The Urbanisation of the Sanitation Crisis:

Placing Waste in the City

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Abstract

Sanitation systems are the most vital provisions in a city. Today, however, the global sanitation crisis is urbanising, and growing numbers of residents live with the struggle and consequences of not having safe, reliable facilities. While there is a large and vibrant literature on sanitation and cities, we have yet to account for the specifically *urban* nature of the deepening sanitation crisis in the global South. In this article, I set out a framework for understanding the dimensions of the urban sanitation crisis, by arguing for the value of developing a relational approach comprising five areas: *people, life, things, spaces,* and *distributions.* Drawing on literature and my own research on urban sanitation in the global South, I argue that if research, policy and practice is to better understand and respond to challenges of urban sanitation poverty, an expansive conception of its specifically urban dimensions will be crucial.

Keywords: urban sanitation; crisis; city development; infrastructure; services; spaces; rights.

INTRODUCTION

Is it possible to write a history or geography of the city without reckoning with waste in its multiple forms? Urbanization has not only produced waste, it has always required it. Waste is the by-product of urbanization, and the raw material of creativity and wealth creation (Campkin, 2013). It has long been powerfully connected to representations of urban misery, collapse or dystopia, from Dickens' *Bleak House* to Boyle's *Slumdog Billionaire*. Part of the power of waste for understanding the city is the extraordinary diversity of work that waste has been made to do. Waste has, as Joshua Esty (1999: 23) has put it, a "remarkable currency and symbolic versatility", but it is also, as Joshua Reno (2014: 22), always much more than a symbolic category, and is "unavoidably entangled with multiple life forms". The city proliferates these multiple forms, even as it seeks to contain them. We can point, for example, to five key and quite distinct areas of research on cities and waste.

First, there is work that examines how particular groups or places in the city – such as 'slums' – are *ideologically defined as 'wasted'* (Anderson, 2006; Mayne 2017; Sundaram, 2008) or as threatening, even repulsive spaces in need to expulsion (Campkin, 2013; Kristeva, 1982). Second, work examining the *socially constructed* and symbolic work of waste in social orders (Douglass, 1984; Esty, 1999; Laporte, 2000). Third, research tracking the role of *sanitation infrastructures* and toilets in shaping notions of public, private, and hygiene (Molotch, 2010; Penner, 2013), including the ways in which these systems produced urban government, public health discourses, and even cities themselves (Joyce, 2002; Kaviraj, 1999; Chakrabarty, 2002; McFarlane, 2008; Melosi, 2000). Fourth, a vast literature examining the working conditions, lives, socialities, economies and politics of informal waste recyclers, often in cities in the global South (Fredericks, 2013, 2018; Aparcana, 2017). Finally, fifth, work that explores not the social constructivism of waste but instead its *materialities* (Grosz, 1994; Reno, 2014).

Across this long and wide-ranging set of debates and frames, it is *human waste* that occupies the most pivotal space in the history of the city. Sanitation is the single most vital provision in a city, the most

important techno-environmental advance in the history of urbanisation. The sanitation crisis in the urban global South constitutes the most pressing challenge in cities today. As cities in the global South expand and densify, the drama of unequal sanitation provisions intensifies, and the sanitation crisis urbanises. Almost 25% of the 2.6 billion people lacking adequate sanitation live in urban environments, mostly in informal settlements. Informal settlements already house one in four urbanites, and are urbanising faster than cities more generally (United Nations, 2017; Satterthwaite and Mitlin, 2014). The sanitation Sustainable Development Goal (SDG) aims to provide sanitation for all by 2030.

Yet, while the crisis is gaining increasing attention globally in policy, academic, activist, and practitioner contexts, our understanding of its *urbanising* nature is weak. To push research, policy, and practice, we will need to enrich our conception of the *urban* in the urban sanitation crisis. There is a growing and disparate body of research exploring the urban dimensions of the sanitation crisis in the global South (eg Joshi *et al*, 2011; Satterthwaite and Mitlin, 2005; Thieme, 2010; O'Reilly, 2010; Otsuki ,2016; McFarlane *et al*, 2014), but rarely do these accounts position the crisis of human waste fundamentally in the city. In the context of the city, sanitation is far more than simply the safe removal and containment of human waste. It is central to everyday life and intimately connected to inequalities in health, gender, caste, religion, education, and work. It is a problematic of density, multiple forms of power, authority, and governance that might coalesce or contradict, and historically produced claims and struggles by an often wide range of social groups. I argue that a focus on the specifically urban nature of the global sanitation crisis demands a relational approach that captures the diversity of ways in which waste and the urban interact. Developing an urban relationality of sanitation is a vital step towards understanding what the crisis is and scoping responses to it.

My aim is to position the global sanitation crisis as an increasingly urgent urban question, and to ask how we might go about understanding and responding to that. When sanitation is placed in an urban context, it is not only a question of governance and provisioning – though they matter, as will see - but a question of bits of broken and inadequate materials, densities of bodies and their wastes, places

and political economies, cultural politics and people, microbes and rights. What is revealed is less a liberal governance question of managing sanitation supply and demand technologies, and instead a bodily, material, and deeply contested geography of human waste. While my focus is on human waste, as we will see there are moments when the line between human waste and other kinds of waste inevitably blurs. For example, in the context of informal settlements the combination of density, under-provisioning of infrastructure, and the presence of multiple wastes in a spatially compressed environment – from animal and chemical to solid wastes of different kinds – means that in terms of people's daily struggles with sanitation and responses to it, attending to the relations between wastes can become important.

