
ROUTLEDGE STUDIES IN SOUTH ASIAN HISTORY
Environment and Pollution in Colonial India
Sewerage technologies along the sacred Ganges
Janine Wilhelm
ROUTLEDGE

Environment and Pollution in Colonial India

India is facing a river pollution crisis today. The origins of this crisis are commonly traced back to post-Independence economic development and urbanisation. This book, in contrast, shows that some important early roots of India's river pollution problem, and in particular the pollution of the Ganges, lie with British colonial policies on wastewater disposal during the late nineteenth and early twentieth centuries.

Analysing the two cornerstones of colonial river pollution history – the introduction of sewerage systems and the introduction of biological sewage treatment technologies in cities along the Ganges – the author examines different controversies around the proposed and actual discharge of untreated or treated sewage into the Ganges, which involved officials on different administrative levels as well as the Indian public. The analysis shows that the colonial state essentially ignored the problematic aspects of sewage disposal into rivers, which were clearly evident from European experience. Guided by colonial ideology and fiscal policy, colonial officials supported the introduction of the cheapest available sewerage technologies, which were technologies causing extensive pollution. Thus, policies on sewage disposal into the Ganges and other Indian rivers took on a definite shape around the turn of the twentieth century and acquired certain enduring features that were to exert great negative influence on the future development of river pollution in India.

A well-researched study on colonial river pollution history, this book presents an innovative contribution to South Asian environmental history. It is of interest to scholars working on colonial, South Asian and environmental history, and the colonial history of public health, science and technology.

Janine Wilhelm received her doctorate from Humboldt University Berlin in 2015. Her current research focuses on the environmental history of South Asia's rivers, the history of modern Yoga and Yoga philosophy.

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Abbreviations

APAC	British Library, Asia, Pacific and Africa Collections
ARDPH	Annual Report of the Director of Public Health
ARSC	Annual Report of the Sanitary Commissioner
BNR	Bengal Newspaper Reports
B.S.A.	Board of Scientific Advice
CGA	Central Ganga Authority
CPCB	Central Pollution Control Board
Dpt	Department
GAP	Ganga Action Plan
GPD	Ganga Project Directorate
GoBeng	Government of Bengal
GOI	Government of India
GoNWP	Government of the North-Western Provinces of Agra and Oudh
GoPun	Government of Punjab
GoUP	Government of the United Provinces of Agra and Oudh
I.A.C.	Indian Advisory Committee
IMS	Indian Medical Service
IOR	India Office Records
NAI	National Archives of India
NGRBA	National Ganga River Basin Authority
NWP	North-Western Provinces of Agra and Oudh
NWPNR	North-Western Provinces of Agra and Oudh Newspaper Reports
Prgs	Proceedings
Secy	Secretary
UP	United Provinces of Agra and Oudh
UPSA	Uttar Pradesh State Archives
UPSA(V)	Uttar Pradesh State Archives: Regional Archives, Varanasi

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Introduction

India is facing an acute river pollution crisis these days. Nearly all of the country's major rivers are burdened with immense amounts of municipal sewage, industrial effluents, solid waste and other harmful substances. Pollution, moreover, is spreading fast. According to a recent report by the Indian government's Central Pollution Control Board, the number of polluted rivers rose from 121 in 2009 to 275 in 2015, while the number of polluted river stretches more than doubled during the same period, increasing from 150 to 302.[1] A primary example for the extent of this crisis is the Ganges. Banaras, Kanpur and other riparian cities discharge over 2,600 million litres of sewage into the river daily. Most of this is raw sewage, since existing sewage treatment plants handle only a fraction of the total amount and are often inadequately operated. Additionally, tanneries, oil refineries, paper mills, pharmaceutical and other industries discharge 290 million litres of often highly toxic industrial wastes. Agricultural runoff (containing pesticide and fertiliser residues), solid waste, and waste generated in connection with religious worship count among the many other sources of pollution.[2] At the same time, the river's ability to regenerate itself steadily diminishes, as water levels keep dropping due to over-extraction and the construction of countless dams.[3] Consequently, the Ganges – officially declared as India's 'national river' by Prime Minister Manmohan Singh in 2008 – has turned into one of most polluted rivers in the world.

The slow death of India's rivers is part of the nation's much more extensive environmental crisis, a crisis that became clearly palpable after Independence and has reached alarming dimensions in the wake of economic liberalisation in 1991. Similar to other emerging nations, India suffers from massive deforestation, soil contamination, polluted and dwindling ground water resources, flood disasters, recurring bouts of smog and ever increasing amounts of garbage, to name just a number of problems. In recent decades, considerable political and public awareness has come to revolve around environmental degradation in India, both on the national and international levels, and has found expression through countless political debates, conferences, press reports and publications on the subject.[4] Early government initiatives towards environmental protection commenced during the 1970s following India's participation in the United Nations' Stockholm Conference in 1972. In the same year, the government

founded the National Committee on Environmental Planning and Coordination as the first national body to coordinate environmental policies and programmes, and to make environmental concerns part of economic development. In 1980, the Department of Environment, the predecessor of today's Ministry of Environment and Forests, was set up. Moreover, the 1970s and 1980s saw the passage of a great number of environmental laws, including the Wild Life (Protection) Act of 1972, the Water (Prevention and Control of Pollution) Act of 1974, the Forest (Conservation) Act of 1980, the Air (Prevention and Control of Pollution) Act of 1981, and the Environment (Protection) Act of 1986.[5] Government initiatives went hand in hand with a growing environmental awareness among the Indian public, initially stirred by the Chipko movement and other conflicts over forests and wildlife during the 1970s.[6] Nevertheless, environmental degradation continued apace since the implementation of environmental laws remained insufficient.

