

Delhi's Belly: On the Management of Water, Sewage and Excreta in a Changing Urban Environment during the Nineteenth Century

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The article locates Delhi's urban environmental history firmly within the matrix of colonial urban politics, and analyses the relationship between sanitary discourse in Europe and the 'politics of sanitation' in India. It describes how colonial town planning, particularly in the context of Delhi, segregated sanitary and unsanitary spaces on a racial basis, the former being inhabited largely by the colonizers and the latter by the colonized. It discusses the technological and administrative measures undertaken by the colonial authorities to improve sanitary conditions on the one hand, and provide fresh water on the other. The article argues that New Delhi, and its water and waste disposal systems, was conceived of in a segregated way with respect to the old city, and civic services too benefited the new city at the expense of the old. It establishes a contrast between conceptions of the city in the West (as modern and progressive spaces) and in India (as unsanitary and therefore uncivilized spaces). Old Delhi, the author argues, was made 'old' through neglect and underdevelopment.

To spoil the pure water of streams and rivers with filth, to cover the limpid depth of anchoring grounds with excrementitious matters, and to transform the basins of our ports into *cloacae*, is always a sort of profanation, an act of barbarism, an attack against health.

(Proceedings of the International Sanitary Conference, Constantinople 1866)¹

[T]he European talks of progress, because, by an ingenious application of some scientific acquirements, he has established a society which has mistaken comfort for civilisation.

(Benjamin Disraeli, *Tancred or the New Crusade*)²

¹ Quoted from Smith (1869: 12). Earlier versions of this article were presented at the Centennial Conference on 'Asian Horizons: Cities, States, and Societies', University of Singapore, 1–3 August 2005 and at the International Seminar on the 'History of Waters in South Asia: Climate, Ecology, De-Forestation, Agriculture, Politics and the Management of Nature', Jadavpur University, Kolkata, 3–4 March 2006. I owe Jim Masselos, Narayani Gupta and Brenda Yeoh many thanks for their critical comments.

² Disraeli (1926–27), Vol. X, Book III, Chapter VII, p. 233.

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Introduction: Sanitation and Emerging Colonial Paranoia

The sanitary conditions of colonial cities in the age of industrialization have been the object of scholarly scrutiny during the last two decades. Colonial port cities like Bombay and Calcutta and, more recently, Singapore have received great academic attention as their development seems particularly to have been, in many respects, quite extraordinary. Dramatic population increase, densification of urban living space, insufficient potable water supply and massive drainage and sewerage difficulties were the major urban problems in colonial India and elsewhere.³ High sickness and mortality rates amongst European soldiers and the fear of diseases spreading from Indian into predominant or exclusive colonial living quarters of Indian towns alarmed many European sanitary officers.⁴ In 1863, the Royal Commission on the Health of the Anglo-Indian Army reported to the Government of India that it would be impossible to separate the question of health related to troops from the sanitary condition of the native population.⁵ The same year, Florence Nightingale cautioned her London audience about the abysmal sanitary conditions of British Indian cities.⁶ To counter the problems of urban growth in India, medical specialists, military experts and politicians referred to contemporary European politics of health, hygiene and security which were part of a wider sanitation discourse to remedy the evil effects of urbanization and industrialization in English cities.

The sanitation discourse steered the overall medical transformation process from the eighteenth century pessimistic view of medicine as a means of avoidance and prevention towards a more self-conscious understanding of prevention and protection. Whereas in the eighteenth century emphasis in towns was on the removal of pathogenic environments like drainage of swamps, ventilation of closed urban areas and burying of corpses outside the cities, the nineteenth century saw 'cleanliness measures' being extended not only to excrement and refuse removal; sanitation then also meant the supply of sufficient potable water and efficient sewerage systems. According to the contemporary miasmatic theories of dirt and disease, European cities were regarded as healthy and safe if fresh water, free circulation of air, sufficient sunlight and refuse removal were provided for. When living conditions rapidly deteriorated in British Indian towns in the second half of the nineteenth century, principles of European urban sanitation were transferred to India albeit without any environmentally related modifications.⁷

³ For Bombay, see Dossal (1991); and for Singapore see Yeoh (2003: Ch. 45, 175–212).

⁴ Population density had reached unimaginable proportions: for example, in Bombay almost 21 persons lived in a single house whereas in Calcutta population density was 7.8 and in Madras 7.7 persons per house, cf. Dossal (1991: 192–95, Table P: 212). Population density in contemporary London was almost the same as in Calcutta.

⁵ Oldenburg (1984: 99).

⁶ Nightingale (1863).

⁷ For a brief introduction into this European discourse see Yeoh (2003: 176–77) and Oldenburg (1984: 97–99).

The politics of sanitation dominated Indian town planning and municipal politics till after Independence, most prominently during the 'Emergency' (1975–77) with its clearance and re-settlement schemes for Delhi.⁸ The sanitation discourse had and still has an impact on the science of history because the history of urbanization in (British) India is constantly reduced or restricted to a history of sanitation. Instead, this history ought to be integrated in the wider context of urban development and urban environmental history. Historical research as well as the historiography of South Asia's environment is, however, preoccupied by colonial forest politics, desiccation theory and practice, and deteriorating living conditions in agrarian and forested areas.⁹ In contrast, this article attempts to establish urban environmental history as an important part of South Asia's environmental history and, at the same time, tries not to compartmentalize environmental history into urban and rural spheres. Suggesting a holistic approach, it will open up the field for a more comprehensive understanding of South Asia's environment from a historical perspective.

After the Great Rebellion of north India's *sipahis* (British Indian soldiers), peasants, zamindars and urbanites of 1857–59 and the suffering the British experienced in many towns of the Ganges plains, colonial officials thought of reconstructing Indian cities on two principles: safety and sanitation.¹⁰ In respect of military safety, parts of the Lakhnau, Kanpur and Delhi central wards were demolished, cleared and transformed into a *cordon de securité*. In respect of health (implying security), in many Indian towns native and European living quarters were segregated by a *cordon sanitaire*. 'Cantonments' and 'Civil Lines', also known as 'Station', were to become the typical European residential area marked by spacious houses set in sprawling compounds, and surrounded by lush greens, supplied with sufficient fresh water and sewerage removed efficiently.¹¹ Densely populated Indian towns suffered from inadequate water supply and from inefficient or hardly existent sewerage and refuse removal systems. However, strict segregation of native and European quarters was not always possible, particularly in the big coastal metropolises.¹²

Bombay in particular was one of the unhealthiest places in the world. With the city's population increasing from approximately 1,40,000 in 1814 to 6,44,405 in 1872, there was an overall increase of disease and mortality over time, which eventually culminated in the outbreak of plague in 1896.¹³ Alarmed, the British Government established Town Improvement Trusts to control and supervise the

⁸ Tarlo (2003).

⁹ So far, there seems to be only one article on urban environmental history: Anderson (1996: 293–335).

¹⁰ Oldenburg (1984: xv–xvii) has argued in favour of three principles, including also 'loyalty'. As this article is on the morphological and social reconstruction of Indian towns, political aspects will be neglected.

¹¹ Pieper (1977).

¹² For a model of emerging colonial towns see Grewal (1994: 173–90).

¹³ Klein (1986: 725–54, esp. pp. 740, 743–45). For the sanitary policy see Ramanna (2002: 83–142).

future development of Indian towns. The duty of these trusts was to buy and sell land on the urban fringes. Within the cities the trusts planned thoroughfares to improve ventilation, to develop residential areas and to resettle the poor.¹⁴ In 1898 Bombay became the first Indian city to found such an institution for planning its urban environs and environment in 1898. As in many other cities later, the policies of the Improvement Trust in Bombay also failed. Instead of improving the housing situation of the city's poor, the propertied elites benefited most from the redistribution of urban land. Moreover, continuously immigrating people still settled in the cheap and densely populated parts of Bombay. Not surprisingly, congestion in the poor quarters had increased further in 1919. Nearly 40 per cent of the city's inhabitants lived on 4 per cent of the city's space, and the mortality rate was still 35 to 60 per cent between 1904 and 1912.¹⁵

Lack of money was one of the major reasons why town improvement failed. It has been argued recently that the fiscal burden of the growing military budget of British India until the beginning of the First World War had created some sort of 'financial conservatism'.¹⁶ However, at the end of the 1870s the percentage of military expenditure was roughly 30 per cent, increasing to 41 per cent at the beginning of the 1880s. Thereafter, military expenditure decreased rapidly varying from 26 to 28 per cent between 1885 and 1898, and till 1914 averaged 23 per cent. Additional taxes amounting to Rs 55,000,000 had facilitated this reduction.¹⁷ However, the increasing amount of 'Home Charges' rather than the military budget caused financial strain on the Government of India. Between 1873 and 1893 these financial obligations grew from Rs 147,000,000 million to Rs 270,000,000, the latter amount totalling more than the income from land revenues and customs duties.¹⁸ More worrying was the amount of the 'India Debt' which increased dramatically from £36,000,000 at the close of Richard Wellesley's expansionist governorship in 1805 to £98,000,000 million after the suppression of the Great Rebellion in 1858. It was against this background that the Government of India opted for fiscal decentralization and local responsibility of public works including municipal investment in the 1860s.¹⁹

Public investment was divided into two categories. Whereas 'State Works' like barracks, law courts and schools were non-remunerative and could therefore be exempted from public control, 'Works of Internal Improvement' were regarded as commercial ventures which had to be remunerative. This was true for almost all irrigation works but particularly relevant for municipal improvement schemes

¹⁴ Meller (1979: 330–50).

¹⁵ Kidambi (2001: 57–79).

¹⁶ Prashad (2001: 115–16).

¹⁷ Simon (1974: 30–34).

¹⁸ Rothermund (1988: 43). As the land revenue and customs duties were still the major sources of fiscal income, the financial burden was about to cause the colonial state's insolvency.