In the context of the city, I argue, we need to see sanitation as a profoundly *networked problem*. Given that sanitation spills across multiple domains of life, habitation, and mobility in the city, it cannot be seen as an isolated issue. Sanitation erodes health, deepens the exploitation of especially girls and women and limits their ability to move around the city, keeps children out of school, stops adults getting to work, exacerbates local tensions around religion or ethnicity, stunts bodily growth, curtails the nutritional value of food, becomes the vehicle of disease, becomes a fulcrum for urban protest and resistance - and on (Corburn and Riley, 2016; Dearden *et al*, 2017). It prescribes people's ability to live fully in the city, to exercise what Henri Lefebvre influentially called their 'right to the city'. Understanding sanitation as a networked, multiple thing in the city means opening out an expansive imagination and debate about urban political transformation. This is a world where toilets and pipes, waste and microbes, engineers, activists, and residents, populate an urban crisis that is increasingly pivotal in shaping our increasingly unequal, contested, and urbanised world.

To develop this relational approach, the article examines five themes recurring concerns in the key challenges and political arenas of urban sanitation in the global South: *people*, and especially differences in gender, age, class, and ethnicity; *citylife* in all forms (focussing less on social difference and perceptions and more on bodies and the metabolic, including of humans, animals, microbes, etc); *things*, from infrastructures to everyday objects like pipes and rags; *spaces*, form the street and

neighbourhood to city council offices and international donors; and *distributions* of money, rights, responsibility, and so forth. These are not separate but closely inter-related areas of concern, even if they are given shape differently across cities, and together they set out both a general thesis on the sanitation crisis in cities of the global South and a set of issues that need to be *transformed in relation to one another* as a basis for more just urban conditions. To illustrate the arguments, I draw on literature from across the urban global South, including my own work in several cities, and especially in Mumbai.

Finally, a word on generalisation. On the one hand, my argument is that we can use the relational approach advanced here, with its five key elements, to better understand and respond to the specifically urban nature of the global sanitation crisis. On the other hand, it is also my argument that better attending to the urban demands recognising that cities are often radically distinct, and that the five themes will therefore look very different across cities. For example, in Cape Town the historical legacies of sociospatial apartheid, and the intersections between race and class, are vital in structuring the forms of power and possibility around sanitation (eg McFarlane and Silver, 2017). But in Mumbai, the confluence of caste and religion play more prominent roles, and here we also have a situation of far greater densities, infrastructure overload, and governance complexities. I am not, then, seeking to generalise from Mumbai for all cities. It is the five-fold relational framework, and not the specifics of the city, that form the general claims in the paper. I have arrived at the five themes not through a particular case study but through extensive reading and research on sanitation across cities in the global South. The focus on Mumbai, the, serves to provide one point of illustration and grounding for the arguments. It is not a representative of sanitation conditions in cities in the global South.

PEOPLE: SEEING SANITATION

Sanitation is not just about pipes and toilets, drains and costings. It is peopled. What does mean in the context of the city? I will return to one fundamental issue here, the question of numbers of people, later in the paper when I discuss density in relation to urban space. In this section, I will focus on a

key issue that emerges across literatures on sanitation in the city: difference. To put this straightforwardly, people see sanitation in quite different ways, sometimes radically distinct and contradictory ways, and this issue of difference is particularly pronounced and powerful in the context of dense cities, with the social, economic and political heterogeneities that come with that.

For some, sanitation will surface as a problem primarily of gender (Molotch and Noren, 2010), or of caste, race and ethnicity (Jewitt, 2011; Swanson, 1977), or religion (McFarlane et al, 2014), or as a vital space for securing or generating livelihoods (Satterthwaite et al, 2005; 2015), a technological challenge (Mara, 2012), a behavioural challenge in relation to cultures of hygiene (Fewtrell, 2005), a politics of disability (Black and Fawcett, 2008), and so on. The ways in which different individuals or institutions see sanitation do not emerge from the ether, but is shaped by the specific contexts of people's lifeworlds. 'Sight', as Corbridge *et al* (2005: 24) write in their study of the state, is "learned and based on past experiences". By 'seeing sanitation', I am referring to the distinct conceptions of sanitation at work in the city, and how those emerge from the contexts people are living in and struggling with (McFarlane and Silver, 2016).

If sanitation is seen differently from different contexts, it is the experience of women that is especially crucial here. In the context of dense urban environments, where space is intensely pressured both at home and across the neighbourhood, women bear the burden of inadequate sanitation. In many neighbourhoods across the global South, women cannot safely use toilets or other spaces such as fields, railway tracks or the cover of bridges, without running the risk of harassment, rape, and other violence. Women often wait until the cover of darkness, or else go at particular times with a larger group for safety (Doron and Raja, 2015). Add to that the deleterious health impacts, cleaning, caring, retrieving water, or the labour of finding and often building makeshift sanitation infrastructures or collecting water, and gender emerges as a crucial dimension of the urban sanitation story.

The violence women experience as part of the sanitation crisis has to be understood in relation to the ways in which politics, legalities, investment, and cultures are shaped in the city. It reflects the

gendered nature of infrastructure provision in the city and expectations about who uses and should be using public space, as well as the social organisation of scarce resources in dense neighbourhoods. It also derives from wider cultural notions of pollution and the female body, which of course exceed the city. In India, for instance, Hindu social orders in some areas strongly connect caste and gender. Women's bodies can become ideologically linked to contamination, dirt and pollution (Phadke *et al*, 2011).

Too often, makeshift sanitary protection might take the form of old clothes and sheets, towels or torn mattresses, often impossible to keep clean and causing infection, pain and discomfort (George, 2016). One of the main reasons girls miss and drop out of school is the embarrassment of leaking rags and the lack of provisions in the school context (Lusk-Stover, 2016). If the ways in which women and girls see sanitation is pivotal to understanding sanitation poverty, it is remarkable just how often provisions are delivered without engaging them in the design and implementation of those structures (Bapat and Agarwal, 2004; O'Reilly, 2010). Men, in contrast, who are already less likely to suffer harassment or attacks, more likely to carve out privacy, more likely to benefit from the distribution of sanitation resources, and less likely to be impacted by, for instance, long queues for toilets (where they often assume or receive preferential treatment), are more likely to have a voice in shaping interventions by the state or other actors – if, of course, those interventions consult residents at all. This is not to trivialise the struggles men too face, for example in relation to missing work, or in exacerbating existing problems such as alcohol or drug addiction (Parkar *et al*, 2003).

