Governing the Contaminated City:

Infrastructure and Sanitation in Colonial and Postcolonial Bombay

International Journal of Urban and Regional Research

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Acknowledgements

For their helpful comments on an earlier version of this paper, I am grateful to Jonathan Anjaria, Amita Baviskar, Matthew Gandy, Steve Graham, Jonathan Rutherford, Jeremy Seekings, to members of the School of Geography, University of Nottingham for useful feedback during a seminar, and to two anonymous referees.

Abstract

This paper examines specific ways in which sanitation infrastructure matter politically both as a set of materials and as a discursive object in colonial and postcolonial Bombay. It reflects on a history of sanitation as a set of concepts which can both historicise seemingly 'new' practices and shed light on the contemporary city. It considers two moments in Bombay's 'sanitary history' – the mid-nineteenth century and the present day – and elucidates the distinct and changing spatial imaginaries and logics of sanitation in their broad relation to urbanization and nature. The paper conceptualises colonial discourses of a 'contaminated city' and public health, and finds productive sites of intersection between these discourses and contemporary debates and practices in Bombay, including bourgeois environmentalism, discourses of the 'world city', and logics of community-managed sanitation infrastructures. It highlights an important role for urban comparativism, in the context of different imaginaries and logics, in both cases. By connecting infrastructure, public health discourses and modes of urban government, the paper traces a specific historical geography of cyborg urbanization that is always already splintered, unequal and contested. For the urban poor in particular, much is at stake in how the sanitary city is constructed as a problem, how the solutions to it are mobilized, and how improvement is measured.

Introduction

This paper theorises the changing role of infrastructure in the conception and governing of sanitation in colonial and postcolonial Bombay. It focuses on sanitation infrastructure as a set of materials and as a discursive object in urban government. It conceptualises colonial discourses of a 'contaminated city' and public health, and finds productive sites of intersection between these discourses and contemporary debates and practices in Bombay, from bourgeois environmentalism and discourses of the 'world city', to logics of community-managed sanitation infrastructures. By focusing on two distinct periods - both important moments in the history of Bombay's urban restructuring - it seeks to historicise seemingly 'new' practices and shed light on the contemporary city. Following a brief discussion on how the paper contributes to theoretical debates on infrastructure and urban politics, the paper critically engages two reports produced by key public health officials in mid-nineteenth century Bombay, Henry Conybeare and Andrew Leith. Conybeare was the Superintendent of Repairs to the Board of Conservancy in Bombay in the 1850s[1]. His 1852 report to the Board, *Report on the Sanitary State and Sanitary Requirements of Bombay*, was an important contribution to government understanding of sanitation (Dossal, 1991). Andrew Leith was the Deputy Inspector General of Hospitals when he submitted to the Board his 1864 document, *Report on the Sanitary State of the Island of Bombay*.

[1] The Board of Conservancy was set up in 1845 to co-ordinate the growing administration of the city. Its remit involved regulating civil and material infrastructure, with the Government of Bombay Presidency retaining final decision-making capacities. The Board of Conservancy laid the basis of municipal organisation in the island and was a forerunner of the Bombay Municipal Corporation, set up in 1873 (Dossal, 1991).

These reports were influential in conceiving sanitation as a problem and public health as a set of solutions in government circles, and illustrate the possibilities and limits of colonial sanitation provision. Sanitary reform was championed by major local officials like Conybeare and Leith, as well as other influential figures of the time such as Arthur Crawford and Thomas G. Hewlett (both Municipal Commissioners), who, as historian Mariam Dossal (1991: 125) has argued, were "deeply influenced by the public health movement gaining ground in Victorian Britain" (and see Kidambi, 2007; Tindal, 1992). Conybeare and Leith believed in the duty of municipal bodies and governments to provide healthy living environments, and identified themselves with British reformers like Edwin Chadwick and John Simon. Both made strong arguments for the role of drainage as central to addressing sanitation inadequacies, and argued for full drainage provision beyond just the European Quarter and into the Native Quarter of Bombay.

They made these assertions through drawing explicitly, in the case of Conybeare, or implicitly, in the case of Leith, on *colonial comparison* as a central means for understanding sanitation as problem and public health as solution. Sanitation solutions, such as drainage, were conceived relationally, and in this relational perspective a clear hierarchy is maintained between metropole and colony. Many of their recommendations were at odds with popular practice in the city. The consequence is that comparison features as an important *metric for government*, and frames policy discourse around the possibilities of resource, expertise and institutions. This theme of comparison is also important for sanitation conditions and politics in contemporary Bombay – now Mumbai - which are discussed at the end of the paper, although with essential differences in urban, political and cultural context, spatial

imaginaries and logics[2]. In particular, I briefly consider how contemporary Mumbai's shift to bourgeois environmentalism (Baviskar, 2002; Green, 1990), alongside attempts to construct a 'world city', relate to sanitary debates and practices in the mid-nineteenth century colonial city. My account, then, considers specific governmental and public agents that at particular moments either had a role to play in, or that illuminate, the logics that have produced the contemporary city's sanitary geography.

Infrastructure, sanitation and the city

The paper builds on a variety of calls for a closer examination of the role of infrastructures in urban politics and justice (Coutard, 1999; Graham and Marvin, 2001; Star, 1999). It contributes to these debates in three ways. First, using the viewpoint of Bombay, the paper casts a critical eye over some of the assumptions that are often made about the relations between infrastructure and urban politics. For example, it is often remarked that infrastructures, as an historically important part of the 'modernist ideal' of the uniform, integrated equally serviced city (Graham and Marvin, 2001), have become increasingly fragmented through processes of deindustrialisation, privatization and the reallocation of state resources (cf. Bakker, 2003; Swyngedouw, 2004). The assumption is often that infrastructures, from water and sanitation to electricity and transport, have become fragmented in particular through privatization and corporatisation since the 1980s, in contrast to an earlier,

[2] Bombay was renamed Mumbai in 1995 by the state government controlled by the Hindu fundamentalist party Shiv Sena, which currently controls the municipal corporation, an act that was part of a volatile debate around the identity of the city, nationalism and ethnicity (Appadurai 2000; Hansen 2001). When discussing the period 1995 and earlier, I will refer to 'Bombay'.

universal imperative (although there is, of course, recognition that infrastructures were splintered prior to state centralisation through multiple providers, Swyngedouw, Kaika, and Castro, 2002). This narrative demonstrably applies in a number of (especially Western) urban contexts, but an historical perspective on Bombay reveals an urban fabric that has *always* been fragmented. While Bombay is, of course, a particular case, the historical view from many cities in the South indicates that casting a more international lens on infrastructure demands different narratives of distribution and fragmentation (see Kooy and Bakker, this issue; Gandy, 2006, 2008; McFarlane, 2008a, 2008b).

Related to this, if there is a tendency to perceive infrastructure as an historical legacy of nineteenth century capitalism that subsequently became 'hidden' beneath streets and walls (Gandy, 2004a), it is clear that from the viewpoint of Bombay infrastructures have rarely become hidden or simply technical issues (cf. Star, 1999). Rather than belonging to the past, in Bombay's public and intellectual imagination infrastructures have always been an important part of urban politics and everyday life, from their contested production in colonial Bombay to their indexing as central features of modernity in the post-Independence Nerhuvian state (McFarlane, 2008c; Prakash, 2006; Sharan, 2006; Shaw, 1999) , to the contemporary media debates in the city surrounding their failure, vulnerability, inadequacy, maintenance, control and use.