¹⁹ Förster (1991: 12–13); Tinker (1954: 35).

which had to be sanctioned by the government.²⁰ Funding and tight financial administration remained one of the major obstacles to town improvement in British India. This was unequivocally pointed out by the colonial regime discussing the general improvement of Delhi's sewerage system as part of the transfer of the imperial capital from Calcutta to Delhi since government was not 'guided by what is the best system of sanitation but by what is the best system which the Municipal funds can afford.'²¹ Despite this 'financial conservatism', it has been argued that in the case of Delhi the implementation of 'modern' technology stood apart from the contemporary theoretical discussions on health and sanitation and was, therefore, not part of the urban improvement scheme.²²

As will be argued in this article, 'modern' technology was part of the discussion at all stages of planning. This discussion took place not only 'on the spot' but among a wider network of sanitary officers, engineers and medical officers of the British Empire in 'the East'. It will be further argued that apart from lack of funds it was rather inadequate technology, inexperienced engineers and ignorant planners which decisively contributed to the under-development of Indian towns. Delhi particularly serves as a case study. A former seat of the Mughal empire, Delhi was the only town in British India where Europeans settled amongst Indians in an Indian town—Bombay, Calcutta and Madras were basically regarded as European towns. This 'closeness' created a paranoia among the British ruling class and led to absurd forms of racial segregation. Part of the colonial paranoia was to prevent the physical development of Delhi after 1858 because of the role the city had played during the 'Mutiny'.

Water Supply and Sewerage System in Delhi until the Middle of the Nineteenth Century

Delhi came under British rule in 1803. The dual government, which lasted till the deposition of the Timurid dynasty in 1857, was reason for some discontent and distress among the British, the urban elites and the inhabitants.²³ Inside the walled city, the European soldiers resided in rented or requisitioned houses in Daryaganj south of the Lal Qila (Red Fort). Additional troops and officers were housed between the Lal Qila and Kashmiri Gate. In 1828 it was decided to move the European troops outside the city wall and to keep only the British Indian forces within the walled city. After the 'Great Rebellion' the positioning of the civil and military personnel was reversed. Now the areas within the city, including the renamed

²⁰ Whitcombe (1982: 692–93).

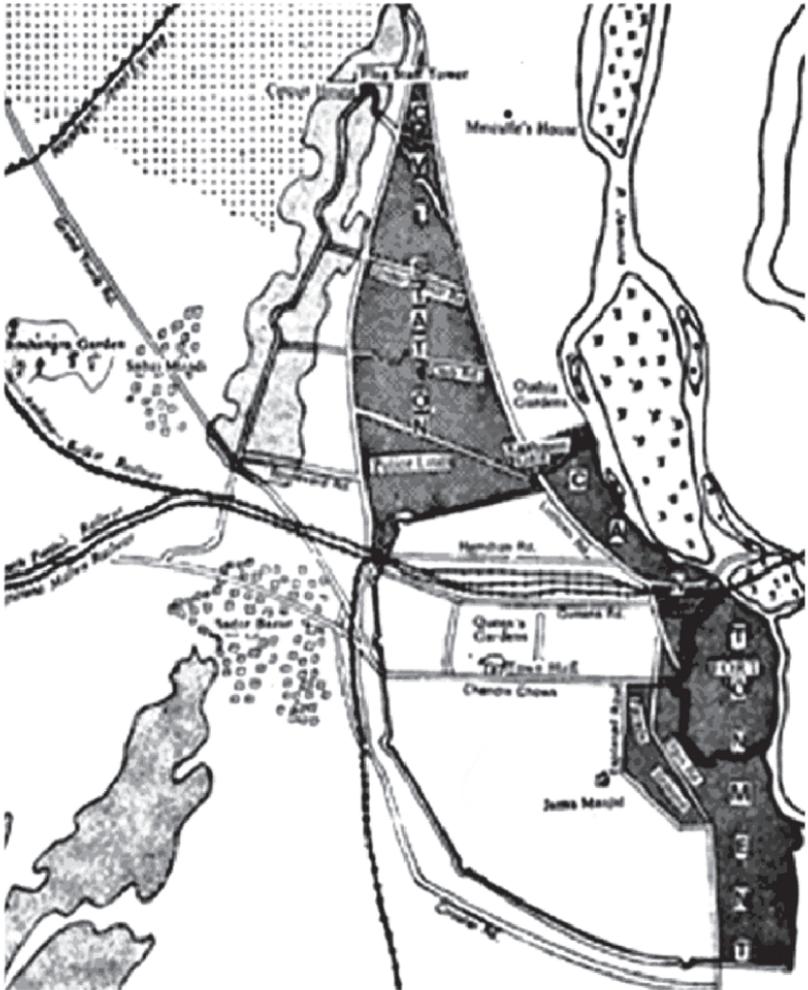
²¹ National Archives of India (henceforth N.A.I.), Education (Sanitary), nos 1–18, A. Progs, September 1912, as quoted in Prashad (2001: 117).

²² Prashad (2001: 117–18).

²³ Mann (2005: 5–34).

'Delhi Fort', were occupied by British soldiers while the civil personnel now settled outside the city wall between the Delhi Ridge and the river Jamuna. Parts of the 'Cantonment' were also shifted onto the Delhi Ridge in 1873 (see Figure 1).²⁴

Figure 1
Delhi, Suburbia, the Civil Lines and Cantonment
in the Second Half of the Nineteenth Century



Population growth was rather modest in the first half of the nineteenth century. According to early British estimates, Delhi's population was 1,31,000 in 1843, rising to 1,37,000 in 1845 and to 1,51,000 in 1854. After the Great Rebellion and the 'pacification' of Delhi, the population came down to 1,02,000 within the walled city in 1864. Including the suburbs, Delhi's inhabitants numbered 1,42,000 rising

²⁴ Gupta (1981: 12, 27).

to 1,64,000 four years later.²⁵ Though the outer wards of the intramural town were fairly crowded, Delhi on the whole was a moderately populated city. This may have been the reason why cholera epidemics in Delhi claimed 'only' 708 lives in 1845 and 864 in 1856. Another outbreak of cholera in 1861 caused 677 casualties among the Indian and 59 among the European population. 'Fever' was 'unusually prevalent [in town], and many residentials suffered' in 1844 and once again in 1854. As casualties, in comparison to contemporary Indian epidemics, were indeed fairly low, the British generally regarded Delhi as a healthy city, far above the average of other Indian towns.²⁶

Despite the overall positive impression, the water supply and sewerage system deteriorated after the occupation of Delhi because the responsibilities for its maintenance were not clear and resources in any case insufficient. Generally, water was obtained from wells. In 1843, about 600 private and about 400 public wells existed in Delhi. Of the total number of wells, the water of 555 was described as 'brackish'. Shahjahanabad, as Delhi was named after Shah Jahan (r. 1627–57) who had the city newly planned and built in the middle of the seventeenth century, was famous for its excellent supply of fresh water. Most wells were fed with additional fresh water from the Ali Mardan canal by especially constructed inlets. By the middle decades of the eighteenth century the canal became dilapidated and dried up. The British started to reconstruct the canal in 1817 which supplied the city with water again in 1820 for the first time in eighty years.²⁷ As the inlets were not repaired, only wells situated near the canal received additional water, though simply by percolation. At the same time it was observed that flooding the wells with water from the canal improved the quality of well water. Since most wells lacked fresh water supply, the well-to-do people had their water fetched from the river Jamuna. Many urban manufacturing industries also used the same source, the water being provided by a presumably regular bullock-service.²⁸

To partially improve the water supply, the Superintendent of Canals, John Colvin Major, suggested in 1832 that an underground channel in front of the Lal Qila be repaired as this measure would supply the whole south-eastern quarter of the city with fresh water.²⁹ Nothing more is heard of the proposal. Perhaps it was too expensive. Instead, in 1846, the British constructed a large tank (Ellenborough Tank), commonly known as Lal Diggi, in front of the Lal Qila. This was definitely cheaper as it demanded only manual labour and no technical constructions. Although the water supply generally improved, it was suggested in 1853 to regularly supply

²⁵ *Gazetteer of the Delhi District, 1883–4* (Punjab Gazetteers, Delhi, Punjab Government), p. 207.

²⁶ *Selections from the Records of the Punjab Government*, Lahore 1875, Vol. v, No. 8, 'Cholera in the Delhi Division', pp. 30–36.

²⁷ Spear (1951: 104–05).

²⁸ *Report on the Sanitary Administration of the Punjab for 1868*, Lahore, 1868, Section III: Detailed Reports on particular stations, para. 148, pp. 71–72.

²⁹ N.A.I., Foreign Department, Political Consultation, 29 October 1832, No. 58., John Colvin Major, Superintendent of Canals, To William Frazer, Chief Commissioner etc., Dehly, Canal Office, 7 July 1832, para. 3.

Lal Diggi with fresh water from the Ali Mardan canal. Apparently the water of the tank had also turned brackish.³⁰ For the time being water supply seemed to be sufficient although the potable water was often of dubious and sometimes even dangerous quality as a chemical analysis from the early 1860s indicated.³¹ It was predictable that with a rising population the problems of sufficient water supply would also increase.

In the seventeenth century water from the Ali Mardan canal had been used for flushing the city's highly efficient subsoil sewerage system which had been constructed with masonry conduits and which had flat stone sides and unplastered beds.³² Later, British officials described the drains as flat-bottomed and unnecessarily capacious, some having arched roofs, some constructed with flat stones.³³ The city's sewerage system was divided into four catchment areas with main longitudinal subsoil canals and secondary drains joining at certain intervals. Drainage was supported by regular flushing with water from the Jamuna and the Ali Mardan canal and by the natural incline of the surface. This helped generate sufficient pressure to prevent the silting of the drains. The largest basin included all wards along Chandni Chauk and beyond covering an area of almost 1 sq km. From the canal in Chandni Chauk the sewerage passed through two small drains in front of the Lal Qila finally discharging into the river close to Nigambod Ghat and by open 'rivetments' south of the Red Fort.³⁴

However, as the canals became dilapidated and as the water level of the Jamuna dropped in the course of the eighteenth century, the sewerage system did not receive enough water for flushing refuse and sewerage, and when regular cleaning was also stopped the drains desiccated and turned into cesspools within decades. British attempts to improve the sewerage system failed because many of the sewers constructed in the first half of the nineteenth century were too small. Apart from this, the drains were opened and cleaned only once a year, mostly during the winter season. As still no provisions were made for flushing the drains, the problem of sewerage and drainage continued to grow. When additional water was available from the Ali Mardan and Jamuna canals from the middle of the 1830s, the lamentable situation did not improve because the British drew more water to the Civil Lines compared to the rest of the city. With respect to civic amenities Delhi developed asymmetrically from the 1820s.³⁵

³⁰ *Delhi Gazette*, Wednesday, 2 March 1853, p. 139.

