode* 35(5):898–918
- Synndegouw E and Kaika M (2003) The environment of the city...or the urbanization of nature. In G Bridge and S Watson (eds) *A Companion to the City* (pp 567–580). Oxford: Blackwell
- Tagoe T (2005) "The Socio-Economic Impact of Sand Winning in the Ga Districts." Unpublished PhD thesis, University of Ghana

- UNEP (2014) "Sand, Rarer Than One Thinks." United Nations Environment Programme
- UNEP (2019) "Sand and Sustainability: Finding New Solutions for Environmental Governance of Global Sand Resources." United Nations Environment Programme
- Watts M (2004) Resource curse? Governmentality, oil, and power in the Niger Delta, Nigeria. *Geopolitics* 9(1):50–80
- Yeboah I E A (2003) Demographic and housing aspects of structural adjustment and emerging urban forms of Accra, Ghana. *African Today* 50(1):107–119
- Yeboah I E A (2008) Ethnic emancipation and urban land claims: Disenfranchisement of the Ga of Accra, Ghana. *Geographical Research* 46(4):435–445
- Yusoff K (2018a) Politics of the Anthropocene: Formation of the commons as a geologic process. *Antipode* 50(1):255–276
- Yusoff K (2018b) *A Billion Black Anthropocenes or None*. Minneapolis: University of Minnesota Press
- Zalasiewicz J, Waters C and Williams M (2017) City-strata of the Anthropocene. *Annales: Histoire, Sciences Sociales* 72(2):329–351
- Zeev N B (2019) Building to survive: The politics of cement in Mandate Palestine. *Jerusalem Quarterly* 79:39–62