Second, the paper relates to debates on the political ecology of urbanization. State discourses on public health, urbanization and infrastructure cast sanitation as a political, economic, social and ecological process. Following Swyngedouw's (2004)

discussion of water in Guayaquil, Ecuador, this approach permits a fuller understanding of the processes that shape urbanization as a set of unequal social relations involving the continuous production of new socionatures (Swyngedouw, 2004; Castree, 1995; Caprotti, 2006; Harvey, 1996; Kaika and Swyngedouw, 2000; Smith, 1984, 1996). As I will argue, colonial governmental debates on sanitation in Bombay constantly configured urbanization in relation to the environment, and vividly revealed urban inequality. This casting of city and environment has changed and been contested through time, often constructing quite different notions of 'sanitary city'. In contrasting specific moments in the colonial and contemporary city, the paper shows that while social and physical processes are historically integrated through the domain of sanitation, the logic and imaginaries change significantly through time. These two moments reveal distinct urban metabolic *transformations*, where 'metabolism' refers not to anatomical or functionalist perspectives in a self-regulatory system, but to complex and often contested processes of change in local contexts (Bakker, 2003; Gandy, 2004; Swyngedouw, 2004; 2006; Virilio, 1986; Luke, 2003).

On a similar register, in linking social and biophysical processes, the paper connects with work on 'cyborg urbanization' (Gandy, 2005). As Gandy (2005: 28) argues, if cyborg is a hybrid between machine and organism, then urban infrastructures can be conceptualized as a series of interconnecting life-support systems. While 'cyborg' usefully conceptually connects body, technology and space, there is a challenge, as Gandy (2005: 33) points out, in tracing the historical and geographical specificity of cyborg urbanisms. In attempting this with Bombay, I am mindful that, following Swyngedouw (2006: 114), "little attention has been paid so far to the urban as a flow

or a process of socio-ecological *change*", and in particular to the unevenness of these geographies as they change through time. How is the urban cyborg – in this paper framed through governmental (especially colonial) discourses of sanitation - geographically produced? What are the socio-environmental injustices of sanitation as a specific yet changing urban metabolism? Why and how do these relations change over time? What are the imaginaries and logics at work?

Third, the paper underlines the importance of infrastructure in attempts to conceive and influence agency and subjectivity, in this case through the enrolment of infrastructure in sanitary discourses. This links to debates on urban governmentality, and implicates infrastructure – discursively and materially – in technologies of rule, in the relations between liberty and sovereignty, freedom and protection, and in influencing the conditions of possibility of urban life (e.g. Joyce, 2002; Legg, 2007). Infrastructures have historically patterned urban experience (Pickering, 1995; Otter, 2004). Otter (2004), for example, contends that the aim of London's nineteenth century reformers to produce a civilised, productive, clean and healthy city necessarily drives the urban environment and the city's moral condition into relation with one another. London's physical and moral characteristics, with echoes of contemporaneous reformers in Bombay, "were perceived as being institutionally amenable to technical adjustment, a basic premise uniting projects as diverse as those of Edwin Chadwick and Ebenezer Howard" (2004: 41). In allowing circulation of air, water, waste, goods, traffic, and people, infrastructures were critical to the social production of a self-governing hygienic, moral subject (Joyce, 2003). These are cumbersome, slow, contested processes, involving the "cajoling" of "matter, minds, and bodies to enter into delicate new configurations…However impatient reformers

were, smooth and rapid progress was hardly to be expected" (Otter, 2004: 43). This slow, contested trajectory is rooted in the characteristic inertia of infrastructure technology (Nilsson, 2006).

This impatience is perhaps most pronounced in reference to waste, from abattoirs and tanneries to the disposal of human waste. In the colonies, imaginative geographies of contamination were underwritten by a close association with disgust at the colonial Other, the uncivilised, racialised polluting bodies that were often viewed as less amenable to self-government than their domestic working-class counterpart (e.g., see Anderson, 1992; 1995; 2006, on 'excremental colonialism' in American public health discourses in the Philippines). Infrastructures, then, materially and discursively, can play important and historically specific roles connection across a range of domains, logics, and materialities in geographically distinct ways, including the social, political, governmental, environmental, body, technical and moral. Sanitation is a stark illustration of the ways in which infrastructure comes to matter in urban government, and reveals often fraught and contentious processes of sociomaterial engineering.

The contaminated city

It is, perhaps, surprising that Andrew Leith, in the beginning of his 1864 sanitation report, does not begin with the conditions of sanitation, but with winds, tides, rainfall, annual temperature variation, reclamations from the sea, wafting air of 'offensive' smells, and the "baleful influence of the marshy wastes on the health of Bombay" (Leith, 1864: 6). For Leith and other public officials in the mid-nineteenth century, addressing sanitation meant dealing with nature. Reports repeatedly refer, in addition to Leith's concerns above, to land (e.g. its low-lying nature), soil, tides, coast (e.g. its

pollution by sewage), air, animals, groundwater, disease, fever, bodies, and especially, of course, human waste. For Bombay reformers, nature had to be integrated into attempts to cleanse the city and urbanise productively. As a domain of intervention, sanitation brought city and nature together, and the most important way in which nature was manifested for public officials was in what I will refer to as the 'contaminated city'.

The contaminated city was understood centrally through the notion of miasma, a theory of disease propagation popular in Britain at the time and amongst influential figures like Edwin Chadwick and John Simon. Miasma referred to the spread of disease through odour, and its sources included pools of sewage, animal carcasses, decaying vegetation, and poor ventilation. Exposure to 'offensive' odours were perceived to result in sickness, from cholera and plague to a range of indeterminate fevers[3]. Conybeare (1852: 17) wrote of 'cesspools' - open drains, that emanated smells into houses and over food - while Leith (1864: 36) wrote of 'noxious matters', 'poisonous gases' and 'accumulated filth', arguing that 'filthiness' was the worst of Bombay's "many Evils". Streets and areas, especially off the main streets in the Native Town, or to the north of the city, were designated 'unsanitary' or 'polluted'. Night-soil collectors using wooden carts and head baskets, and later iron carts from Britain, struggled to collect ever-increasing amounts of human waste from the streets, then taken by train to Sion and Kurla north of the island city, and mixed with ash and vegetable matter and dumped into salt marshes (Tindall, 1992: 200). Colonial law

[3] By the 1870s, the miasmatic theory was rejected by many (but by no means all) of the sanitary experts in Britain as it became increasingly clear that disease like cholera was spread through water rather than air (Halliday, 1999: 140-141).

and regulation was often at variance with the practices of local society. Forms of labour and its location, from tanneries and dyers to slaughter houses, were described as 'dangerous' and 'offensive', as were, for instance, Hindu cremations or Parsi death rituals (where bodies are left to vultures). Notions of the contaminated city reflected, as Sharan (2006: 4906) has put it, "different cultural understandings of public and private, sacred and profane, appropriate and inappropriate behaviours".