³¹ *Report on the Sanitary Administration of the Punjab for 1868*, Section I: System of Sanitary Improvement best adapted to the Punjab. 2.—Sewerage and Disposal of excreta, para. 53, p. 30. Section III: Detailed Reports on particular stations, para. 148, p. 72.

³² Prashad (2000: 120).

³³ *Report on the Sanitary Administration of the Punjab for 1868*, Section III: Detailed Reports on particular stations, para. 52, p. 29.

³⁴ Greathed (1852: 1–2, 4, 6).

³⁵ Prashad (2001: 120); Gupta (1981: 19). For a contemporary description of the canals within and without Delhi *vide* 'Canal of Feroz Shah', *Journal of the Asiatic Society*, Vol. 2, 1833, pp. 104–05; 'Canal at Delhi', *ibid.*, pp. 105–09; 'Canal of Ali Mardan Khan', pp. 109–11.

The removal of night soil and refuse in Delhi as in all other Indian towns was customarily organized by the inhabitants of the city's wards. Street sweepers collected the rubbish into piles at the corners of lanes and alleys. Every morning, excreta was shoved into jute sacks and also collected at street corners. Some time in the first half of the nineteenth century, special receptacles were constructed along the open drains to collect night soil. In the early part of the day, the stable litter would be removed by bullock or donkey carts first, followed by the night soil bullock carts collecting the sacks of excreta and thereafter proceed in a chain of carts out of the city towards the trenching sites. These sites were located south of Delhi Gate near the Old Jail on Mathura Road, at Malakaganj, north-west of the city and at Motia Khan and Original Road towards the west. At the dumps the excreta was processed and later sold as manure to nearby peasants.³⁶

Comparisons with contemporary modes of conservancy show that in Indian cities, including the colonial port cities, and in the most prominent and most populated capitals of Europe, Paris and London, the system of removal of night soil was more or less similar. Thousands of scavengers and sweepers, 350 horses and 120 vehicles of various descriptions were employed to remove excreta from the cesspools of Paris and to dispose it off in the famous *Voirie*. Nightmen periodically cleaned the more than 3,00,000 cesspools—which outnumbered houses—of London. Because excrement was allowed to accumulate in large cesspools, the London as well as Paris system of removing night soil was regarded inferior to the Bombay system where cesspools were forbidden in 1847 whereafter excreta was regularly collected from individual privies.³⁷ However, the final disposal of the night soil on the beach of Bombay's Back Bay caused severe problems after a few years as the high tides did not clear beach and sea sufficiently. In 1850, the Bombay Government prohibited the disposal of excrement on the Back Bay beach and a substitute beach far away from the city was selected for the purpose.³⁸

Two Decades of Reports and Reforms: Sanitation and Administration in Delhi, 1852–74

Act XXXVI of 1850, passed by the Government of India, regulated the fiscal income of towns in British India for the first time. By 1858, the act had been applied in 352 towns. Because of the exorbitant increase of the 'India Debt' after the Great Rebellion, the Government of India was urged to decentralize its fiscal system. This included the transfer of public works to municipal bodies and the enlargement of the municipalities' financial basis. Proposals were made in 1861, yet government left it to the provincial authorities to work out concrete plans. In 1862, the Lieutenant Governor of the Punjab resolved that future municipal committees were to

³⁶ Prashad (2001: 126–27, 148).

³⁷ Conybeare (1855: 1–9, paras 2–43). (Appendix H, 'A Comparison between the different Methods of conveying away, and ultimately disposing of Night-Soil, adopted in London, Paris, and Bombay').

³⁸ *Ibid.*: 11–12; paras 50–54, 14–15, paras 63–64.

be composed of citizens chosen by the trade *panchayats* or selected for their public spirit. The municipal budget would still be based on the income of octrois³⁹ while the tasks of the municipalities would remain restricted to conservancy, road repair and lighting, and framing of by-laws and their enforcement by fines. When police charges were transferred to towns in 1864, Governor General Lord Lawrence permitted the municipal committees to levy taxes for their payment and to set up administrative institutions.⁴⁰

The Delhi Municipal Committee (DMC) was founded in 1863, together with more than fifty municipal committees in the Punjab.⁴¹ In 1871, Delhi was given the status of a first-class municipality which empowered the DMC to initiate independent public expenditure, subject only to provincial government audit. Only six cities in the Punjab enjoyed this financial privilege: four European hill stations, Amritsar and Lahore. Despite its privileged position, the DMC struggled with the provincial and central authorities for financial aid to improve the sanitary conditions of the city. The history of the DMC reads as a story of permanent initiative, setbacks and frustration. Though Delhi developed into British India's seventh largest town, the richest commercial town in the Punjab and the largest railway junction on the subcontinent at the beginning of the twentieth century, a growth that went along with a steady population increase (1875: 1,60,550; 1881: 1,73,400; 1891: 1,92,600; 1901: 2,08,500; 1911: 2,32,800), the Government of India as well as the Punjab Government continuously hampered Delhi's physical development which including that of almost all basic civil amenities.⁴² Early sanitation reports on Delhi provide a lucid example of how the city was turned into an unhealthy place and how, in distinction to the Civil Lines, it was constructed as Europe's Oriental 'Other'.

Of far-reaching consequences was the central government's decision not to demolish the city wall. Early British proposals to tear down the wall and to fill up the ditch were rejected on financial grounds.⁴³ Despite numerous attempts of the

³⁹ Octroi were levied at various rates on the value of almost all goods and merchandise brought within the municipal limits, only grain and piece-goods being exempted.

⁴⁰ Tinker (1954: 29–37). Municipal Acts were introduced in Bengal and Awadh in 1864, in the Madras Presidency in 1865, and in the Punjab in 1867.

⁴¹ The Delhi Municipal Committee consisted of the Deputy Commissioner as President, with five additional official members including the Vice-President, and 15 non-official members. These were appointed by government after having been nominated by the Deputy Commissioner and subject to the approval of the Delhi Division Commissioner. *Gazetteer of the Delhi District 1883–4*, Punjab Government (n.d.), p. 204. For a list of the members of the DMC between 1863 and 1931 see Gupta (1981: 235–38).

⁴² Gupta (1981: 45–46, 64–65). For the early history of the DMC see pp. 70–80. Numbers of the population increase are given in *Gazetteer of the Delhi District*. Part B—Statistics 1912. Punjab District Gazetteers, vol. V. B. Delhi District, Statistical Tables 1912, Lahore, 1913, pp. xii–xiii.

⁴³ Delhi Archives, Records of the Deputy Commissioner's Office. 'Demolition of City-Walls, Gates and the removal of glaxis', 3/1863. From the Secretary to Government, Punjab, Public Works Department, to the Secretary to Govt. of India, Public Works Department. Dated Lahore, the 21 April 1863, para. 30.

DMC the destruction of the wall was explicitly prohibited. Even the demolition of parts of the wall as well as its lowering was interdicted. For environmental reasons, a section of the wall in Daryaganj was torn down to facilitate ventilation of the European quarters. For the construction of the railway line, Mori Gate and Kabuli Gate had to be demolished.⁴⁴ During the 1870s, some British officials again strongly voted for the demolition of the wall to increase ventilation. Additionally, it was sought that the ban on constructing houses 500 yards away from the wall also be lifted to create space for new buildings.⁴⁵ The Military Department of the Punjab, however, pointed out in 1877 that the demolition of the wall was not advisable 'as its retention limits the growth of the city.'⁴⁶

Apparently Delhi was still to be punished for the trauma the British had to experience during the siege of the city in 1857. In a growing 'culture of remembrance' and with Queen Victoria's proclamation as Empress of India in 1877, Delhi became the metaphor for the subjugated Indian people. Indeed, in a couple of decades, the British had reduced the former Mughal residence to a mediocre provincial town of north India which recovered from its humiliation and desacralization only during the last two decades of the nineteenth century. Yet, the city wall was still not to be touched. When British administrators prepared the grand Imperial Darbar in 1911, a few parts of the wall were demolished for military (security) reasons. However, the road along the riverside of the fort was constructed without prior approval from the central government which caused some administrative trouble.⁴⁷ As will be seen, the colonial policy of subjugation and punishment of Delhi was reflected by means of the water supply and sewerage system.

In the middle of the 1860s the provincial governments initiated reports on the sanitary administration with particular reference to the three Presidency towns, European cantonments, British Indian barracks and Indian cities.⁴⁸ When the first report on the sanitary condition of the Punjab was published in 1867, Delhi was described as the cleanest city of the province, even in the bylanes and back alleys. The removal of refuse and excreta was organized by the city wards (*mohalla*). In every *mohalla* there was a masonry receptacle with or without a lid. One or two sweepers were employed by the residents of the *mohalla* for regularly cleaning the receptacles and were paid in kind or cash by them. By orders of the DMC the

⁴⁴ Gupta (1981: 87).

⁴⁵ N.A.I. Home Department, Public Branch, B Proceedings, May No. 250. From A.C.C. DeRency, Secretary Commissioner, Punjab, to the Secretary to Government, Punjab. 'Report on the Sanitary Condition of Delhi', 4 December 1873, paras 18–20.

⁴⁶ Delhi Archives. Records of the Deputy Commissioner's Office. 'Demolition of City-Walls, Gates and the removal of glacis', 3/1863. Memo. No. 356 S, Cantonment Lands, dated Simla, 12 September 1877.

⁴⁷ *Ibid.*, Copy of a letter No. 461—D.W., dated 19 May 1911, from Colonel R.S. MacLagon, Superintending Engineer, Second Circle, to the Secretary to Government of India, Army Department, Simla.