The experience for children is different again. In poor neighbourhoods, malnutrition and dehydration exacerbated by inadequate sanitation stunts growth and keeps kids out of school (Dearden *et al*, 2017). The millions of children who live in the streets of cities in the global South, sleeping on railway platforms or under bridges or on pavements, often have no access to any form of adequate sanitation. In poor neighbourhoods, open drains, landfills, garbage grounds and contaminated rivers can become play areas. Children call fall into, from or through often precarious toilet structures located at water courses, and girls can suffer harassment, abuse and rape when using toilets or other

spaces (McFarlane *et al*, 2014). In short, if we see sanitation from the perspective of children in the city, as compared to men or women, the problem itself shifts dimension.

'Peopling' urban sanitation demands attention to other relevant subject positions. Consider, for example, how a municipal officer might see sanitation. Often, the municipal officer has to negotiate all manner of power brokers in the city, from landlords and private companies running services, as well as the agendas of the municipality, which in large cities are sometimes multiple and in contradiction. They are answerable to politicians, which means they can become embroiled in the electoral politics through which toilets and water pipes might be mobilized for vote-banks, or become negotiating tools through which to make or unmake power-bases. In the urban context we are more likely to find complex and multiple forms of power and authority in both formal and informal governance and politics, and this too is a vital element shaping how sanitation is differently peopled.

In Mumbai, the Shiv Sena, a regional party with a long history of ethno-religious chauvinism and anti-Muslim politicking and which has governed the city since 1995, plays a vital role in the geographies of patronage. In the neighbourhood of Khotwadi in western Mumbai, for instance, the Sena represents the neighbourhood and the local party *shakha* (office) is a key urban intermediary for infrastructure and services (McFarlane *et al,* 2014). While, as De Wit and Berner (2009: 930) describe, patronage can be progressive in that it often constitutes one of the only ways in which services are delivered to the poor, patronage by definition extends to some over others, and is less reliable in a predominantly Muslim neighbourhood.

Politicians often attempt to associate themselves with improved water and sanitation provisions - whether it is they who provide them or not - and disassociate themselves from the removal of toilets or the cutting of water pipes. For example, Lisa Björkman (2015) describes how in 2009, after six people died in a cholera outbreak in Rafinagar, Mumbai, the water department decided along with the local municipal councillor to cut the plastic water pipes in the area, on the basis that plastic pipes are more vulnerable to being broken and therefore to transmitting contaminated water. Here, Björkman

argues, councillors and other politicians are in a bind: even if they want to cut the plastic pipes, they can't be *seen* to want to.

The most likely way to build sanitation solutions that are relevant and successful is to do so through an understanding of people's needs and desires, and to position the experience and perception of ordinary people – particularly women and girls– as central to the planning, design and implementation of sanitation. Yet, in some quarters blame has become increasingly important to the management of sanitation. For example, Community-Led Total Sanitation (CLTS) initiatives, which are based on participatory mapping of neighbourhoods to understand practices of open defecation and promote self-help, has been widely popularised despite been criticised for encouraging a divisive set of local relations often insensitive to gender, class and people's backgrounds, as well the demands it puts on making land available to build toilets that can end up excluding tenants and landless groups (Mehta and Movik, 2012; Kar, 2012). For instance, CLTS recommends creating a culture of intolerance towards those who defecate in the open when toilets are available, and there have been cases where this has involved public humiliation and even violence.

CITYLIFE

Much research on urban sanitation starts and stops with a focus on residents and policy. While these are vital domains, the effect is to close from view the wider ecology of urban sanitation. The next step in this relational approach is to focus attention more squarely on city*life* itself. How should we understand 'life' in the context of the urban sanitation crisis? How do different forms of life *act* in the constitution of sanitation in the city? If the previous section focussed on people's views, perceptions and experiences, this section looks to the biophysical and metabolic dimensions of living more specially, which includes but is not limited to people. The vantage point here, then, is expansive: bodies, excrement, diarrhoea, microbes, metabolisms, urine, resources, soil, animals – sanitation in the city is an ecology that shapes and inter-relates different forms of life. The dense, fragmented, physically constrained spaces of the city, especially in relation to informal neighbourhoods, have often profound impacts on bodies and the metabolic realms of cities.

The body is the site where the urban sanitation crisis is most powerfully felt, yet the physical experience of urban sanitation is too often hidden from view in research. In the context of human waste and the city, the metabolic processes of the body – eating, drinking, secreting, menstruating, defecating, urinating, sweating, medicating, sleeping, moving – are profoundly shaped by processes external to it. Contaminated water weakens bodies through diarrhoea and illness, bodily wastes seep into water and food supplies and enter back into bodies, dysfunctional or broken toilets can lead to injury, and people miss work and school to care for themselves or family members.

But bodies are not equally vulnerable, and women and children's bodies are especially at risk. For women, the consequences of supressing bodily flows and secretions are not just discomfort, pain, and dehydration, but a host of urinary tract and bowel infections, complications with menstruation, and serious impacts on pregnancy and breastfeeding. The body and its secretions are profoundly gendered: differently contained, sorted, and demarcated by cultural power. As Mary Douglas (1966) argued so influentially, the body is an historically produced symbolic site. And yet, focussing on the life of sanitation demands that we move beyond Douglass' social constructivism to accommodate the embodied, material, and metabolic processes of waste in the city (Reno, 2014).