The poor were disproportionately affected by inadequate sanitation. For example, while among Hindus in general the death rate was 58.8 per thousand, it rose to 94 per thousand among lower castes (Ramasubban and Crook, 1996: 146). In 1892, while the predominantly European south Fort area had a mortality rate of 8.6 per thousand, this rose to 46.2 in the relatively close locality of Kamatipura (*ibid*. 147). Poorer areas had some of the highest mortality rates in the city, and as T.S. Weir, the municipal officer of health in the 1890s, observed, rapid residential expansion, accompanied by a lack of sewer connections, led to increasing mortality rates (Ramasubban and Crook, 1996: 147). Urban contamination was also identified with migrants to the city, who looked for work in the booming cotton mills. In 1877, famines across western India led to migration into the city, and low-income migrants often ended up in localities such as Khara Talao and Kumbharwada in central Bombay, where overcrowding aided the spread of illness and disease (Masselos, 1996). The Sanitary Commission was of the view that migration and vagrancy acted as a contagion.

Disease and the threat of disease was a "constant presence" (Dossal, 1991: 126; Kidambi, 2007) in elite imaginations, and this, along with the political threat of

overcrowded areas as a basis for politicisation and revolt, meant poor and dense areas were viewed as a problem (Chakrabarty, 2002). It followed that stamping out the source of bad smells, and increasing the circulation of clean air and water, would address miasma and reduce illness, disease and mortality. Instead, practice more often took the form of attempts to create what Guha (1993: 389), writing about British barracks, has referred to as "little islands of purity in the miasmatic landscape", *cordons sanitaires* to protect elite groups from the threat carried by the poor and poor places. However, in contrast to contemporary Indian cities where middle classes can increase protection from disease through medicine (Chaplin, 1999), segregation in colonial Bombay was always vulnerable to breakdown. There was widespread understanding that *no one* was safe from disease – if residential segregation mitigated the spread of infection, migration, work and social patterns made it impossible for wealthier classes to isolate themselves. Partly as a result, one enduring central tension in discourses on the contaminated city was between three concerns: protecting the elite in 'islands of purity', providing citywide sanitation, and demolishing 'unclean' areas.

But it was not simply logics of fear and protection that drove sanitation concerns. The contaminated city starkly illustrated the limits of Bombay *as a city*. That Calcutta already had a water and drainage system underlined this sense of urgency for planners who viewed Bombay as *urbs prima in Indis* (Crawford, 1908). Infrastructure, drainage in particular, was central to the construction of the contaminated city. For Conybeare, the polluted side-gutters and open drains running along the streets of the Indian quarter, and the 'gigantic cesspool' that was one of Bombay's main drains – running between the Indian town at Khetwadi and the sea at Love Grove, Worli,

where many complained about sewage pollution along an attractive part of the sea front – meant that what drains existed posed serious health threats to local people. Conybeare's 'cesspools' were in his view the product of inadequate drainage. He complained that a lack of planning meant that many of the homes in the Native Town were "clustered together at random" without regular spacing for ventilation and without drainage (1852: 39). On the other hand, the only drained area of the city was the Fort, where mortality rates were considerably lower. He (1852: 40) assumed drainage was the solution, and argued that the drainage of crowded areas could halve mortality, "a saving of human life well worth any efforts that could be made by a Government or municipality".

For Conybeare, the contaminated city demanded questions about the purpose of government, and here he placed the protection of 'human life' above a fear of the Other. This is strikingly similar language to that used to describe London in the 1840s. For many experts and officials, it was the mass construction of drainage that held the key to tackling illness and disease, leading to the construction of Joseph Bazalgette's sewer network in the 1860s (Halliday, 1999)[4]. While sewers, latrines and water in-flows were of critical concern to Conybeare, for him, and for Leith writing over a decade later, it was in drainage that investment must be focussed and where health improvements and mortality reduction could be most readily located. Conybeare acknowledged, however, that he lacked data to support his case on the

[4] Despite this focus on drainage, the persistence of the miasmatic theory of foul air as the cause of disease clouded the links between epidemics and water, and meant that some experts failed to see the full importance of drainage (including Edwin Chadwick and, for a time, John Simon) (Halliday, 1999: 186). This is despite mounting evidence to the contrary, provided as early as 1854 in John Snow's work linking polluted water and cholera.

importance of drainage. The argument he made rested upon remarkably little reference to Bombay itself.

Colonial comparison

Where Conybeare and Leith contrasted was in how they demonstrated their argument for drainage improvement. Leith makes his argument through a wide-ranging engagement rooted in Bombay and its environs as its central reference point. Conybeare, in contrast, looked less to Bombay's geography and more to the metropole. It is ironic that Conybeare (1852: 2) does so in part because of the lack of knowledge about Bombay – rather than rooting his report in the city, he bemoans the lack of information the state has about the city and instead looks to Britain for solutions:

> We are, indeed, without the first basis for sanitary statistics – a trustworthy census, an annual mortality return; our town, with half a million of inhabitants, is not divided (as for half a dozen municipal and sanitary purposes it ought to be) into any generally recognized districts and sub-divisions; the houses have one number for police and census, and another number for house assessment. There is, in fact, a general want of unity and system.

Of the Native Town's neighbourhoods, he went on, the elite "generally know as little as they do of the interior of Africa" (*ibid*). The lack of local data meant that Conybeare relied on English sanitary statistics "to show what would be the effect of sanitary improvements in diminishing the annual death-rate of Bombay" (1852: 3). While Dossal (1991: 128) argues that Conybeare's report provided a "vivid description of the hopelessly inadequate drainage and sewage system which existed in Bombay town in the early 1850s", the emphasis on colonial comparison means that

there is for large parts of the report (142 pages in length) strikingly little about the city itself. Conybeare argued that if in London a geography of drainage maps on to a geography of mortality, fever and illness, so too does it apply to Bombay, and here he returns to Bombay to point to differences between the elite A division (Fort, Esplanade, and Colaba) to the south compared to E division (Mazagon, Tarwary, Cammatee Poora, Parell and Sewree) to the north as differences between drained and undrained spaces. Sanitary statistics from English towns demonstrated that "a large and specific amount" of death is from the "deficiency of covered drains" – about 20% of excess deaths are attributed to this alone, Conybeare (1852: 17) argues. Long extracts on Manchester and Charlton are presented as speaking for themselves, as if addressing the problem alone.

It is not surprising, of course, that comparisons should be drawn, given that British officials were aware of the high-profile sanitation debates and engineering constructions in British cities due to the traffic of people, technology and ideas between different sites in the empire (Headrick, 1981, 1988). For officials immersed in discourses of inherent superiority over colonial subjects, comparison was a natural, routine part of government. More important than the fact comparisons took place, or questions of whether they were conceptually robust, is what the comparative move indicates about the discursive power of colonial comparison in knowledge for urban government. Conybeare's report is littered with comparisons as often the most important basis for understanding and gauging the extent of a 'problem' and the justification of what needs done and how. In the report at least, Conybeare does not question the logic of understanding the contaminated city through living conditions in urban Britain and the gathering momentum of the British sanitation movement rather

than through Bombay (much less its inhabitants). Public debates made similar moves, with English media often holding civic authorities to 'European standards' (Hosagrahar, 2006).