⁴⁸ See, for example, *First Annual Administrative Report of the Sanitary Commission for Madras from April 1864 to April 1865*, Madras, 1865.

sweepers had to remove the filth and sweep the streets before noon, defaulters being liable to a fine.⁴⁹ But with respect to drainage the same report stated that '[s]uperficially the city presents an appearance of cleanliness not often seen in the cities of the Punjab, but it is undermined with cess pits whose foul contents poison the water by percolation and the air by evaporation and make the place pestilential.'⁵⁰ Echoing the European sanitation discourse, the report concluded that sufficient water supply would substantially improve public health in Delhi. With respect to the sewerage system the report recommended that covered sewers constructed on the English model would be infinitely preferable to any Indian construction and also be less expensive.⁵¹

Not only was European technology declared superior to Indian technical systems but India's climate being different from Europe's, any future sewerage system of Delhi could end in the river Jamuna without causing health problems because in India 'towns being so few, areas so great, rivers so large and their beds so different' the situation was a contrast to England where 'rivers have become so polluted that it may be necessary to prevent any sewerage being emptied into them.'⁵² Arguments regarding the dangers of disease deriving from polluted rivers, which were part of the European sanitary discourse, were denied as having any applicability to India from the very beginning. Furthermore, the argument certainly made cheap solutions for sewerage systems in British India possible. Emptying sewerage into the Jamuna saved money. For this reason the DMC was able to spend little money on the maintenance of the existing system. By 1871, just nine new drains had been built and twenty repaired. Apart from these minor construction works, the tank close to Ajmeri Gate was cleaned out.⁵³ Two years later it was reported that the sewers which had been constructed by the British in a rather haphazard way in earlier years had turned into cesspools.⁵⁴

The *rais*, the nobility of Delhi, complained in the local newspapers about the lack of improvement of the drains and sewerage system. It was also pointed out that the DMC was building minor drains at huge expense in the British quarters of Delhi and in the Civil Lines area but hardly anything was being done for the densely populated *mohallas* of the walled city.⁵⁵ The restoration of Roshanara Gardens in West Delhi by Colonel Cracroft is evidence of British extravagance

⁴⁹ *Report on the Sanitary Administration of the Punjab for 1868*, para. 145, pp. 70–71.

⁵⁰ *Ibid.*, Section I, System of Sanitary Improvement best adapted to the Punjab. Sec. 2—Sewerage and Disposal of excreta, para. 53, p. 30.

⁵¹ *Ibid.*, para. 55, p. 31.

⁵² *Report on the Sanitary Administration of the Punjab for the year 1870*, Lahore, 1871. Report by Crosthwait, T.P.S., C. E., on the Delhi Sewerage, dated 10 March 1870, para. 184, p. 74.

⁵³ *Report on the Sanitary Administration of the Panjab, for the year 1871*, Lahore, 1872. Section VI—Sanitary Progress, Delhi City, para. 233, p. 77.

⁵⁴ Delhi Archives. Records of Commissioner, Delhi Division (1857–1939). From A.C.C. DeRency, Secretary Commissioner, Punjab, to the Secretary to Government, Punjab. 'Report on the Sanitary Condition of Delhi', 4 December 1873, para. 25.

⁵⁵ *Urdu Akhbar*, 16 April 1871, *Urdu Akhbar*, 8 July 1871 and *Urdu Akhbar*, 16 December 1871 as quoted in Prashad (2001: 119 and 124).

and self-interest. The gardens had fallen into neglect and parts of it had turned into swamps since the middle of the century. However, instead of opening up and cleaning old drains, a network of spacious roads with side drains, culverts and bridges was constructed and the enclosure wall restored at great cost.⁵⁶ Defending his project, Colonel Cracroft argued that the roads had improved ventilation and, moreover, the restoration scheme had contributed to the environmental improvement of neighbouring Sabzimandi because dangerous exhalations had disappeared since then.⁵⁷ It was counter-argued that, in fact, ventilation would have been much easier facilitated by cutting down a few trees, apart from the view that 'the roads have been laid out with more reference to aesthetic effect than to the conveniences of traffic.'⁵⁸ An amateur English landscape gardener had spent Indian public money on a British pleasure ground.⁵⁹

In respect of conservancy the discussion about the most appropriate system culminated in the question whether, due to India's climate, dry conservancy was more applicable in India or the European technology of water carriage systems.⁶⁰ Emphasizing the cultural differences it was pointed out in 1858 that water closets would be a totally new thing to Indians and, therefore, they would not like it. Even if 'modern science' was introduced in India, 'traditional values' would prevent progress in the privies.⁶¹ By the 1870s British officials and sanitary officers were still not decided which kind of excrement removal would be best applicable to British Indian cities. On the one hand it was opined that under no circumstances should excreta of the Indian population be allowed to enter any sewerage systems (racist argument: contra). On the other hand it was pointed out that the additional amount of excrement would not block the sewer systems (technical argument: pro). As experiments in Madras had shown water carriage systems were also the cheapest mode of night soil removal as long as sufficient water was available. For this reason, the water carriage system was also recommended for Bombay.⁶²

⁵⁶ Delhi Archives. Records of Commissioner, Delhi Division (1857–1939) Improvement of the Western Suburbs of Delhi. No 167/1872–76/15 Vol.I. From the Secretary to Govt. Punjab, PWD to the Commissioner and P., Delhi Dn. Dated 28 November 1872, No. 2401.

⁵⁷ That drainage had dried the swampy parts of Sabzimandi and that ventilation had also improved was testified by an evidence of the Conservator of Forests. Copy of a letter No. 1358 dated 10 August/73 from the Conservator of Forests, Punjab to the Secretary of Government Punjab, Civil Department, *ibid.*

⁵⁸ *Ibid.*, from A.C.C. DeRency, Secretary Commissioner, Punjab, to the Secretary to Government, Punjab. 'Report on the Sanitary Condition of Delhi', 4 December 1873, paras 2–11.

⁵⁹ Within an English landscape garden the 'pleasure ground' was located in front of the Manor House. In contrast to the rest of the garden which in most cases was open to the public the pleasure ground was the private and most decorated part of the garden with a well kept lawn as well as flowerbeds, vases and statues.

⁶⁰ N.A.I. Home Department. Public Branch Consultation 14 January 1859, No. 57. Extract from the Proceedings of the Hon'ble the President of the Council of India in Council, para. 3. Public Works Department, Fort William, 1 April 1858.

⁶¹ Smith (1869: 84).

⁶² Clark (1875: 8).

The discussion about an appropriate conservancy system went on until the end of colonial rule, basically repeating or revolving around old arguments. Some said that the water closet system had had no trial in the Indian environment and it was doubted whether Indians would accept this latest symbol of Western civilization.⁶³ As many towns of India did not receive enough water throughout the year, most health officers opted for the dry conservancy system. Experiments in various jails of the Punjab had demonstrated its positive effects if strict rules of cleanliness in the latrines were duly observed. In fact, arguments like wastage of water, different climate and, therefore, culturally different habits of defecation ultimately prevented the introduction of 'modern' excreta removal systems in Indian cities.⁶⁴

The sanitation plan for Madras pointed out that, as a lot of manual labour was involved in the removal of excreta, the dry system would certainly be more expensive than the water carriage system.⁶⁵ Therefore the report decided against the costly former and in favour of the latter system. It was argued that since India's annual precipitation was as much as England's, it was rather a question of storing and distributing water than of its availability. Apart from that, costs could also be reduced if instead of 4,000 sweepers cleaning cesspools only 40 supervisors controlled the sewers of Madras.⁶⁶ In Calcutta excrement was collected and thrown into the river Hugli by municipal sweepers. This was still regarded as the easiest, cheapest and most efficient system of removal. Meanwhile the municipal railway transported some of the daily refuse out of town to form an embankment.⁶⁷ In Delhi, the situation grew worse at the beginning of the 1870s. The trenching grounds close to the city could no longer cope with the daily amount of excreta, and carts transported their loads towards the Ridge as far as Kutb Minar 10 km south of Delhi. Here the local population was soon complaining about the deteriorating quality of well water which was testified by repeated British chemical analyses.⁶⁸

Though excrement of Delhi was filling the dumping trenches and polluting groundwater, the city itself still seemed to have been considerably clean. A certain Mr Dannenburg, a German appointed by the DMC to supervise night soil removal in Delhi, had subdivided the city into cleaning circles each having an Inspector of Nuisances for regular control. Dannenburg also testified to the cleanliness of the back alleys in early morning hours, which was true for both the walled city and the suburbs.⁶⁹ Despite this positive impression British statistics from the early 1870s

⁶³ Dowden (1869: 7–9, 73–75).

⁶⁴ Extract from the Proceedings of the Hon'ble the President of the Council of India in Council, paras 4–5.

⁶⁵ Tulloch (1865: 19–42).

⁶⁶ *Ibid.*: 44–45, 61–62.

⁶⁷ Smith (1869: 6).

⁶⁸ *Report on the Sanitary Administration of the Punjab for the year 1870*, Lahore, 1871. No. 13 C of 1871, Section VI—Sanitary Progress, para. 183, p. 61.

⁶⁹ From A.C.C. DeRency, Secretary Commissioner, Punjab, to the Secretary to Government, Punjab. 'Report on the Sanitary Condition of Delhi', 4 December 1873, para. 15.

indicate that the mortality rate in Delhi was more than in other towns of British India. Besides polluted water there were other reasons too for the high mortality rate. While the death rate was 33.4 per cent in Madras, 25 per cent in Bombay, 23.7 per cent in Calcutta, 28.5 per cent in Lahore, 22.3 per cent in Nagpur and 25.5 per cent in Lakhnau, it had reached a frightening 41.4 per cent in Delhi.⁷⁰ Finally, in 1875, army authorities became alert to the unsanitary conditions of Delhi and sent a report to the Secretary of State for India who immediately ordered the Government of the Punjab to undertake measures for the improvement of Delhi's sanitary environment. Existing plans for the water supply of Delhi were duly implemented but the problem of sewage, refuse and excreta removal remained unsolved for decades to come.⁷¹

Trial and Error: Fresh Water for Delhi, 1869–1904

As in Europe, in India too water supply was on top of the sanitation agenda. The more urban mortality increased and the more the British felt threatened by the unsanitary Indian (urban) environment, the more an efficient and sufficient supply of potable water was demanded for Indian towns. It was self-evident that British Civil Lines and Cantonments had priority in the framework of sanitary planning. Often, water supply and sewerage systems of British stations were not included in the overall town planning scheme but dealt with separately. Whereas British settlements had enjoyed all imaginable technical equipment, Indian towns had hardly any sanitary amenities. In the big port cities where segregation could not be implemented, the debate on water supply became even more urgent. Plans and projects for future water supply systems were evolved in the middle of the nineteenth century, and discussed and implemented within a decade.⁷² In Delhi plans for the city's water supply were formulated in the 1860s, but it took more than four decades for them to materialize.