Excrement is at once physical and symbolic, a metabolic process and a representational marker of cultural boundaries, a product of both self and society and a marker that both are defined against, central to the spread of illness and disease through and beyond the city (see, for instance, Warwick Anderson, 2006, on excremental urbanism). Excrement's geographies, nature, and consequences are not fixed and predictable but multiple and nonlinear. In many cities in the global South, and especially in informal settlements, excrement is not controlled, moved out of sight and treated, but *there* in urban space, gathering in open drains, spilling into narrow streets and areas where children play, finding its way through insects or hands into food and water, oozing through rivers and streams in the city.

Excrement is always potentially life threatening, and diarrhoea particular so. Usually the result of food or water contaminated with fecal matter, diarrhoea is fundamentally woven into the experience of the city for much of the world's urban poor. It is at once entirely treatable and tragically deadly, and – given the compressed geographies through which illness and disease can move around dense, poorly provided for urban spaces (more on this below) - the most pervasive feature of everyday life in informal settlements. It dehydrates and malnourishes, stunts growth and keeps kids out of school and adults from work. Disruptions and emergencies in the city's metabolism, from floods to breakdowns in infrastructure, can have a catalytic effect on the spread of diarrhoea. It is one of the main causes of child mortality for the under-5s in informal settlements (UNICEF, 2016; Porecha, 2015; WHO, 2015). Diarrhea kills more children than any other illness except pneumonia, and is generally caused by just seven key pathogens (Heddy *et al*, 2016: 1253; Liu *et al*, 2016), pathogens we know can move at speed between people in dense urban settlements (eg Farag, et al, 2013; Root, 2001). People are often forced into impossible choices between hydration, eating and medicine. And yet, the cumulative costs of treating diarrhoea and its consequences is often less than investing in decent water and sanitation infrastructure (Patel *et al*, 2013).

The life of sanitation ecologies is, then, as much political and economic as it is metabolic. The urban sanitation crisis in the global South is a profound drama that demands continual always zooming into the scale of the micro and then out the scale of economic disinvestment and political marginalization. The *microbial* life of sanitation matters profoundly. As Ebola spread rapidly across the three worst-affected countries in African in 2014 - Sierra Leone, Guinea and Liberia, where over ten thousand people were killed – and through, for a period, Mali and Senegal, the vital importance of good quality sanitation, water, hygiene and health care was identified as central (Westcott, 2015). However, health facilities often lacked clean water and sanitation facilities; in some places, even just water and soap may have reduced the rate of infection (*ibid*).

If Ebola has acted as a spur for investment in sanitation in dense and often impoverished urban spaces in Africa, albeit in a patchwork way (Mis, 2014; Lazuta, 2015; Nyamalon, 2015), in Brazil the Zika

outbreak drove sanitation further up the political ladder. Zika's link to neurological illnesses in unborn babies resulted in a level of public concern that dengue fever – another disease that does well amid poor sanitation and urban density – has never quite generated (Osava, 2016). As Edison Carols of the Trata Brazil Institute put it, "symbolically, microcephaly has a stronger effect because of the emotional impact; it has a baby's face, while dengue is abstract, it moves people less, despite the high mortality rate" (*ibid*. no page). While there is evidence that urbanization has reduced malaria in some places, diseases like cholera, tuberculosis, schistosomiasis, trachoma, and soil-transmitted helminthiasis are all more prevalent in informal settlement conditions, and infections typically seen as rural are themselves urbanising, such as lymphatic filariasis (Neiderud, 2015).

Despite this context, the microbial is increasingly being put to work in a new economy of virtuous urban sanitation ecologies. Across cities in the global South, a new experimental moment is at play as residents, community activists, businesses and municipalities begin to look upon growing piles of human waste as an opportunity rather than a problem. Development NGOs and local entrepreneurs are making a case, in informal settlements across the world, for the social and economic potential of turning waste into energy, fertiliser, and food. Eco-sanitation initiatives seek to transform excrement into fertilises for high-yielding fruit trees, but struggle to cope with dense conditions and are sometimes shunned by residents, while sometimes very large bio-centres syphon of gas from chambers underneath informal settlement community toilet blocks. In Nairobi, for example, biogas centres have spread rapidly in recent years, with more than fifty serving 20,000 persons daily. In 2004, Umande Trust was formed to further develop biocentres and generate local employment and services including gas for cooking, potentially changing the nature of everyday sanitation and the links to poverty and livelihood (Otsuki, 2016; Thieme, 2010).

These interventions can have unseen consequences. For example, in March 2017, the largest garbage ground infrastructure in Ethiopia collapsed, killing over 100 residents in an informal settlement at the Koshe landfill, Addis Ababa. Some blamed the construction of a new bio-gas plant built to meet social and environmental goals of improved energy through waste. The government argued that it

sought to close the site but met with local resistance. This may be a more extreme case, but the larger point is that cities are often vigorously debating how they ought to dispose of waste while meeting the needs of local communities and building sustainable metabolic systems, in ways that forge new connections between life (the body, the microbial) with unpredictable potentials (Getnet, 2017).

Finally, understanding the life of the urban sanitation crisis also requires attending to the role of animal life, including goats, cows, chickens, pigs, dogs, cats, rodents, and birds. Animals have all sorts of roles to play in this ecology. They defecate into water, drains, open ground, and soil. They rummage through heaps of solid waste scavenging bits of food. They pass on parasites and provide milk and food. Pigs, for example, act as mixing vessels for influenza (Johnson and Shastri, 2017). Animal meat hangs in informal settlement kiosks and provide sustenance not just for people, but for flies and microbes through which waste can make its ways into food supplies. This complex ecology is generative of all kinds of urban biologies, and those combinations are not necessarily predictable (*ibid*), particularly so given that it is always already entangled with people and, as the next section shows, the manifold material *things* of the sanitation crisis.