Bombay, of course, like the other Indian port cities of Calcutta and Madras, and like many other urban forms across European empires (Chattodpadhyay, 2000; Harris, 2008; Headrick, 1998; Hosagrahar, 2006; King, 2004; Legg, 2007, 2008; Rabinow, 1989; Wright, 1991) was always conceived in part through comparison, as a hybrid city developed through European discourses of planning and improvement. On colonial Lagos, for example, Gandy (2006: 375) writes of how British colonial administrators "sought to transform the port into the 'Liverpool of West Africa'". Perera (2005, 2008) narrates how in colonial Colombo, modified British town planning discourse, mediated through a variety of agents, including influential individuals like Patrick Geddes and legislation like the 1915 Housing Ordinance, laid a particular view of the capitalist city over the colonial city. As he argues, British experts 'saw what they knew', problems familiar to British industrial cities, and proposed plans that were effectively futures for urban Britain. Similarly, Bombay was often grasped in the shadows of British planning discourses.

These attempts to grapple with colonial mixture have witnessed important discussions on the nature of power and change as different ideas, materials and people interact (Harris, 2008; Young, 2001). Daniel Headrick (1981, 1988) has shown how colonial networks left a legacy of technological imperialism marked by particular notions of machinery and innovation. For Headrick, the construction of large urban water and sanitation infrastructures was conceived though comparison between cities, and often

reinforced social prejudices (frequently through segregation) and economic disparities within cities. These cities, of course, varied a great deal, but many had much in common, and the comparative frame led to often similar discourses of 'problems' and 'solutions' across cities. For instance, the perceived challenge for colonial officials in Calcutta was similar to that in Bombay: "getting rid of water and waterborne pollution", making drainage a key problem (Headrick, 1988: 153). Like Bombay, Calcutta is low-lying (10 meters above sea level, 3 metres in Bombay) and had large marshland areas. With echoes of Bombay, officials in Calcutta drew on the British "gospel of progress through machinery", and believed that "Indian cities resembled some English ones earlier in the century" and therefore required large drainage infrastructures (*ibid*). The mode of colonial comparison deployed by Conybeare, one that understands, measures and seeks to make a place reconcilable with a British model, underlines the legitimacy of the imperial interest while marginalising the views and practices of the city's inhabitants (as opposed to forms of hybridity that may challenge colonial power, Morton, 2000).

Conybeare and Leith's contaminated city connected the political, social, cultural and ecological. Sanitation as a discursive domain and set of infrastructures constructed the city as a vulnerable and dysfunctional cyborg city, unable to cope with the growing mass of 'unhealthy' bodies, unhygienic practices and accumulated, noxious spaces. As with many other colonial contexts, 'public health' was the solution to Bombay's unsanitary geography of 'noxious matters' and 'wafting miasma'. In the next section, I will consider the scope, limits and implications of the notion of 'public health' as a sanitation solution, and will contextualise the role of infrastructure within those responses.

Calibrating improvement: infrastructure and public health

The public health movement entailed a fundamentally different relation between city, bodies and nature, and ranged from environmental sanitation, especially drainage, sewers and water supplies, to personal hygiene, norms of behaviour, and regulations of public space. Often, public health entailed an effort to create a functionalist urban metabolism with steady in-flows and out-flows. The notion of public health in Bombay was wide-ranging, encompassing a focus on the role of infrastructures like drainage, to housing, commercial regulation and public education, and echoed the British public health movement institutionalised in the Public Health Acts of 1848 and 1866, and the first Public Health Commission in 1869. Comparison proved crucial for understanding and intervening in public health. In this section, I will raise five features of Conybeare and Leith's public health in Bombay that further illuminate the key imaginaries and logics of the sanitary problem as they perceived it.

First, the contaminated city as a problem, and public health as a solution, was not just the *domain* of government, but was *productive* of government. Officials sought to learn about the city through data collection techniques like the census or mortuary returns. This was a period of urban restructuring – and sanitation, especially infrastructure, was important for the imaginative and practical transformation of Bombay form a port to a knowable, functioning city. Second, while the public health argument won out "extraordinarily quickly" in the UK, reflected in a new public health ideology, legislation, reports, the activities of municipalities, and large engineering programmes (Joyce, 2003: 67), Conybeare and Leith were frustrated by the lack of progress in Bombay. Conybeare complained (1852: 21):

[T]he importance of sanitary improvements is not as yet duly recognized in Bombay…the general impression seems to be, that a defective police is a greater municipal evil than a defective sanitary condition…The apathy that prevails regarding the amount of life lost through defective sanitary arrangements is extraordinary.

Conybeare's complaints about the lack of attention given to sanitation points to an important tension of British rule in the mid-nineteenth century: economic and military concerns (particularly after the 1857 rebellion) often took financial and administrative precedence over welfare concerns, tensions that often resulted in disagreement within the local administration in Bombay and which were productive of the particular character of displaced and limited liberalism in Bombay[5]. If the economic was not a key concern in colonial imaginative geographies of the city as contaminated, it was crucial for how public health was negotiated as a response.

Conybeare compared Bombay with British cities in order to calibrate the progress made in those respective sites with sanitation. In Britain, he argued, the sanitation movement had progressed through three domains: first, in *legislation*; second, through the establishment of *local government* in municipal establishments in most large towns; and third, in the reduction of *costs* of drainage through the development of sanitary engineering in the work of Parliamentary Commissions. These recommendations, similar to those made by Leith, were often made (if not practiced) in other colonial cities (Headrick, 1988: 145-170). Conybeare compared each of these domains in Britain with the situation in Bombay, and complained that Bombay did not

[5] Joyce (2003: 249); see Gandy (2006) on the abandonment of public health in favour of segregation in colonial Lagos, and Swanson (1977) on the 'sanitation syndrome' and urban apartheid in early C20th South Africa.

meet the 'standard'. For example, he argued that the enforcement of local building acts in England was more stringent, creating "a greater regularity of streets and buildings in English towns" (1852: 8).

He examined the "applicability" of British improvements to India and Bombay specifically, using as standards "the improved system of municipal establishments, sanitary enactments, and sanitary engineering, now generally adopted in large English towns", including Plymouth, Liverpool and London, and found Bombay wanting in each area (1852: 10). He complained that Bombay had only one-fifth of the average proportion of sewerage to population of England. He went on (1852: 26): "In Bombay, on the other hand, the sewers are not water-tight, and are all laid close to the surface, in soil which, owing to the dryness of the climate, sucks up every drop of moisture within reach of it", all of which is compounded by an absence of house-drainage. Improved house-drainage would, he asserted, allow waste water to be added to the sewers, increasing flow, instead of water being lost to dry up in soils. Leith made a similar argument, suggesting that there was a need for institutional reorganisation – so that, for example, a new municipal inspectorate be set up to promote and enforce 'cleanliness' – and higher spending.