In 1869 the DMC accepted a proposal of Crosthwait, a civil engineer who had been employed for some time with the Dublin city water works, for a water supply scheme which could be completed within three years. According to this proposal, water from the Ali Mardan canal was no alternative for a sufficient water supply. Additional wells needed to be dug in the city.⁷³ However, the proposal suggested that the main supply should be covered by water taken from the Jamuna by wells sunk in the sandy bed of the river 'where a clear, cool, undercurrent of very pure

⁷⁰ Clark (1875: 5).

⁷¹ Gupta (1981: 89). Gupta speaks of a rather academic discussion which had set in after London's order to improve the sanitary condition of Delhi. However, as will be seen, the discussion was by no means only academic but led to concrete plans which were implemented within the following decades.

⁷² For Bombay see Dossal (1991: 95–124). An equally comprehensive history of Calcutta does still not exist, but see Gupta (1993: 29–55), particularly pp. 51–53; Nair (1990: 224–37).

⁷³ *Report on the Sanitary Administration of the Panjab, for the year 1871*, Lahore, 1872. Section VI—Sanitary Progress, Delhi City, paras 4–11, p. 70.

water is to be found at all seasons of the year.⁷⁴ This water was to be pumped from the wells in a reservoir close to the Idgah situated west of the walled city and from there supplied to the city and the suburbs by an underground network of main and branch pipes. The cul-de-sacs of the intramural city were excluded from the project as this 'extension' was considered too expensive. Instead, the inhabitants of the *mohallas* were to be provided with public water taps and washing places. In the beginning, only the walled city was to be supplied with additional water from the reservoir leaving a third of Delhi's inhabitants without any water supply.⁷⁵

To finance this project, the report suggested to levying a special house tax of Rs 1 per house per annum.⁷⁶ The DMC suggested individuals to have private pipes laid inside their houses, convinced that well-to-do inhabitants of the city would gladly pay the extra rates for this municipal service as it would save their women from fetching water from public wells. Apart from that, the DMC believed that various industries would also willingly pay for an improved water supply.⁷⁷ The tax met with no resistance from Delhi's population and people were indeed willing to pay it for the improvement of the urban water supply.⁷⁸ In respect of financing the whole project, the Provincial Government of the Punjab stated that preference had to be given to the water supply of the European living quarters for preserving the health of the soldiers stationed in the Cantonment and the Civil Lines. Thus, to begin with, only the intramural city was to be supplied with the additional water. However, Crosthwait also proposed the postponement the drainage and sewerage systems to facilitate the construction of the water pipes. The DMC followed the recommendation unanimously.⁷⁹

For starting construction works the Government of the Punjab had to assess the project for its financial soundness and eventually sanction it. In 1873 the Punjab Government found that the water works were too expensive and that therefore loan from the Government of India to the DMC could not be granted. Contradicting all arguments hitherto put forward, the Punjab Government demanded that the DMC reduce costs by taking water from the Ali Mardan canal because most of the additional water required would be used up in flushing the drains; water from

⁷⁴ *Report on the Sanitary Administration of the Panjab 1869*, Lahore, 1870, No. 727 of 1870, Section I: The Progress of the Sanitary Improvement. 1. Delhi, para. 11, pp. 7–8.

⁷⁵ *Report on the Sanitary Administration of the Panjab for the year 1870*, Lahore, 1871, No. 13 C of 1871. Section VI—Sanitary Progress: Progress in Mr Crosthwait's scheme, Report by Mr Crosthwait, dated 10 March 1870, para. 183, pp. 65–70.

⁷⁶ *Report on the Sanitary Administration of the Panjab 1869*, Lahore, 1870, No. 727 of 1870, Section I: The Progress of the Sanitary Improvement. 1. Delhi, para 8, pp. 5–6.

⁷⁷ N.A.I. Records of Commissioners, Delhi Division. Commissioner's Office, Miscellaneous Correspondence. Water Supply to Delhi City. No 206/1869–1882/11. From Major C.A. McMahon, Deputy Commissioner, Dehlie, to Lieutenant Colonel W. McPeilee, Delhi Division. Dated Dehlie, 18 January 1869.

⁷⁸ Gupta (1981: 88–89).

⁷⁹ *Report on the Sanitary Administration of the Panjab for the year 1870*, No. 13 C of 1871. Section VI—Sanitary Progress: Progress in Mr Crosthwait's scheme. Report by Mr Crosthwait, dated 10 March 1870, para. 183, pp. 61, 63, 70.

the river Jamuna should be largely resorted to for bathing. To further reduce expenditure the DMC was requested to submit a water supply scheme which would supply only the intramural city.⁸⁰ The ensuing internal correspondence of the Punjab Government demonstrates the different positions of sanitary and public works politics. The Sanitary Commissioner of the Punjab contradicted the Public Works Department (PWD) emphasizing that the point of Crosthwait's scheme was the availability of cheap potable water by constructing wells close to the Jamuna where the water would be filtered naturally by percolation. The commissioner asked whether the PWD was raising financial problems for its own reasons.⁸¹ Eventually the originally proposed water supply scheme was sanctioned by the Government of India in 1874.⁸²

Two years later, tests with experimental wells were still going on. Difficulties arose when the water level of the river sank during the dry season. At least thirty-five additional wells had to be dug to ensure sufficient potable water for Delhi. It was pointed out again that there was no cheaper alternative to the proposed wells close to the Jamuna, because artificial filters were more expensive.⁸³ Experiments went on till 1882. For unknown reasons the chief engineer suggested relocation of the supply wells towards the north, opposite the ruins of Metcalfe's House and removal of the reservoir from Idgah to Hindu Rao's House. Apparently the water supply was still deficient for it was argued that these measures would improve the situation. Also, miscalculated and growing construction costs forced the DMC to downscale the water supply project. Therefore, provisions made for the increasing population were not implemented. Instead of an average 16 gallons per day per head only 10 gallons was to be available. These measures, it was calculated, would reduce the daily demand by approximately 50 per cent. Concluding remarks stated 'the urgent necessity for calling in the aid of a more experienced Engineer who should be a practical Water-Works Engineer'⁸⁴ which the DMC agreed to.⁸⁵

⁸⁰ N.A.I. Government of India. Home Department Proceedings 1874. Sanitary Proceedings, November, Nos. 6 to 8. Delhi Water-supply Project. From Colonel R. Maclagan, Secretary to the Government of the Punjab, Public Works Department, to T.H. Thornton, Secretary to the Government of the Punjab, Civil Department. No. 1706, August 1873, No. 6, paras 2-5.

⁸¹ *Ibid.*, from A.C.C. DeRency, Sanitary Commissioner, Punjab, to T.H. Thornton, Secretary to the Government of the Punjab, paras 3-6.

⁸² *Ibid.*, from C.M. Rivaz, Secretary to the Government of the Punjab, to E.F. Harrison, Secretary to the Government of the Government of India, Financial Department, dated Lahore, 29 June 1874. Public financial aid could be granted according to the Local Public Works Loan Act of 1871.

⁸³ Delhi Archives. Records of Commissioners, Delhi Division. Commissioner's Office, Miscellaneous Correspondence. Water Supply to Delhi City. No. 206/1869-1882/11. From the Municipal Engineer Delhi to J.W. Smyth, Deputy Commissioner Delhi. Dated 15 March 1877.

⁸⁴ *Ibid.*, Note by the Chief Engineer on the Project for the Delhi Water-Supply, prepared by Mr Morley. C. Pollard, Major General, Chief Engineer, Punjab. Dated 2 February 1882.

⁸⁵ *Ibid.*, A subcommittee appointed by Resolution No. 1, 20 February 1882, to report on a letter from the Secretary to Government to the Punjab Public Works Department; Copy of resolution No. 2 passed at an ordinary meeting of the Municipal Committee held on the 24 April 1882.

Finally the water works were begun after loans had been granted. From the initial plans to the commencement of construction more than twenty years had elapsed. The additional wells and water works were built on the banks of the Jamuna close to Chandrawal village whose inhabitants had to be partly resettled. As finances remained insufficient, the whole project could be implemented only gradually. The wells were constructed in two lots, the 'old wells' in 1892, the 'new wells' in 1894. Regular pumping started in November 1892.⁸⁶ First, the walled city containing the cantonment was supplied with water from the new water works followed by the suburbs whilst the Civil Lines could still be supplied with adequate fresh water from the Ali Mardan canal. Many people had been looking forward to the 'modern' water supply system. Despite malicious statements from the military authorities that all Indians would draw water from the free public standposts, there were many applications for private pipe connections. On the other hand, the DMC had prohibited the *chamars* of Delhi to fetch water from public standposts in 1892. The resolution had to be rescinded by order of the Commissioner of Delhi who had collected information from other north Indian towns where such discrimination was not practised.⁸⁷

From the very beginning water supply was deficient. Instead of the daily 1.75 million additional gallons, as calculated in the estimate for construction, the newly constructed wells provided only 1 million gallon. For this reason the executive engineer of the Delhi Water Works refused to take over the system. The main reason for the deficiency was the 'clogging of the original filtering or percolating medium sand between the wells and the river bed, the silt being sucked in during the subsoil flow occasioned by pumping from these trench wells. This clogging, no doubt, was aggravated to a great extent by the fact of the wells being so close to the river bed from which the well supply is directly drawn.'⁸⁸ It was predicted that the present water supply would diminish further.⁸⁹ As a remedy it was suggested that the water be pumped directly from the river into the setting tanks and filter beds and from there with the same set of engines into the reservoir.