THINGS: A POLITICS OF FABRICATION

Materials compose citylife everywhere, but they take on particular potency and urgency in the context of sanitation. Understanding, and indeed addressing, urban sanitation inequalities demands, to use Christine Hentshell's (2014) phrase, *a politics of fabrication* that looks to improve and extend the materialities of the city in ways that help secure people's health, reduce their labour, and create predictable rhythms of reliable systems into the future. The 'things' of the urban sanitation crisis include *toilets, pipes, drains, septic tanks, sludge,* and *sewers* – each in their own way, and together, fundamental elements in the everyday life of the sanitary city. While these things are found, of course, in rural as well as in urban contexts, what distinguishes them in the city is the often incredible pressure placed on already often inadequate materials by densities of groups, and the often greater range and influence of diverse social, political and economic relations and differences which structure access to things and the ways in which they are (or are not) maintained.

For many urban residents in the global South, the built environment is inherited as a set of fragments (McFarlane, 2018; De Boek, 2012; Satterthwaitte and Mitlin, 2013). The fragment is a hallmark of the urban sanitation crisis, and at the centre of this geography of urban fragmented things is the toilet. More often than not, this is not the toilet of an integrated, functioning circulatory city infrastructural system, but the disjointed, disconnected, poorly functioning, and unreliable toilet. From hanging latrines made of wood, corrugated metal and jute, to three-storey public blocks replete with decorated children's facilities, the what and how of the toilet is a litmus test of sanitation. If, as Henri Lefebvre put it (1991: 227), monuments are poems and buildings are prose, then toilets are too often sites of risk, shame and disgust, profoundly dramatizing that "foundational starting point where each of us deals directly with our bodies and confronts whatever it provides" (Molotch, 2010: 2; Penner, 2013). In the city, the toilet is shaped not just by the materials that compose it, but by the social power relations and inequalities of different groups co-existing in compressed, dense spaces.

"If we had to pick one tangible symbol of male privilege in the city," write Shilpa Phadke, Sameera Khan and Shilpa Ranade (2011: 79), "the winner hands-down would be the public toilet". Not only is there a profound imbalance of provisions of toilets for women as compared to men in Mumbai, as well as more generally in cities of the global South, the size, functionality and location of public toilets are extremely circumscribed. This is particularly difficult for poorer and usually lower caste women in Mumbai, who find it harder to make use, for instance, of the toilets in hotels or restaurants, and for whom the lack of toilets is, as Phadke *et al* (*ibid.* 80) put it, "a reminder of her unwantedness in the city." This unwantedness is particularly striking in Mumbai, the city that has both the highest number of working women in the country and greater wealth than any other city on the subcontinent (Patel, 2013).

To understand the toilet, we need to understand the social, political, economic and material infrastructures that support it. This infrastructure, as Barbara Penner (2013: 14) has argued, is composed both of pipes and plants and social attitudes and beliefs, which is why Slavoj Zizek (2008:

4-5) states that "as soon as you flush the toilet, you're in the middle of ideology". Toilets can be the focus of all sorts of political and social tensions all over the urban world. In 2015, for example, activists in Cape Town emptied the uncollected contents of toilet blocks over political buildings in the city in order to stage a political critique. Around the same time, activists in Mumbai launched a sustained campaign around provision for women and girls in public toilets called 'Right to Pee' (McFarlane and Silver, 2016). Yet, as Black and Fawcett (2008) argue, the number of toilets is often not the most important factor in sanitation health improvements. What matters more is the location of toilets, their reliability, and whether they have, for example, water and – especially for women and girls using facilities late in the day - lighting. If these are pressures in both rural and urban spaces, they are all the more pronounced in dense cities with multiple authorities and unequal power relations between individuals and social groups, who make all kinds of jostling claims and counter-claims upon fragmented, scarce provisions. A politics of fabrication must begin with the recognition that making toilets work for the city demands an urban imagination that is at once material and infrastructural, social and political.

In 2011, the Gates Foundation launched a competition they called the 'Reinvent the Toilet'. The foundation asked engineers to develop 'Toilet 2.0': a toilet suitable to hot climates with often little water and electricity, but which would be cheap. A wide range of submissions were made, including waterless toilets that use solar panels or microwaves and which turn waste into fertiliser or charcoal. The idea of the technological fix to what is a complex set of political, cultural, economic and material questions is common in conventional approaches to the global sanitation crisis. There is an important logic driving what has become a burgeoning world of experimentation with sanitation provisions. It is clear that for many cities the conventional sanitation systems rolled out in Western cities in the nineteenth century, which require huge quantities of drinkable water and massive expense and disruption in delivery, are inappropriate and/or unfeasible in many cities in the global South today. There is potential in these experiments for sure, but the challenge is to connect them much more strongly to an urban imagination.

At the back of the toilet, often spilling wastewater into the environment around it, is the *pipe*. In cases where the pipe extends to drains, they often run along or near the surface, and we can follow it on its path and see the material, metabolic, ecological, and social life of sanitation in the city as wastes make their way through neighbourhoods and watercourses. The pipes that bring water that feeds into toilets or neighbourhoods are often broken and vulnerable to contaminants, and their material properties and placements are frequently the subject of eager debate amongst residents, municipalities, and activists. As Lisa Bjorkman (2016) argues in *Pipe Politics,* pipes – like toilets – are very often political, woven into the connections people have not just to water boards or engineers but to political parties, councillors, municipal officers, and landowners. Even the pressure in the pipe is not just physical but political (Anand, 2011), and vulnerable to all kinds of changes in political, social or environmental conditions.

While there is evidence that clean, functioning toilets are more important than clean water for people's health in informal settlements (Black and Fawcett, 2008), clean and reliable piped water is clearly fundamental to urban sanitation. In dense informal settlements, with often multiple histories of claim-making and provisioning through all kinds of political and social connections, water, like toilets, is rarely one kind of thing. Often, it is provided through a complex geography of spaghetti pipes, with mixed levels quality, quantity, pressure, ownership, and cost, alongside deliveries from public or private tankers and bottled water. Typically, the poorest residents in informal settlements will pay more for water, and exert more energy to get it, than middle class residents in the same city, and then for water that is of more dubious quality (Bakker, 2010; Truelove, 2011).