Protest and resistance at times played important roles in derailing or slowing British sanitation provision. While not a focus of this paper, the relations between caste, sanitation, and British colonial policy are important for how the British-driven sanitation practices took shape in colonial India. Lower caste groups, *dalits*, have been traditionally assigned tasks deemed 'polluting' by other caste communities, such as sweeping, disposing of dead animals, leatherwork, and manual scavenging – the

removal of human waste from dry latrines using brooms, tin plates, and baskets carried on the head (Black and Talbot, 2005). Some higher caste groups protested British sanitation policies on the grounds that the caste system provided a traditional mode of sanitation, and resented intervention (this resistance included, at times, sweepers themselves, although the relations between sweepers and British officials was often ambivalent, see Hosagrahar, 2006, on Delhi). Resistance also occurred in relation to the costs of infrastructures. Both landlords and private reclamation companies protested drainage schemes that might mean greater taxes or adversely affect their holdings and local land prices. Drainage schemes were highly politicised debates in Bombay's English media, and in 1871 tensions around taxation culminated in the Ratepayers Agitation, which led to the resignation of the Municipal Commissioner, Arthur Crawford.

Third, public health was driven in large part by logics of protection, both medical and political, as well as ensuring security (through avoiding resentment) and the health of the elite. As Chakrabarty (2002: 76) has argued, a major aim of public health measures throughout colonial India "was to control the spread of epidemics from fairs, bazaars, and pilgrimage centres". These fears, argues Chakrabarty, were both medical and political. Medically, following Arnold (1986) and Oldenberg (1989), places where Indians grouped in high numbers were perceived as sites of potential contamination, threats to European health. These threats were not simply understood as local, in at least two senses. First, the development of the public health debate in Britain and India was influenced by the identification of cholera as endemic to India, and the realisation that it was transported through shipping lanes to Europe. Each outbreak of cholera in Britain and India led to new research and public health policies,

and while there was often a delay in the spread of ideas between Britain and India, there was a keen interest among many reformers in India on public health debates and practices in Europe (Headrick, 1988). Second, a particular cultural conception of health was at stake here, overlain over 'traditional' notions that it was often in tension with, such as ayurvedic health systems emphasising herbal treatment and correcting bodily imbalances (Hosagrahar, 2006). Politically, the bizarre was seen "as a den of lies and rumours, *bazaar gup*, through which the ignorant, superstitious, and credulous Indian masses communicated their dark feelings about the doings of an alien *sarkar* (government)" (Chakrabarty, 2002: 76).

Fourth, and to a lesser extent, some of the impetus for public health efforts emerged from the sense that the contaminated city posed a threat to productivity - Conybeare (1852: 23) wrote that public health was not just about preventing loss of life, but ensuring "productive labour" in the mills and in other industries. The biopolitics of sanitation was not just about fear over illness, disease, polluting bodies or social unrest, but about facilitating the production of Bombay as a capitalist city. And fifth, direct links between 'filth' and 'immorality' were an impetus to public health. Drawing on police evidence from the UK, Conybeare (1952: 22) argued that "sanitary reform is in itself a police improvement; and that crime, dirt, and a high-rate of mortality, are generally found to be co-extensive". Here, Conybeare highlights parts of Whitechapel or Glasgow, where disease and crime inhabit similar spaces.

This striking association of sanitation and police is no accident. Indeed, one distinction between the conception of sanitation solutions in the metropole and the form of excremental colonialism in cities like Bombay is the difference – in extent if

not in nature – in the expectation of the ability of 'natives' to self-govern. Conybeare and other colonial officials believed that 'natives' had to have sanitation enforced upon them, and doubted that they would follow norms of public health voluntarily. His view on morality and sanitation resonates with the impetus of a great deal of reform across not just the British but other European empires (see Wright, 1991, on the discursive linking of sanitation and over-crowding with morality and aesthetic squalor in Paris and the French colonies). But while in the UK there was a certain degree of faith that people would adopt more sanitary behaviour as public consciousness grew – including ensuring clean and dirty waters were kept separate, following regulations on the provision of latrines in new developments, and not defecating in public – in Bombay, Conybeare and Leith, among others, had no such faith in what Leith referred to as a population "slow to believe" (1864: 25). If Conybeare sought a reduction in police spending in favour of public health, he nonetheless wanted sanitation improvements to be policed through municipal enforcement. This police approach to sanitation was popular amongst the colonial elite. Flagship English media such as the *Times of India (Bombay)* was of the opinion that sanitation had to be conducted through direct intervention by the local government, claiming that local people were unable to meet standards acceptable to the ruling classes on their own: "…if there is one direction in which we must pursue the policy of *festina lente* it is in enforcing sanitary measures on a populace who can neither understand nor tolerate them" (Times of India, 1913: 6). Sanitary improvements often involved demolition of unsanitary areas – particularly "badly overcrowded" areas – followed by the construction of new houses in their place, supposedly "in line with strict sanitary requirements" (Times of India, 1913: 6).

As Chakrabarty (2002: 66) argues, in bringing together concerns with order, police, civic consciousness and a particular kind of aesthetic, debates about public health and hygiene are important to the broader project of modernity. Conybeare recommended that the "labyrinth of crooked narrow alleys in the Indian quarter be cleared and straight streets run through it, which would facilitate the laying of drains and faster flow of traffic, and improve ventilation" (Dossal, 1991: 130-131). In this view, public health involves an enrolment of nature, the social and infrastructure, with infrastructure playing a crucial role in a broader context of conceiving and measuring improvement. As Sharan (2006: 4906) has suggested in reference to colonial Delhi: "Infrastructure in the colonial city, it may be suggested, operated most powerfully in the symbolic realm, gesturing to an imminent modernity, even as that modernity was endlessly deferred". If modernity was deferred, modernist categories of public and private were also subverted by the ways in which Indians used open space, from washing to changing, to sleeping, and urinating and defecating in the open. This tested the patience of reformers who sought to cajole new subjectivities through sociomatieral networks. Leith (1864: 15) complained of 'indecent' habits in public space that the government found difficult to end: "There is scarcely a part of the Fort or Native Town in which the ground along every dead wall is not wet or in pools from its being resorted to as an urinary…regardless of decency, and this custom is unchecked".

This was despite boards bearing the threat of penalties, "…as if in contempt of these mere declarations of what the law is, nuisances of the most odious kind are daily or nightly committed under them" (Leith, 1864: 16). Leith and others complained that there were too few sanitary inspectors to enforce fines (see Hosagrahar, 2006, on

Delhi). These spaces of indecency were opposed to the perceived order of the European quarter, especially in the areas of the Fort, Colaba and Malabar Hill, containing large, gothic buildings, wide streets and open parks (London, 2002). As Chakrabatry (2002: 68) argues, such discursively opposed spaces reflect the perennial gap between modernist desire and popular practice.