⁸⁶ Delhi Archives. Commissioner's Office, Delhi Division. Certain Papers in Connection with the Water-Supply, Delhi. W-2/1894/51. Delhi Water Works joint report on the causes of the reduction in yield of the trench wells by Messrs Parker and Goument, March 1896, para. 2.

⁸⁷ Gupta (1981: 160–61). After the cholera of 1871, the extramural *chamar* settlement was demolished and people resettled beyond the Ridge. The DMC thought the *chamar* settlement too filthy. However, British authorities regarded resettlement too drastic since the *chamars* were now cut off from their economic and social connections with the city. It seems as if the Indian DMC took the opportunity to get rid of the 'unclean' *chamars* so close to the city. From A.C.C. DeRency, Secretary Commissioner, Punjab, to the Secretary to Government, Punjab. 'Report on the Sanitary Condition of Delhi', 4 December 1873, para. 30.

⁸⁸ Certain Papers in Connection with the Water-Supply, Delhi. W-2/1894/51. Delhi Water Works joint report on the causes of the reduction in yield of the Trench wells by Messrs Parker and Goument, March 1896, paras 2–3.

⁸⁹ *Ibid.*, para. 4.

Still in the experimental stage, the results of pumping and filtering had to be systematically recorded.⁹⁰ In 1898 it became obvious that more than a million gallons of water per day was needed to serve Delhi's demand.⁹¹

Additional funds were granted by the Government of the Punjab to extend the water supply system.⁹² For financial reasons, however, the suburbs, particularly Sabzimandi and Paharganj, remained excluded from the extension programme.⁹³ Many parts of Delhi, therefore, had to suffer severe water shortage at the beginning of the twentieth century. Still worse, the extension of the Western Jamuna Canal had caused a lowering of the water table of the river with negative consequences for wells along the river banks. Moreover, several wells within and outside the city ran dry because of the falling ground water table.⁹⁴ Between 1900 and 1904 the consumption of water within the intramural city rose dramatically from 600,000 gallons per day to 1.9 million gallons within the intramural city. This was due to the rising individual water consumption of an increasing population, as also on account of undetected leakages in the pipe system and leaking standposts. To cope with the increasing demand it was suggested to construct an independent sewerage and drainage system which would be provided with unfiltered water.⁹⁵ Again, the suggestions never materialized. Intensive and extensive water consumption in new irrigation schemes in the agrarian hinterland of Delhi as well as the rising consumption of water within the city predated the present day scenarios of constant water shortage in Delhi.

Delhi's permanent water shortage did not prevent the British authorities from urging the DMC in 1913 to provide an additional 100,000 gallons per week for watering the King Edward Memorial Garden.⁹⁶ Despite the 'extraordinary' demand it had become obvious that the European experience of Crosthwait was by no means sufficient to build the water works in Delhi. This was partly caused by an inappropriate technology applied in a geologically unknown or unfamiliar environment. Also, British canal construction with its enormous and wasteful water consumption

⁹⁰ *Ibid.*, Memorandum regarding the Wells in connection with the Water-supply at Delhi by E.E. Olivier, Chief Engineer, Punjab, P.W.D., dated 3 November 1894.

⁹¹ *Ibid.*, Note on the Delhi Water Works by Colonel S.L. Jacob, Chief Engineer, Punjab, PWD, dated 16 April 1898.

⁹² *Ibid.*, copy of a letter No. 142/E dated 13 June 1898 from Secretary Municipal Committee Delhi to the Deputy Commissioner Delhi.

⁹³ *Ibid.*, from the Secretary Municipal Committee Delhi to the Deputy Commissioner Delhi. Delhi dated 22 June 1898. The Secretary of the DMC remarked that Sadar Bazaar, Sabzimandi and Paharganj were still not provided with water and that even smaller extensions of the walled city where wealthy inhabitants had asked for house connections could not be provided with that service because the supply of water was limited.

⁹⁴ Gupta (1981: 166).

⁹⁵ Delhi Archives. Commissioner's Office, Delhi Division. Inspection Note by Mr C.E. Goument, Sanitary Engineer, to Government, Punjab, on Delhi Water Works. Dated 25 October 1904, W-2/1894/51.

⁹⁶ *Ibid.*, from the Hon'ble Mr W.M. Hailey, Chief Commissioner, to the Deputy Commissioner, Delhi. Dated Delhi 28 July 1913. Darya Gunj Water Course 4/1911, No. 5792.

for agricultural purposes apparently reduced the amount of water available for urban consumption. This does not mean that the technology as such did not fit but that it would have needed some modification within the Indian environment and that different technologies of water carriage systems needed some ‘tuning’ or ‘fitting’. And, ultimately, it became clear that water supply was also dependent on a complementary efficient drainage and sewerage system if towns were not to drown in their own sullage.

Non-cooperation and Neglect: Delhi’s Sewerage System, 1852–1910

Basically, the sewerage system as proposed in the report of 1852 was planned in the 1880s by the PWD. Due to the tight municipal budget and the preference which had to be given to the water supply, construction works could begin only in 1893 after loans had been raised. However, the money was used for water works. This angered Delhi’s public who complained about the DMC bringing fresh water into the city but neglecting the removal of contaminated water.⁹⁷ The existing but completely neglected and partly rotten subsurface system of former Shahjahanabad was now abandoned in favour of an open drain system. Apart from the above described open drain system in Chandni Chauk, the rest of the city was drained through outlets into the ditch at Kashmiri Gate, Mori Gate, Lahori Gate and Ajmeri Gate, turning the ditch into the receptacle of the walled city.⁹⁸ The area along the ditch between Delhi Gate and Ajmeri Gate was soon to become the settlement area of the Balmiki community which is generally associated with scavenging and refuse collection in north and central India.⁹⁹

Large parts of the ditch in front of the wall were also used as urban dumping grounds which would not have been the case if the wall had been demolished and the ditch filled up. For the extramural Civil Lines the DMC constructed a separate sewerage system stressing that ‘no drainage from any native quarter of the city will be allowed to enter the Salimgarh channel.’¹⁰⁰ In Delhi, the *cordon sanitaire* of north Indian colonial town appendices was implemented by separating Indian and British sullage. This kind of separation was not possible in the colonial port cities as segregation was never complete. In Delhi, however, colonial politics of sanitation and segregation reached an absurd level when not only the water supply and sewerage systems of the Cantonment and the Civil Lines were given priority but when their sewerage was separated from that of the rest of the city. The European sanitation discourse developed paranoid forms in the colonial environment

⁹⁷ Prashad (2001: 121–22).

⁹⁸ *Report on the Sanitary Administration of the Punjab for 1868*, Section I: System of Sanitary Improvement best adopted to the Punjab. 2: Sewerage and Disposal of excreta, para. 52, p. 29. Annual Report on the Sanitary Administration of the Punjab for 1867. No. 470 of 1868. Delhi District, para. 80, pp. 16–17.

⁹⁹ Singh (1999). The Balmikis or Valmikis consist of several groups like the Bhangi, Mehtar, Lalbegi, Chura and other *jati*.

¹⁰⁰ Chief Commissioner’s Office, Delhi, F 610, vols I–II/August 1880, quoted in Gupta (1981: 162).

and particularly in Delhi. It seems as if Delhi was to suffer more and more from colonial sanitation and segregation politics.

Inspecting Delhi's open drains in 1887, a British official was shocked by their current condition because they were 'merely extended cesspools...containing semi-liquid black deposit.'¹⁰¹ When the Deputy Commissioner of Delhi urged the DMC to come to terms with the sewerage system, another loan of Rs 6,00,000 was taken from the Bank of Bengal. The money was not used for five years and the DMC was forced to reinvest the loan at a lower rate of interest. This reinforced the DMC's fears of using up public money to fund infrastructure projects. In 1899 the circular intercepting drain was eventually completed. This was through part of the 'public support' which Delhi received for the Delhi Coronation Darbar in 1902–03. However, the crucial subsoil sewer from Fatehpuri Masjid to Delhi Gate was completed only in 1909, after a period of 28 years.¹⁰² Labourers preferred to move to the Darbar site instead of working in Delhi because the DMC could not pay the same wages as the Government of India paid for the Delhi Darbar.¹⁰³

The Delhi Imperial Darbar of 1911–12 accelerated the acquisition of land near Sabzimandi for erecting a pumping station to discharge the sullage of the suburb which was located too close to the Darbar site and the camps of princely visitors.¹⁰⁴ Whereas the intramural sewerage system had been completed in time, its connection with the extramural suburbs was strongly recommended by British officials. Plans were proposed to connect the drains from Paharganj, Sabzimandi and the rapidly expanding Sadar Bazaar by an underground sewerage system with the Bela, the bank of the Jamuna between Salimgarh and Daryaganj.¹⁰⁵ This generated discussion on the future use of the area. Hitherto, the Bela had been used to discharge the Fort's sullage. The sewage was used by garden agriculturists to manure melons and vegetables. As the original drainage system of the Fort had become dilapidated, the military envisaged a complete reconstruction of the system. However, a report of 1909 pointed out that along with the new sewerage system of the Fort the Bela would need sufficient draining. According to a plan, most of the area was to be cleared of shrubs to give it a park-like appearance, and the north-western end close to Salimgarh was to be transformed into a sewage farm.¹⁰⁶ It took decades for the plan to materialize.

¹⁰¹ Delhi Municipal Commission Proceedings, 19 September 1887, quoted in Prashad (2001: 119).

¹⁰² Prashad (2001: 122).

¹⁰³ Gupta (1981: 166–67).

¹⁰⁴ Delhi Archives. Records of the Deputy Commissioner's Office, Delhi. Acquisition of land at Sabzimandi for a pumping station for the disposal of Sabzimandi sullage.

¹⁰⁵ *Ibid.*, Records of Commissioner, Delhi Division. Delhi Drainage Scheme. S2, Vol. II/1907, box 63.