The pipe in the city is not the same sort of thing, then, as the pipe in the village. In dense neighbourhoods where social and political pressures are high and water pressure often low or changeable, and where wastes seep into porous materials, the pipe is no mere technical provision. And yet the work of technical provision is often vast, requiring engineers and residents to know the lie of the land in complex, tacit ways, given that siphoning water from here and can mean a drop in pressure over there, dealing with an often fluctuating physical landscape and managing a complex geography

of pipes that snake across and beneath surfaces. Pipes come and go around elections, change their material constitution, or become temporarily pivotal to the hopes of aspiring local politicos. Decent sanitation in the city demands the pipe, but the city often has other ideas in mind for it.

The same is true of other seemingly mundane sanitation materials, such as the drain. Often blocked, strewn with garbage, leaking and seeping, and open to the air, drains in many cities in the global South, and especially in informal settlements, are crucial to the wider geography of urban sanitation. Illness is often higher amongst people living closest to open drains (Gupta *et al*, 2017), yet the drain can be space where children play in neighbourhoods lacking public space. In neighbourhoods where the state does not maintain drains, residents themselves often put together informal regimes to manage them. If these regimes are vital for public health, they are vulnerable to conflict amongst neighbours and often unable to cope with the consequences of intense rainfall, which pushes the contents of drains around streets and even into homes and exacerbates the potential spread of disease such as leptospirosis (Lau *et al*, 2010).

Beneath the toilet lies *the tank*. In cities in the global South, most toilets in poorer neighbourhoods lack connections to sewers. The septic tank is a poor substitute. In dense neighbourhoods, it can fill up with remarkable speed, blocking up toilets and spewing its contents into public conveniences. Little wonder, then, that many argue that meeting sanitation needs demands a shift away from septic tanks (Satterthwaite 2008). But most informal settlements aren't going to receive sewer connections any time soon, if at all, even though municipalities often remain fixated on a sewer-based imaginary of waste collection (World Bank, 2014). Delivering a sewer connection is expensive and disrupts the city, closing roads and streets and potentially displacing homes, and that's before we ask whether water-intensive structures are even appropriate for many cities in the South. At the same time, there have been remarkable successes in providing makeshift small-scale sewers for lower costs and less disruption, with strong community participation, such as the Orangi Pilot Project in Karachi (Satterthwaite *et al*, 2015). If these initiatives struggle to cope with higher densities (Mara, 2012),

they provide examples of what can be done in the city even despite the material, political and social pressures.

In the context of waste amidst dense urban relations, the politics of hope is one invested in all sorts of unlikely ideas. This is not a claim we often here in debates about the city, but a fundamental challenge for the city in an increasingly global urban age is developing *faecal sludge management* (FSM) plans (Ross *et al*, 2016). It may not seem a likely rallying cry for the city, but the urban left across the globe could do well to get its hands dirty and ask what a plan for sludge might look like? In cities were FSM plans are in at least partially place, albeit not in comprehensive and fully inclusive ways – such as in Dakar in Senegal, Palu in Indonesia – improvements have been made on the back of strong city oversight (Peale *et al*, 2014).

But the bigger question here is: what kind of urban imagination is needed to think through the politics of the fragmented pipe, drain, tank, and sewer *together*? Here, a politics of fabrication comes to the fore, one that connects a focus on local fragmented things to the larger urban world of policy, law and regulation, budgeting, and social attitudes. This calls for a new holistic thinking, where sanitation is seen as part of an ecology of relations that extend across the city and promises an enlivened urban commons, ie a city of genuinely shared resources and decent provisions that allow for residents to live fuller, healthier lives. One route to thinking things together in the city is to foreground the *spatialities* of sanitation in the city, and it is to these I now turn.

SPACE: SANITARY GEOGRAPHIES

Cities typically bring together large spatial variations in their provisions, conditions, forms, and environments, in ways that are pivotal to how sanitation is experienced and politicised. This creates a particular kind of challenge for understanding and respond to urban sanitation challenges. How might sanitation succeed at the scale of the city as a whole while attending to the different conditions and needs across the city? Evidence suggests that combining capital-intensive provisions such as sewerage, drainage and waste treatment with localised toilet and water provisions and maintenance,

requires coordination and investment at the city level, which in turn requires political champions and budgetary support at senior levels in the city and, where necessary, national governments (Water Aid, 2016). Likewise, we know that ensuring that regulations on minimum standards are enforced, that costs are accounted for, and that maintenance occurs, requires a clear intuitional framework that is enforced and understood across the city (*ibid*). But how might policy and institutional contexts operate to facilitate provisions and maintenance for all urban residents?

The first step is in recognising that while city visions and plans are crucial, the city is not a machine, with levers that either need fixing or that simply haven't been built yet. Most cities, especially large cities, are too messy – too varied, multiple and unpredictable - for that (Amin and Thrift, 2016; Magnusson, 2011). The best laid plans often need elaborate translation when they hit the ground. Infrastructure provision needs rerouted past properties or roads or public objections, financial disbursements get caught up amidst other local priorities and agendas, recalcitrant parties, officials or residents subvert plans or pull them in new directions, and on. This does not mean that nothing can be changed, of course, but that making significant changes at the scale of the city requires enrolling all manner of authorities, power brokers, social groups, and material conditions.

Key here is *density*. Most cities contain vast variations in density, both over space and time, and sanitation geographies are highly sensitive to density. Sanitation has been described as the 'demon of density' (Dempster, 2016). This is perhaps a little elaborate and Dickensian, but not entirely without merit. The Bangladeshi capital, Dhaka, for example, has some of the highest informal settlement densities in the world, including sites of over 1 million people per km^2 (Cox, 2012). Only 25% of Dhaka is connected to sewers, and most depend on pit latrines, septic tanks, and informal drainage (Rahman *et al*, 2014). In Mumbai's informal neighborhoods, the ratio of toilet seats to people varies across the city from 58:1 to 273:1 in the poorest, where there are often only a few public toilets and hanging latrines (McFarlane *et al*, 2014). Paromita Vohra's 2006 film *Q2P* vividly portrays Mumbai's snaking queues of people at toilets in informal settlements as a social compression of relations of gender, caste, ethnicity and class. The queue is a measure of the city: of bodies in dense

space, of social relations that dictate who gets to be where when, of the lack of toilets and water pipes, and of the lack of cash invested by the state, of the uncounted residents the state does not see or provide for.