Sanitation, then, as a discursive domain and set of infrastructures constructed the city as a vulnerable and dysfunctional cyborg city, unable to cope with the growing mass of 'unhealthy' bodies, unhygienic practices and accumulated, noxious spaces. It was an unknown and dangerous city that could best be acted upon through a comparative framing. Conybeare and Leith's judgements of what was needed depended, explicitly or implicitly, on a particular British model of sanitation. The view that British models should be developed was echoed across the Bombay municipality over time; as Gandy (2008) points out, water engineers like Hector Tulloch argued in the early 1870s that if the technical issues, borrowing capacity and powers of the municipality could be resolved, then an integrated hydrological system such as London's or Paris' could be developed. The colonial mode of measuring improvement through comparison meant that there was little attempt to develop workable practices more in line with popular activities (Headrick, 1988).

The spatial imaginaries and logics of the contaminated city are summarised in Table 1. I want to make three summary points based on this table. First, the spatial imaginaries were relational – local geographies of drained spaces and undrained spaces, noxious miasmatic environs and clean, safe spaces, were understood in significant part through the lens of the British sanitation movement. Comparison was

a natural move for colonial officials implicitly convinced of the superiority of British expertise and practice, and Conybeare and Leith vividly reveal the significance of comparison on knowledge for urban government. Second, as a temporal logic, sanitation became important in the perceived transformation of Bombay from a port to a city proper that not only integrated nature but regulated behaviour and modern public spaces. However, reformers were impatient and frustrated at the inertia of infrastructure engineering, the lack of funds, and what they saw as the slow or failing response of local people to adopt new practices of hygiene and behaviour. Third, in practice these strategies and investments were ultimately elite-focussed.

Table 1: The contaminated city: spatial imaginaries and logics

Spatial imaginaries	**Logics**
Noxious/clear Drained/undrained Safe/unsafe 'Islands of purity' Metropole/colonial European/native Public/private	Temporal • Precolonial to colonial-British • Unsafe to safe • Inertia Form • Comparativism • Technology, engineering • Segregation, demolition • Elite spaces Focus • Protection • Environment • Productivity

norms	

Conybeare and Leith's commitment to drainage infrastructure was not shared throughout the city. Their wide-ranging public health proposals, from educating people about personal cleanliness to widening the gap between houses and building drains, were largely shelved in the face of the economic depression of the late 1860s that followed the cotton boom when the American Civil War (1861-65) had cut-off raw cotton supplies to Britain. With available funds being channelled into military operations and supplies following the mutiny in 1857 (Guha, 1993), officials sought to fund drainage improvements through taxation, but with little support from landlords and private land reclamation companies.

There were piecemeal efforts to provide communal latrines to workers housing around the rapidly expanding textile industry in the 1860s and 1870s (Ramasubban and Crook, 1996: 144), but by 1875, the public health focus was on the less costly issue of public education over drainage. As Gandy (2008) and Prashad (2001) assert, by the 1880s, the enthusiasm for the 'new science' of sanitation was adapted to discourses of cultural and racial difference to account for widening disparities in living conditions. The relative abandonment of drainage to hygiene and behaviour left an over-stretched infrastructure and a struggling cyborg city: Ramasubban and Crook (1996: 151) argue that the poor ability of the city to drain used and contaminated water meant water-borne bacteria and viruses could not be substantially reduced. In the latter half of the 19th century, the city's European inhabitants increasingly abandoned the Fort to commerce, and moved to the less crowded, coastal

environs at Colaba and Malabar Hill (Tindall, 1992). The functionalist city-wide urban metabolism that some reformers sought ultimately served the elite and reinforced existing patterns of inequality in the city.

The municipality was not uncritical of its own role in addressing public health. Indeed, both Conybeare and Leith suggested that a lack of enforcement of law and regulation, inadequate spending on drainage, and institutional in-fighting slowed the development of pubic health as debate and practice in comparison to British cities, allowing the contaminated city to prosper. Writing in 1908, the former Municipal Commissioner, Andrew Crawford, was scathing about the performance of the government and municipality. He complained in particular about flouted regulations. For instance, on sanitation in mill areas, he wrote (1908: 4, emphasis in original):

> [S]anctioned and convined at by the City Fathers, a huge *'Cottonopolis'* is filling up rapidly what within twenty years will be the heart of the Native Town. All this in open defiance of all laws of sanitation, in open contravention of the Municipal Act I of 1865.

He went on: "I ask – why have the corporation acted for years in defiance of all Sanitary Laws, breaking their own laws…Who is mainly responsible for the Bubonic plague? *'Who says rats?'* " (Crawford, 1908: 13, emphasis in original). He blamed the Corporation for the creating the conditions for the plague outbreak of 1897 by not enforcing law and regulation. The Corporation, he argued, had allowed 'dangerous trades' (including tanneries and cow-sheds), had not provided masonry to pipes, had not treated soils, failed to take control of factory dwellings that did not have sanitation, and failed to halt plans to build on the Back Bay, building that would "deprive the western portion of the Native Town of access to fresh air" (Crawford,

1908: 7). Disease continued to drive sanitation reform in the early 20th century, prompting calls for a "systematic improvement in the hygienic conditions of the city" (Times of India, 1913: 6). But with little investment in social housing, private landlords benefited from renting unsanitary buildings to the urban poor, while infrastructural investment was channelled towards roads transporting colonial and Indian elites. The Bombay Improvement Trust – originally set-up as a response to plague outbreaks - was more concerned with its commercial interests than with social housing with adequate sanitation, and spent substantial funds on road schemes designed to enhance the city's commercial infrastructure (Kidambi, 2001; 2007).

While authorities often attributed sanitation inequities to the scale of population increase, in practice these inequities have been the combined product of: privileging explicitly 'economic infrastructures' (for example, roads, railways, dockland extensions, and sea reclamations for wealthy housing) and military infrastructures over more 'social infrastructures' like sanitation; a lack of consultation with the poor on their sanitation requirements; a lack of commitment to social housing with adequate sanitation; a lack of enforced regulation on developers in sanitation provision for new properties; and a lack of planning for or adequate responses to large increases in population in terms of sewerage and drainage provision. Where basic services have been provided to the urban poor, they have often reflected fears over the spread of illness and disease or a need to maintain the health of the city's labour force, or a by-product of the expansion of the city.

In the last part of the paper, I shift attention to the contemporary city. I want to highlight two largely distinct sets of processes that define sanitation in the contemporary city: the first, bourgeois environmentalism and its relation to the notion of the 'world city'; and second, a welfarist effort to provide basic sanitation infrastructure to informal settlements known as the Slum Sanitation Programme. Again, I will briefly consider the spatial imaginaries and logics at work here, and seek to contextualise the role of infrastructure within it. Clearly, this temporal comparative move leaves out a great deal of debate on the mechanisms of continuity and discontinuity between colonial and postcolonial Bombay/Mumbai. In particular, and at a general level, while postcolonial governments shifted the governmental perspective from British-Native divisions to formal-informal divisions, they continued the tendency to view sanitation infrastructures as integral to the production of an ordered, clean and modern city, and faced the enormous practical challenge of extending a patchwork of infrastructure. Sanitation remained enrolled in a general discourse of dirt, order, gaze and the construction of the modern city. As Chakrabarty (2002) has argued, both colonialists and nationalists alike were repelled by what they saw as the predominant aspects of open space in India: dirt and disorder.