¹⁰⁶ *Ibid.*, Commissioner's Office, Delhi Division. From the Hon'ble Mr A. Meredith, I.C.S., Commissioner, Delhi Division, to the Secretary of Government, Punjab, No. 74, Delhi, dated 4 February 1910. Bela Plantation. Insanitary Condition of the Delhi Fort and Surroundings. No. 610/1872/16, Vol. II.

Apart from the piecemeal implementation of 'modern' technology, it was certainly deficit funding which caused many of the drainage problems from which the municipality of 'Old Delhi' is still suffering. Non-cooperative administrative bodies on different levels paralysed or blockaded each other's work. Central and/or provincial government decisions and orders frustrated municipalities when plans were rejected for financial reasons. In 1879 the Madras Municipal Committee, for example, felt that the government was not willing to grant funds as stipulated under the Local Public Works Loan Act of 1871.¹⁰⁷ In fact, major projects like water supply and sewerage had to surmount barriers of administrative bureaucratic control. As has been shown above, the Punjab Government even cited technical problems to refuse the funding scheme for Delhi's water supply project. Yet, despite the liberalization of urban administration and growing financial and legislative competences of local municipalities after Governor General Lord Ripon's legislation of 1882, the latent problem of funding public expenditure never disappeared.

On the one hand these problems arose due to insufficient income which to a large extent came from octroi. In the Punjab about 90 per cent of the municipalities' income came from these revenues, which was a large amount in comparison with other provinces of British India.¹⁰⁸ On the other hand, the high police charges had to be paid from the municipal budget. Whereas some towns like Lahore had been exempted from these charges, Delhi had to pay for its police forces until the capital of British India was transferred in 1912. Budget figures demonstrate the fiscal burden of the DMC. Municipal income rose from Rs 1,93,000 in 1870–71 to Rs 2,67,000 in 1881–82.¹⁰⁹ After the reforms income rose continuously to Rs 6,60,000 in 1906–07 and Rs 7,33,000 in 1908–09.¹¹⁰ The maintenance of water works cost Rs 54,200 in 1906 and Rs 55,800 in 1909 representing 8.2 per cent and 7.5 per cent of the budget respectively. In the same years expenditure on drainage was Rs 3,700 (0.5 per cent) and Rs 13,400 (1.8 per cent). With roughly Rs 80,000 (13 per cent) in 1906 and Rs 1,09,000 (15 per cent) in 1909, conservancy

¹⁰⁷ N.A.I. Home Department, Municipal Branch (B) Proceedings January 1880, No. 15. From A.C. Tupp, Officiating Accountant-General, to the Acting Chief Secretary to Government, Fort St. George, dated 5th May 1879, No. 1825. Application Madras Municipality for 3,00,000 loan for water-works. Drainage System of the city of Madras.

¹⁰⁸ Tinker (1954: 74, Table 4, Principal Sources of Municipal Income: 1908). In Bombay the municipal income consisted of 47 per cent octroi and 34 per cent water and conservancy rates, in Bengal there were no octroi at all, municipal budgets mainly consisting of 39 per cent house tax and 28 per cent water and conservancy rates, whereas in the Panjab the latter charges amounted to ridiculous 2 per cent.

¹⁰⁹ *Gazetteer of the Delhi District 1883–4*. Punjab Government (n.d.), Table No. XLX, Municipal Income, p. xiv.

¹¹⁰ Delhi Archives. Delhi Drainage Scheme, S2, Vol. II/1907 box 63. From F.L. Brayne, Secretary Municipal Committee, Delhi, to The Deputy Commissioner, Delhi, dated 17 June 1909. No. 10 Appendix B: Past actual and future estimate income and expenditure of Delhi Municipality.

remained the budget's largest entry. Police charges rose slightly from Rs 69,400 (11 per cent) in 1906 to Rs 70,500 (9.8 per cent) in 1909, the second largest item of the DMC budget.¹¹¹

In spite of there being a house tax, a vehicle tax and a toll tax to raise money for sewerage and other projects at the beginning of the twentieth century, rather little money from public income was spent on 'modern' technologies. Water works were comparatively expensive whereas sewerage was neglected. Increasing taxes had only limited possibility for increasing public income as the poorer classes in town could not afford to make additional payments. Urban revolts had too often been the response to increase in taxes.¹¹² Generally, projects for improving water supply and sewerage had to be funded by government loans. Since the pressing problems of water supply, sewerage and conservancy made additional investments necessary, DMC funds were increased from Rs 5,06,000 in 1900 to Rs 1,152,000 in 1910.¹¹³ On the other side the maintenance of public order was almost as expensive as excreta removal, police and conservancy charges coming close to 25 per cent of the DMC budget. The latter numbers may also be taken as an indicator of the colonial regime's conservationist 'law and order' character. This becomes particularly true when we take a closer look at Delhi's conservancy system.

Underdevelopment: Public Latrines and Excreta Removal in Delhi, 1863–1912

Conservancy in British Indian (and Indian) towns remained part of the *mohalla* self-organization until the establishment of municipalities in British India. Conservancy was also the most labour intensive of municipal civic services. Thousands of sweepers cleaned Indian cities day and night. The same was also true for European cities. Well into the twentieth century, in Europe as well as in India conservancy remained an arduous manual job. Part of the municipal civic service was the construction and maintenance of public latrines. In India, however, public latrines were generally regarded as dangers to life 'and of a far more universal moment than those from which they are guarded by the suppression of crimes of fraud or violence.'¹¹⁴ Therefore, British officials started to experiment with the improvement of latrines in the cantonments. Latrines were to be set up at suitable places and were to be kept clean by scavengers whose duties had to be strictly regulated. After successful experiments in the cantonments, public conveniences were also to be erected in major towns. Sanitary officers had already experimented with the size of public latrines in Bombay in 1839, 1847 and again in 1855. A report recommended small-scale latrines with strict enforcement of the existing

¹¹¹ Ibid.

¹¹² Gupta (1981: *Delhi between Two Empires*, pp. 168–69).

¹¹³ *Gazetteer of the Delhi District 1883-4*, Supplement: Table 46. Supplement Delhi City Municipal Funds, p. cii. During the 1890s funds stood at an average Rs 4,50,000 (Ibid.: lv).

¹¹⁴ N.A.I. Home Department, Public Branch, Consultations 21 January 1859. From Major R. Strachey, Offg. Secretary to the Government of India, to C. Beadon, Secy. to the Govt of India. Public Works Department, Fort William, 18 December 1858, para 2.

regulations for the cleanliness of towns.¹¹⁵ This policy was successfully implemented in Agra where public latrines were erected in various parts of the city and in the cantonment which substantially improved the cleanliness levels of the place.¹¹⁶

Public latrines were rather unpopular among urban inhabitants, however, not for 'traditional values' but for construction deficits. Women refused to enter them if seats were enclosed because the closet was too narrow and often men dirtied the place. In contrast, the latrines of men had to be compartmentalized because they wanted privacy. Apart from construction deficits, the location of public latrines was also criticized. They were often located at the outskirts of urban settlements, far away from those people for whose use they were actually intended.¹¹⁷ In Delhi people complained not only about the distance of all public latrines from the bazaars and main roads, let alone from the *mohallas*, but also about their inadequate number within and outside the walled city.¹¹⁸ No wonder that many people still answered the call of nature in public spaces. To counteract such 'nuisance' the government pointed out that the success of all sanitation policies depended on the strict implementation of existing laws by municipal police forces.¹¹⁹ Rapidly increasing crime rates for north Indian cities indicate how rigidly the politics of public cleanliness could be executed.¹²⁰

Whereas the urban poor remained subject to continuous policing, British authorities considered introducing water closets for the 'civilized elite' Indian urbanites, particularly in the coastal colonial port cities.¹²¹ It was, however, doubted whether

¹¹⁵ Conybeare (1855: 28, paras 122–24, 30, para. 135).

¹¹⁶ N.A.I. Government of India. Home Department. Public Branch, Friday the 4 February 1859. Memorandum upon the Conservancy of the City, Suburbs, and Stations of Agra, by. Mr. M.R. Gubbins, Magistrate, pp. 181–87.

¹¹⁷ *Ibid.*, Home Department, Public Branch Consultation, 21 January 1859. From Major G.W. Williams, Supt., Cantonment Police, N.W. Provinces, to W. Muir, Secy. to Govt, N.W. Provinces, No. 38, dated Camp Dehra, 17th June 1858, paras 3–4.

¹¹⁸ From A.C.C. DeRency, Secretary Commissioner, Punjab, to the Secretary to Government, Punjab. 'Report on the Sanitary Condition of Delhi', 4 December 1873, para. 15.

¹¹⁹ N.A.I. Government of India. Home Department. Public Works Department, Fort William, 18 December 1858. Extract from the Proceedings of the Hon'ble the President of the Council of India in Council, para. 5. See also From Major R. Strachey, Offg. Secretary to the Govt. of India, to C. Beadon, Secy. to the Government of India, *Ibid.*, Home Department, Public Branch Consultation, 21 January 1859. Office Memorandum. Provision of Public necessaries in the vicinity of towns and necessity of amending the laws on the subject.

¹²⁰ *Ibid.*, Government of India. Home Department. Public Branch, Friday the 4 February 1859. Memorandum upon the Conservancy of the City, Suburbs, and Stations of Agra, by. Mr M.R. Gubbins, Magistrate, pp. 184–85. Gupta (1981: 79–80); Oldenburg (1984: 69–73, 108–11). 'Sanitary crimes' rose from 591 incidents in 1867 to 1,330 in 1871 and to 2,722 reported in 1876 which rather documents constabulary energy than an overall increase in such 'crimes'.

¹²¹ For Singapore, in contrast, a water carriage system was totally denied, after the municipal engineer John MacRitchie had visited Indian towns like Lakhnau, Agra and Delhi in 1893 when he had come to the conclusion that water closets were not favourably received by Indians whilst British authorities were generally afraid of Indians not able to understand the technology of water closets, see Yeoh (2003: 194–95).