For many urban residents in poor neighbourhoods in the global South, the street they live on is a narrow, congested and active space. Residents chat, wash kitchen utensils, hang washing, read newspapers, run shops or small informal manufacturing units, grow plants, and more, while children play or do their homework and people come and go. If the street is often the heart of the neighbourhood, where public and private are blurred, it is also one of the spaces where the wastes of the neighbourhood seep in, coagulate, and mount up. Human and solid waste are often mixed, to the point that to understand people's daily experiences it becomes fruitless to separate them out. Open drains, for example, might fill with human and solid wastes, and are often managed informally by women who sort piles of solid waste awaiting recycling or collection, wastes that might move around in the rains or quickly attract mosquitoes and flies that redistribute those human wastes across the area (Corburn and Riley, 2016).

Beyond the street and neighbourhood, one of the contradictions of contemporary infrastructure in many cities is that it is when it is at its most inadequate that the greatest demands are made of it. On railway and bus stations, typically woeful sanitation provisions are stretched beyond their limits by often huge levels of demand that fluctuates over a day, week and season. Train stations like Chhatrapati Shivaji Terminus in Mumbai becomes, during rush hour, one of the densest places in the world. It is not uncommon for female toilets in particular to be closed or non-existent in India's vast network of city train stations (Faleiro, 2014). Provisions on the trains are often not much better. At the same time, train tracks, bridges and tunnels often double-up as toilets in the early mornings and late evenings, creating temporary publics of defecating and urinating bodies often in view of hundreds of commuters.

Seeing sanitation from the city scale, then, reveals not a machine but a variously dense, expanding, diverse, and changing landscape. Yet none of this is meant to be pessimistic. Density, for instance, is not only a problem. The compression of people into small slithers of urban space gives rise not only to pressure on already fragmented services, or to social conflict, but to cooperation, workarounds, solidarities, mutual support of different kinds, and social campaigns and movements that seek to produce new arrangements (McFarlane, 2016; Simone, 2014, 2018). The challenge for action at the city-scale is to connect the specific challenges in place and across the city to workable, flexible policy frameworks. The fifth and final element in this relational approach turns to that question.

DISTRIBUTIONS: RESOURCING CHANGE

At the heart of the city sanitation geography described above is the problem of *distribution* of resource. Some places suffer from too little infrastructure, others from too much waste, while some places and people are prioritised over others. Take, for example, the distribution of land. For some activists, the urban sanitation crisis is primarily a crisis of land and housing. Rather than seeking out slithers of land to build public toilet blocks that are vulnerable to breakdown, and which often involve long queues of people at peak times, reliable sanitation and water means a house with a bathroom in a well-maintained building. Across the world, there are long-standing debates as to the relative merits of upgrading existing places versus building new housing. The evidence does not point to one blueprint here, given that successful approaches depend fundamentally on the context and the needs and desires of residents. However, the thrust of research and, increasingly, international policy and practice, suggests that building on existing community efforts, provisions, and desires – rather than demolition and rehousing – is generally more successful (Huchzermeyer and Misselwitz, 2016).

Key too is the distribution of money. It is a common refrain of city and national governments in the global South that they lack the capital to deliver sanitation for all. The argument here is typically that the real cost of urban sanitation systems lies not in the particular infrastructures and associated services and administration alone – itself often seen as too expensive - but the disruption and compensation impacted by closed routes, impacted businesses, displaced homes, and necessary

rebuilding. Yet, there is a great deal of evidence showing that the cost of delivering sanitation is off-set by the money saved in health care and better attendance at work and school (Black and Fawcett, 2008; Satterthwaite *et al*, 2015; WHO, 2012). The question of what sanitation improvement can bring and the kind of city it might enable is either not well understood, or simply ignored in favour of other political priorities and momentums.

The larger question here is: if urban sanitation is a right, what then is the role of the state? If the claim from the state – whether at the level of the city or national state - is often that the market is vital to meet costs (Sattherthwaite and Mitlin, 2014), then how might the market play a role? Can the marketization of sanitation in cities ever become compatible with a rights-based agenda of sanitation for all? As Mike Davis (2006) has argued, human waste is increasingly becoming another frontier for capital, as public toilets become 'cash-points' and waste removal and recycling become sites for accumulation that deepen social cleavages between those who can afford to pay and those who can't. In some cities, transnational 'environmental services' companies have become increasingly important in the political economies and delivery structures of sanitation, and these actors – companies like Suez or Veolia, for instance - exhibit considerable power in negotiations with municipalities (Murphy, 2010)[1]. But rather than invoke an over-simplified and argument of public over market, it is important to acknowledge – and especially so in contexts where there genuinely isn't sufficient public money or capacity available – that in some cases small-scale profit-driven enterprises have been vital in providing or supporting systems (Simone and Pieterse, 2017).

There is also an emerging body of evidence pointing to the role of small-scale markets in sanitation delivery for generating livelihoods. Still, the impacts of urban sanitation on livelihood remain underestimated (Mitlin and Satterthwaite, 2013; Mulenga, 2011; Bostoen *et al,* 2006), and livelihood opportunities through sanitation are an emerging urban research area. Key research challenges here include tracking for example how biogas toilets turn waste into a resource for new jobs, skills, and

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[1] I am grateful to an anonymous reviewer for prompting mention of this.

fuel, or children acting as part of a 'living infrastructure', operating sanitation services as an incremental response to the lack of urban services, or the role of desludging technologies (usually for septic tanks) in generating new livelihood opportunities (Lloyd-Jones and Rakodi, 2002; Evans, 2002; Otsuki, 2013; Mulenga, 2011; Greico, 2008; Lusambili, 2011).