The ideologies, of course, differed. If colonialist fears were both political and medical, the nationalist project sought to instil a sense of civic consciousness, a sense of responsibility for one's actions on fellow citizens, whether through, for example, keeping roads clean or taking care with public property. Gandhi was a passionate advocate of more hygienic methods of sanitation, suggesting on one occasion that "sanitation is more important than Independence" (Black and Talbot, 2005: 98), and campaigned against scavenging. However, Five-Year Plans since Independence have

poured a great deal of money into water infrastructures while largely ignoring sanitation. Both colonial and nationalist projects sought to make open spaces, streets, and bazaars "benign, regulated places, clean and healthy, incapable of producing either disease or disorder" (Chakrabarty, 2002: 77). Nehru stressed the need for improvement not just to the physical fabric of the city but to "ingrained habits and lack of desire as well as lack of training to use better accommodation" (cited in Sharan, 2006: 4908).

However, nationalist discourses had to move beyond colonial baggage, and did so through replacing the trope of the 'native' with the trope of the 'rural', where 'rural' (both in terms of people and trades) was viewed as inferior to the modern urbanite, in need of transformation through enforcement, removal and education (Sharan, 2006: 4910). This anti-rural discourse was closely related to the Nehruvian view of the city as an important site for the expression and negotiation of modernity, a city, in the words of former President K.R. Narayanan, "unfettered by the traditions of the past" (Perera, 2004: 180). In this impulse, a new comparative discourse became influential in the shape both of European and American modernist planners, including Albert Mayer and Le Corbusier, and Indian intellectuals educated in Western architecture and planning, including Charles Correa and Mulk Raj Anand. These individuals were particularly influential in Bombay - especially in plans for an ordered and geometric new development, New Bombay - and Chandigarh (Anjaria and Anjaria, 2005; Garimella, 2005; Perera, 2004; Rohartgi, *et al*, 2003; Shaw, 1999). The impetus to international comparison also resonates with the planning for the municipality in Delhi in 1947. Legg (2006b: 196) argues that reports on Delhi at the time drew on Western models of government and citizen. The London County Council served as a model for

the proposed two-tier authority, and the subject of the government echoed Western conceptions of the citizen to exercise individual rights as part of a democracy, securing 'self-government'. The encouragement of citizenship was a break from colonial policy, "but not from Western discourses on governance and thus marks a continuity with imperial conceptions of the self" (Legg, 2006b: 196). There is clearly a complex story to be told around the changing logics and imaginaries of urban sanitation through history, but rather than consider this narrative form I will instead end the paper with a contrast between the colonial and contemporary city in the hope that doing so casts light on these respective urban moments (a theme explored in other urban writing, e.g Alsayyad and Roy, 2006; Sharan, 2006).

Bourgeois environmentalism and the 'world city'

If in the 1990s the middle class environmental health lobby in Bombay was preocuppied with air pollution (Ramasubban and Crook, 1996), recent years have also witnessed increasingly fraught debates around public space that might be described, using Amita Baviskar's provocative phrase, as 'bourgeois environmentalism' (and see Green, 1990). This includes disparate efforts to remove informal settlements, street hawkers, and (often Muslim) immigrants from spaces across the city. Notions of cleanliness, sanitation, and order often play a role in these debates. As Baviskar (2002) argues in relation to Delhi, a lack of public toilets means that any open space with sufficient shelter becomes a potential place to defecate. She uses the example of the public park. While to the expanding middle-classes the park embodies "a sense of gracious urban living, a place of trees and grass devoted to leisure and recreation", to others it may be the only available space that can be used as a toilet (see Bapat and Agarwal, 2003). Baviskar (2002: no pagination; Chatterjee, 2004) uses this conflict

to point to "the increasingly powerful presence of bourgeois environmentalism as an ideology shaping the landscapes and lives of millions of Indians", a notion that combines the political, economic, social and ecological. Bourgeois environmentalism discriminates between 'good' and 'bad' natures, such as between the park and the 'unsanitary slum', and privileges commodified socionatures (on the middle classes and the environment, see Mawdsley, 2004, 2006).

It is clear that there is now a growing impetus to 'cleanse' the streets of India's major cities, whether through violence or through regulation, and to focus infrastructure resource on high-end residential and industrial secessionary network enclaves that disproportionately benefit the wealthy, including roads, fly-overs, air-conditioned malls, and ICTs (Banerjee-Guha, 2002; Easterling, 2005, 135-160; Mazumdar, 2007; Weinstein, 2008). A particular kind of contemporary comparison plays a role in this urban transformation, this time in the impulse to recreate so-called 'Slumbay' as a 'global city', an Indian Shanghai attractive to foreign investment.

For example, the influential and controversial 2003 report by McKinsey and Company, entitled *Vision Mumbai: Transforming Mumbai into a World-Class city*, argues that Mumbai needs to transform its infrastructure and governance in order to become a world class city. It draws on examples from New York, London, Shanghai and Singapore, and emphasises high-impact projects with public-private partnerships, largely ignoring informal settlements and sanitation. *Vision Mumbai's* comparative method is integrationist, seeking to plug Mumbai into a pre-existing framework of ideas and corporate political agenda. It is caught up with a variety of processes in the city, including: slum demolition and renovation, most starkly evidenced in a current

effort to demolish Dharavi, one of Asia's largest slums, situated in the centre of Mumbai, and construct a 'world class cultural, knowledge, business and health centre in its place; the proliferation of securitized and high-end shopping malls, gated communities, and gentrified neighbourhoods; the growth of Special Economic Zones (SEZs); and even a new town – *Maha Mumbai* – planned and built, in a bold display of state abandonment to private control, by the huge infrastructure firm, Reliance Energy – explicitly aimed at imitating rival global locations like Dubai's Jebel Ali, Malaysia's Bandar Nusajaya Industrial Park, and the SEZ phenomenon in China. Similar changes are taking place in other cities, and have been characterised by some commentators as indicative of a 'postdevelopment state' marked by graduated sovereignties of unequal biopolitical investment in different categories of population (Ong, 1999; and see Bunnell and Coe, 2005, on Malaysia; Chronopoulos, 2006, on Buenos Aires). As Bunnell and Coe (2005: 845) argue in relation to zoning technologies in East and Southeast Asia, these processes are not wholly new, but have their origins in Western colonial practices and enclaves (see Sidaway, 2007).

Part of this vision for Mumbai (see, for example, Bombay First, 2003) entails the removal of the city's 2000 informal settlements, constituting at least six million people - 54% of the population - crammed into just 8% of the land (MW-YUVA, 2001). To this end, an estimated 90,000 huts were torn down during the winter of 2004-2005, leaving hundreds of thousands of people homeless and without alternative accommodation, and other demolitions have taken place since (generally greeted with silence or approval by the media). While the logic and nature of this impetus of urban cleansing may have changed through time, these processes are far from 'new'; they

have figured consistently in Bombay since its rapid expansion in the early part of the 19th century.