Indians would be able to use this latest Western technology ‘properly’ with which even Europeans had become acquainted only recently. Particularly, the habit of Indians of using leaves for cleaning, which would congest the high pressure pipe system was regarded as the main obstacle to the introduction of water closets. For Delhi, the use of Western sanitary technology was proposed only in 1915, after the city had been announced the new capital of British India.¹²² Latrines, like many other European institutions or what the British regarded as original European institutions,¹²³ were also regarded as a means of a long-lasting British civilizing mission in India for ‘[i]t seems to be alike reasonable and politic to look rather to the gradual enlightenment of the people for an improvement in their social and domestic habits than to the authoritarian interference of Government’.¹²⁴ Regulating and controlling defecation and urination became one of the core issues of British urban sanitary politics in India.

It has been argued elsewhere that policing sweepers was also part of the colonial regime’s policy of control and surveillance.¹²⁵ However, control could not always be established as planned. In Bombay, the colonial government’s regulations of 1846, 1849 and 1852 compelling sweepers to work only at night, were in vain. Quite aware of their monopolistic position sweepers refused to follow these regulations.¹²⁶ In Delhi, the municipality’s attempt to organize conservancy was met by strikes of the town’s sweeper guild in 1876 and 1886. Ultimately, the DMC was urged to allow sweepers to retain their monopoly and not to enrol them as paid servants of the municipality.¹²⁷ The DMC’s plans to modernize excreta transportation by means of a light tramway took more than a decade to materialize. Within a couple of years the DMC abolished the tramway arguing that sweepers were cheaper and more reliable. Nevertheless the DMC continued to blame sweepers for the unhealthy state of the city’s streets and lanes. For this reason the DMC asked for the improvement of the sweeper organization instead of an overall reform of the conservancy system.¹²⁸

At the same time the DMC started an experimental ‘trenching farm’ at Khandrat Kalan south of Delhi (see Figure 2) for decomposing the excreta and refuse of Delhi’s southern wards. The place turned out to be unsuitable for the purpose as the water supply there was not sufficient for processing. A site near the Old Jail and the former trenching pits was then selected for the trenching farm. The authorities thought that the sewage outlet near Delhi Gate would provide the farm with

¹²² Prashad (2001: 124).

¹²³ It may be noted that the world’s first working water closet system was constructed in the cities of the mature Harappa Civilization (2300 to 1800 BC). However, excavations of the historical site took only place after 1921. Palmer (1977: 5). Wright (1960: 1–22).

¹²⁴ N.A.I. Home Department, Public Branch, Consultations 21 January 1859. From E. Currie, Member of the Legislative Council, to A.R. Young, Secretary to the Government of Bengal (dated 13 November 1858).

¹²⁵ Prashad (2001: 124).

¹²⁶ Conybeare (1855: 19–20, paras 84–88).

¹²⁷ Gupta (1981: 161).

¹²⁸ Prashad (2001: 126–27, 129).

enough water. However, the geology of the terrain and the abundance of water created serious problems for which reason the farm was abandoned and again established at Khandrat Kalan in 1898. Working gangs from the famine relief programme of the same year levelled the ground to make room for more trenching and, additionally, the area was provided with an extra watercourse.¹²⁹

As for the system of night soil removal, the DMC proved incapable of reform and improvement. In 1908 the conservancy system still functioned on the regulations set up in the 1860s. In addition to 350 carts of refuse, 700 kg of excreta had to be removed every day. However, it should be remembered that this was also true for many poor quarters within European towns. Here this 'traditional' mode of conservancy existed well into the second half of the twentieth century. British upper-class residents of Delhi were disgusted at the sight of swarms of flies on the line of carts 'out' and 'in', particularly when flies from the trenching grounds intermingled with flies from the carts carrying meat from the slaughter houses to the city's markets.¹³⁰ The hygiene and sanitation paranoia reached its peak in 1907, when the General Quarter Master of India thought it a dangerous practice to dispose of European soldiers' excreta from Daryaganj Cantonment in the municipal trenching grounds close to the Old Jail. He feared that flies breeding on Indian excrement would be transported into the Cantonment and contaminate European latrines—with horrible consequences. Therefore he recommended that a separate trenching ground be requisitioned.¹³¹ It was, however, not necessary to reorganize, let alone modernize, excrement transportation as the Daryaganj Cantonment was soon to be moved to the New Delhi Cantonment.

Conclusion

Even until 1928 excrement and refuse were dumped within the city, in the ditch, and in pits close to town. With New Delhi construction works coming to an end, British officials became seriously concerned about the state of sanitation so close to their imperial capital.¹³² When building New Delhi, planners could rebuild and reorganize the water supply, sewerage and conservancy systems of the whole urban area. It was therefore suggested in 1912 that a Town Improvement Trust be established for conceptualizing and planning the whole municipal area. The suggestion came to naught. Instead planners, architects and bureaucrats planned a completely

¹²⁹ Prashad (2001: 139–42).

¹³⁰ *Ibid.*: 128.

¹³¹ Delhi Archives. Records of the Deputy Commissioner's Office. Copy of a letter from the Quarter Master General in India to the General Officer Commanding, 7th (Meerut) Division, No. 2177/C dated 24 July 1907. Transfer of 30 acres of land in the Military Department for trenching purposes beyond Delhi Gate 57/1907. The same fears can be observed in Singapore where it was the night-soil coolie who carried germs from latrine to latrine. Conservancy carts were also regarded as dangerous pools of contamination and origins of diseases, see Yeoh (2003: 200–01).

¹³² *Public Health Report on the Delhi Province for the year 1928*, Calcutta, 1930, p. 3.

segregated city, reducing Delhi and its surrounding ancient monuments to a picturesque background.¹³³ When the new capital of British India was inaugurated in 1931, certain implications became obvious. First of all, municipal work now was concerned with the maintenance of New Delhi and not with the modernization of Old Delhi, as the walled city and adjacent suburbs were now called. Second, the most developed urban civic service, the municipal water supply system, was re-oriented to benefit New Delhi at the cost of the old city.¹³⁴ Third, plans for a new sewerage system covering the whole municipal area were turned down in favour of a modern waterborne sewerage system for New Delhi.¹³⁵

The functions and financial possibilities of the municipal committees in British India remained limited throughout the colonial period. In most cities, conservancy was one of the major items of the municipal budget. Whereas in Europe sanitation technology was used as a means of social control to get rid of rebellious city sweepers, in India policing the urban sweeper was seen as a means of civilizing the uncivilized. Established as a separate professional group, mostly paid by the municipality and disciplined by municipal regulations, dressed in uniforms and equipped with brooms, sweepers also became a symbol of backward India not fit for 'modern' technology.¹³⁶ Apart from conservancy and sewerage systems, even the heavily promoted public water supply remained an unsolved problem. Only eight out of eighty-seven towns in the United Provinces had water supply systems at the beginning of the twentieth century. The situation was worst in the Bombay Presidency where just ten out of 157 municipalities possessed a 'modern' water supply system.¹³⁷ Whereas in the 'Western world' cities became the symbol of 'progress' and 'modernity', in India—*pars pro toto* for 'the East'—cities stood for backwardness, stagnancy and incapability to proceed on the 'path of progress'.¹³⁸

In some sense, former Shahjahanabad was not only transformed into a distant *staffage* at outskirts of park-like New Delhi, but Delhi was also made 'old' through neglect and underdevelopment. Perhaps more than other cities in 'the East', Delhi became a metaphor for the Oriental 'Other'. Seen from a distance, Delhi was a picturesque Oriental town with domes, minarets and cupolas, the ruins of the Purana Qila and the tombs of Safdarjang and Humayun. To depict and document British succession to the great and ancient Indian realm, the British desperately needed Delhi and her historic environs. However, the closer one came, the more the city turned into a typical example of unhealthy Indian cities populated by unclean inhabitants, indicated by the 'misused' ditch, refuse and excreta on the roads and stagnant water in open drains in overcrowded wards. This Delhi was also needed, for it documented the necessity and importance of colonial rule as an instrument for civic enhancement. It was this particular colonial policy which caused

¹³³ Mann and Sehrawat (forthcoming).

¹³⁴ Gupta (1981: 220–21).

¹³⁵ Prashad (2001: 124).

¹³⁶ Masselos (1983: 101–39).

¹³⁷ Tinker (1954: 73).

¹³⁸ Mann (2004: 1–26).

the multiple problems from which Delhi's belly suffered from the beginning of the nineteenth century. Many of them are still prevalent and far from being solved.¹³⁹

During the nineteenth century, colonial municipal politics led to substantial changes in Delhi's environmental condition. Guided by a European sanitation and public health discourse, British and sometimes Indian administrators planned civic amenities, supply systems and city extensions to fulfil the expectations of a slowly but steadily growing urban population. As has been demonstrated, these changes comprised a wider range of environmental themes in respect of the overall improvement of living conditions within the city's quarters. Therefore, water supply, sewage and drainage, and refuse and excreta removal cannot simply be reduced to problems of health and sanitation but have to be viewed as issues of environmental importance which can considerably affect the overall situation of urban inhabitants. Water, for example, is not only a matter of health but a basic human necessity which has to be organized in one way or another—and satisfactorily. And excreta removal turns into a severe problem if existing systems of drainage and sewerage are neglected and, ultimately, replaced by an environmentally inappropriate technology, and when this European technology is used for demonstrating superiority over Indian civilization.

Finally, it has also been demonstrated that the environmental history of a city cannot be restricted to its limits. They are artificial demarcations set up by princely rulers or by bureaucrats. City limits are constantly shifting, extending or contracting as the patterns of land use within and outside a city are subjected to changes. For this reason, urban environmental history is interconnected with or part of a 'rurban' environment consisting of the city's core, the urban fringes and the surrounding environs including villages, fields, watercourses, barren lands and forests. Delhi's environmental history is a fine example of this interconnected, if not intermingled, history placing local urban water supply and excreta dumping in the context of changing local and regional irrigation schemes and water pollution. At the beginning of the nineteenth century, the environs of Delhi had probably a highly sensitive environmental-cum-ecological balance which changed substantially within a hundred years of colonial urban politics. The same politics aggravated the environmental problems of Delhi as the imperial and republican capital.

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¹³⁹ Köberlein (1998), Zérah (2005: 127–50).

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