While water has long been recognised as a global human right, it is only relatively recently that sanitation has received the same kind of focus. Almost half the countries in the world do not recognise sanitation as a right, and many of those that do haven't made substantial changes in practice or investment (Glass, 2012). There is a long history of connecting sanitation and rights, from the action of civil rights activists and sanitation workers in postwar United States to historical struggles around caste and sanitation in India. Today, activists and residents from Mumbai to Cape Town and Accra to Rio are demanding the right to sanitation as the right to city-life. In doing so, they take us beyond the *abstractions* of global human rights talk and into the *distribution* of provisions in the city, it's schools and colleges, clinics and hospitals and transport hubs, parks and public squares, homes and neighbourhoods.

In the city, the right to sanitation is more than just the right to decent toilets. Given that sanitation is radically networked, spilling over across domains of life, habitation, and mobility in the city, it cannot be seen as an isolated issue. Most of the time, it will require more than one sort of intervention – more than just technology, or political will, or money, and so on. In the absence of good sanitation across the city it becomes difficult to live a decent urban life. In other words, the right to sanitation is, in practice, *the right to city-life*. This the fundamental challenge of contemporary urban policy and practice in the face of a deepening crisis.

This is why movements like Mumbai's *Right to Pee* argue that their campaign is more than just one for toilets. As one activist put it in interview: "It's a political statement", the "freedom" to move around and not be stuck in-doors, to not "shut up and stay home". For Henri Lefebvre, the right to the city was the right to being an active participant in the production of urban space, making genuine

contributions to urban planning (of neighbourhoods, infrastructures, services, schools, children's play areas, and so on), to what the city is and what it is for, and to the distributions that helps shape the fabric of the city. When we examine sanitation in the context of the city, it becomes clear that not only is sanitation exclusion and poverty a multiple, diverse and divergent condition shaped by the five dimensions of people, citylife, things, spaces, and distributions, but that ensure the right to sanitation also means thinking and acting across these spheres.

CONCLUSION

Human waste provides a powerful lens on the city. Not only has it been thought in multiple ways in relation to the urban as a process, space, and problematic, human waste itself is radically networked across a dizzying range of urban spheres: health, work, education, gender, race, ethnicity, religion, age, animals, microbes, infrastructures, services, land, housing, neighbourhood, votes, money, rights, and more. When human waste and the city are thrown together - particularly in unequal cities in the South with often extensive poverty, intensive densities, fragmented provisioning, and multiple forms of formal and informal power and governance - these relations are intensified and are profoundly revealing of poverty and the struggle for more fulfilling urban lives.

To understand and better respond to the sanitation crisis in the global urban South, we need to pay far closer attention to the city, and in particular to how a relational approach – set out here through the five key dimensions of people, citylife, things, spaces, and distributions – plays out within and between different cities. For research, policy, practice, and activism, there is potential in developing frameworks, knowledge and political approaches based on these five themes. While this approach underlines the importance of particular elements – the experience and priorities of women and girls, for instance – it also cautions against privileging one issue over others, such as technology or finance, given the risks and human costs of failed projects that don't connect adequately to context. In the longer run, these issues need to be *transformed in relation to one another* as a basis for building not just the right to sanitation and citylife, but socially just cities where people can thrive.

After all, these five themes are inevitably connected. We've seen this in how particular themes blur into others, whether the relationship between density and fragmented sanitation provisions, or the question of social differentials of power around gender or class. But these five themes are also related in the ways in which they ask questions of one another. How sanitation is seen by different people, for instance, impacts the ways in which problems and solutions are identified, and the kinds of distributions that become possible. A particular way of seeing sanitation, for instance, may have the effect of undermining a politics of fabrication, or of negating the importance of spatial variation, or lead to a failure to appreciate the role of microbial life in shaping particular health conditions or socioeconomic potentials. Equally, focusing on how sanitation is seen alone may close off issues or solutions beyond the scope of how problems are rendered in particular places, such as around housing, electoral politics, or rights. However, moving between the different points in the relational approach developed here can develop a wider conversation and suite of approaches to an increasing urgent urban problem.

The global profile of sanitation poverty in cities is growing, but there is a lot to be done before we get to the necessary substantial investment in infrastructure, services, and planning that will enable a radical shift toward good sanitation conditions as a right in the city, regardless of the legal status of its residents. The diversity of cities, both within and between them, demands that successful approaches require greater imagination and contextualization than one-size fits all blueprints, such as modernist water-intensive sewer imaginaries (Satterthwaite *et al*, 2015). Given that many informal settlements are squeezed into small slithers of land and forced to live amongst human and solid waste, responding to sanitation poverty can demand radical and significant political change. This might include, for instance, reform in land and housing rather than piecemeal attempts at toilet provision. In some cases, the challenges are less about infrastructure, housing or land than they are about tackling the racism or ethno-religious politics of local states (McFarlane and Silver, 2016).

But while localised interventions tailored to context and social and material needs will be key, and researchers and practitioners need to be open to the potential of different ways of delivering solutions

in different places, to succeed those interventions will often need the vision, institutional support and investment that can only come from comprehensive focus at the scale of the city as a whole. What this means is that for any given city an emphasis on local priorities needs to be balanced by city-wide approaches that have the political and budgetary support of the relevant city and national authorities. Building a transformatory agenda for urban sanitation in a city demands raising awareness, creating debate in the city, and local political champions with the capacity to act and enroll coalitions of public, private and residential groups. But it also means enhancing our collective urban literacy on the sanitation crisis, and developing an understanding and set of solutions that engage squarely with the city as we find it.

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