Table 2 below summarises some of the spatial imaginaries and logics of bourgeois environmentalism and its relation to the 'world city'. I want to make three key points here that contrast the contemporary sanitary city with that of the contaminated city. First, as with the contaminated city, the spatial imaginary at work is relational. Problems, solutions and progress are constructed in relation to cities elsewhere, although an important difference is that in the contemporary city the key agents of this discourse are not foreign but domestic. The context, imaginaries and logics of comparison are very different, but what is common to both cases is the importance of comparison in knowledge for urban government at distinct moments of urban restructuring. Second, the sense of inertia over infrastructure engineering or new sanitary behaviour that marked constructions of the contaminated city is less at issue here. The temporal logics of bourgeois environmentalism and the world city are of rapid change, characterised by large scale demolition, rebuilding, and global exchange of ideas, images, commodities and people. Third, the focus remains on an expansively conceived environment that integrates the social and natural, and on the elite. While Mumbai is now a large industrial and financial city, there is a common focus on demolition and the creation of clean, ordered elite enclaves in both cases, albeit with specific sets of imaginaries and logics. There is little space in either vision for social welfare. Bourgeois environmentalism effectively abandons the post-Independent modernist discourse of equal, uniform cities of the 1950s and 60s (Chatterjee, 2004). But welfarism has not been completely abandoned, despite the growing influence of a bourgeois environmentalist ideology.

Table 2: Bourgeois environmentalism and the 'world city'

Spatial imaginaries	Logics
Global/local Exclusive enclaves Public/private norms Clean/dirty Pleasant/unpleasant	Temporal - Dirt to 'clean', ordered spaces of retreat - Becoming global, faster, easier Form - Post-industrial - Comparativism - Elite - Demolition Focus - Environment

For example, the Slum Sanitation Programme (SSP) – the most ambitious urban sanitation intervention in Indian history – is aimed at providing toilet blocks in informal settlements across Mumbai, and is supported through funding from the state and the World Bank (Burra *et al*, 2003; McFarlane, 2004, 2008a; Sharma and Bhide, 2005. The SSP is premised on participation from NGOs (non-governmental groups) and community groups. While in the nineteenth century the wide-ranging public health discourse insisted on drainage infrastructures as central to sanitation, the focus of the SSP is not – controversially for many public health officials – on sewers and

drainage, but on building people's capacity through partnerships that insist on community-managed toilet block infrastructures as key to providing sanitation to the poor. It has had mixed results, and its long term sustainability is in question partly because of this focus. Moreover, while the partnership rhetoric involves a shift from protecting the elite from the threat and unsightliness associated with the poor and poor places, to enabling the poor to sanitise themselves and their settlements, it takes place alongside processes of urban demolition and restructuring driven by logics of bourgeois environmentalism and the 'world city', and a continued lack of investment in social housing. Despite the SSP, infrastructure investment in the contemporary city remains focussed on elite, gated areas, resulting in a starkly unequal urban metabolism.

Conclusion

Reflecting on the similarities and differences between these two key moments in the city's sanitary history is useful for tracing the history of ostensibly new practices such as the tendency towards urban secessionary networks and enclaved spaces, and for theorising the contemporary moment (Alsayyad and Roy, 2006). This is not to say that the contaminated city and the bourgeois world city are somehow the same, or that these two moments – from the nineteenth century and the early twenty-first century – are the only moments that might be usefully contrasted. These two urban milieu are very different in context, imaginaries and practices, but when brought into dialogue they cast interesting light on the contemporary city. Both are key moments of urban restructuring, one from a colonial port to a colonial city, and the other in politico-corporate Mumbai's attempts to build a 'world city'. Both rely on different modes of urban comparison with different objectives; both enrol particular kinds of

infrastructures as a means of connecting city, nature and sanitary space; and both emphasise elite investment, retreat to networked enclaves, and the demolition of 'unsanitary' spaces of the urban poor. I wish to highlight six intersections in particular.

First, if today there are new materials and technologies enrolled in sanitation provision, illness and disease remain a daily threat to the urban poor, and issues that were central to colonial officials like Conybeare and Leith, such as drainage, overcrowding and the disposal of human waste, remain central today. In addition, the principle of circulation – of connected water and sanitation infrastructures – remains absent for most informal settlements today as it did in the mid-nineteenth century. If 40% of total mortality in contemporary Mumbai's informal settlements is attributed to infections and parasitic diseases arising from water contamination and poor sanitation, and if death rates are 50% higher than adjoining rural districts (Davis, 2006: 146-147), then this is in large part a product of the differentiated infrastructure provision that has marked the city since the emergence of colonial governance during this period.

Second, there is a common focus on gated enclaves and protection, although for the contemporary elite the ability to protect themselves is strengthened through medicines not available to colonial elites, a fact that arguably further reduces the likelihood of contemporary middle class support for investing in sanitation welfare for the poor (Chaplin, 1999). Third, there is a consistency of focus on enforcement and demolition, from the threat of the contaminated city that propelled colonial administrators to the bourgeois environmentalism that marks the contemporary city.

Fourth, also reminiscent of colonial governing are attempts to blame the poor themselves for a lack of sanitation. For example, in recent work conducted on the Slum Sanitation Programme (SSP) in the city (McFarlane, 2008a), some municipal officials claimed that one of the reasons for health problems among the poor is a lack of "discipline", or the wrong "mentality", with the result that people won't attempt to maintain toilet blocks. These comments are reminiscent of Leith's complaints about a population 'slow to believe' – in this respect at least, the SSP is suggestive of a tradition of welfarism of which Leith and Conybeare were a part.

Fifth, there is a common focus on environment in both the contaminated city and the contemporary city. Environment here links social and natural, but also public and private norms and behaviour, and it is at stake in imaginaries of the city as colonial-modern, or as a world city. If the environmental focus of the contaminated city was on clean environments through infrastructure, demolition and segregation, the focus in the contemporary city is on clean environments through manicured enclaves and demolition.

Sixth, both contexts indicate the discursive power of comparison with other cities in knowledge for urban government, in the spatial and temporal imaginaries of the city, and in logics of urban change. If colonial comparison underlined the legitimacy of the imperial interest, contemporary 'world city' comparison underlines that of the corporate interest and supports an ideology of bourgeois environmentalism. Urban comparison has been at different times key to the vision and nature of urban restructuring, and for sanitation, infrastructure investment, and the urban poor, much is at stake in how those comparisons are conceived and conducted.

By connecting infrastructure, public health discourses and urban governmentalities in Bombay, the paper has traced a specific historical geography of a politicised cyborg city that is always already splintered, unequal and contested. The contaminated city and bourgeois environmentalism have different political, economic, cultural and environmental logics. Neither entails substantial possibilities for social justice, and both sets of spatial imaginaries and logics are contingent on particular constellations of political will, economic priorities, sociospatial differentiation (including race, caste, religion, gender, etc), and materialities (including technology, engineering, expertise and perceptions of environments). In Bombay, the former was driven by medical and political fear; a desire to convert a port to a functioning, knowable city amenable to government; and a desire on the part of some officials to protect human life. It tended towards logics of segregation, demolition, regulation, flight, and partial upgrading of infrastructure. Bourgeois environmentalism is driven by an elite desire for manicured urban environments and for a particular notion of the global city, tends towards demolition, the privileging of high-end residential and commercial sites over social welfare, and the retreat to gated enclaves. The discursive and material domain of sanitation remains as fragmented, unequal and politicised as it was one and a half centuries ago.

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