From the 1980s onwards, government initiatives increasingly focussed on the pollution of the Ganges. The Ganges is a river of outstanding importance, materially as much as spiritually. For one, it acts as a lifeline for Northern India. Running from the western Himalayas across the northern Indian plains towards the Bengal Delta, it is home to a rich diversity of vegetation and animal life and sustains a vast human population with water for drinking, irrigation, industries, and other purposes. The urban centres along the river banks alone today have a combined population of about 20 million people. At the same time, the Ganges is of immense religious and symbolic value to millions of Hindus, who use its water for many rituals and choose it as receptacle for their ashes after death. The many sects and belief systems within the Hindu tradition may differ widely from each other in many ways, but the superior religious and cultural significance of the Ganges is acknowledged by each.[7] The river's powerful symbolism is aptly conveyed in a passage written by the thoroughly secular Jawaharlal Nehru in his last will, ten years before his death in 1964. After expressing his wish to have part of his ashes strewn into the Ganges at Allahabad, Nehru remarked:

> The Ganga especially is the river of India, beloved of her people, round which are intertwined her racial memories, her hopes and fears, her songs of triumph, her victories and her defeats. She has been a symbol of India's age-long culture and civilization, ever-changing, ever-flowing, and yet ever the same Ganga. […] [T]he Ganga has been to me a symbol and a memory of the past of India, running into the present, and flowing on to the great ocean of the future.[8]

At the 1981 session of the Indian Science Congress in Varanasi, inaugurated by Nehru's daughter Indira Gandhi, scientists expressed their concern at the growing pollution of the Ganges. In response, the Prime Minister directed the Central Board for the Prevention and Control of Water Pollution to investigate the sources of pollution at different sites in collaboration with the State Pollution Control Boards of Uttar Pradesh, Bihar and Bengal, as well as the Centre for

Study of Man and Environment in Kolkata. The results of this first comprehensive survey were published in 1984, indicating the gross pollution of the river through municipal sewage, industrial effluents, corpses and carcasses, etc.[9] In 1985, government under its new Prime Minister Rajiv Gandhi drew up an ambitious and heavily funded plan to clean the river, the 'Ganga Action Plan' (GAP), which in 1993 was extended to the Ganges's tributaries. The GAP envisaged a reduction of pollution levels by at least 75 per cent, primarily through the construction of treatment plants for municipal sewage and industrial effluents, the erection of electric crematoria, the creation of low-cost sanitation facilities, and general river-front development.[10] From its early stages, the GAP was criticised by NGOs, the media and others for a variety of reasons, such as the plan's strongly bureaucratic and centralised approach, the corruption involved in its implementation, and its failure to take into account people's religious perspectives on the river, which tended to obscure the problem of environmental pollution and hinder the development of public environmental awareness. Overall, the GAP failed to change pollution levels to any meaningful extent, despite enormous financial investments.[11]

Following the GAP's failure to counteract pollution, the Indian government in 2009 established the National Ganga River Basin Authority (NGRBA) and initiated the 'Mission Clean Ganga', which is supported by the World Bank with one billion dollars. The NGRBA has committed itself to render the Ganges completely free from municipal sewage and industrial effluents by the year 2020. At the same time, it has expressed itself ready to adopt a more holistic approach to achieve this goal (e.g. by addressing the crucial importance of the minimum water flow), and to more actively involve NGO's and the public at large.[12] Most recently, the 'Mission Clean Ganga' has received a boost by India's new Prime Minister Narendra Modi, who on taking office in May 2014 declared the cleaning of the Ganges as one of his top priorities.[13]

Along with the Indian government's long-standing endeavours, there has been a surge of scholarly and popular writing on India's river pollution crisis. Since the initiation of the GAP in 1985, numerous scholars have investigated the environmental degradation of the Ganges and other rivers, and the various reasons responsible for it. Amongst others, they have critically analysed the government's river clean-up schemes, their perceived structural weaknesses, and the political, social and religious factors which keep undermining their success.[14] For Western observers, an important motive for investigation clearly is their bewilderment at how the Ganges and other rivers can simultaneously be worshipped as goddesses and subjected to the most appalling forms of environmental pollution.[15] Two of the most important scholarly studies are Kelly D. Alley's *On the Banks of the Ganga* (2002) and Lena Zühlke's *Verehrung und Verschmutzung des Ganges* (2013), which both offer in-depth analyses based on a wide range of source material, while keeping a particular focus on discourses around purity and pollution. David L. Haberman's *River of Love* (2006) presents an equally profound account of the environmental condition of the Yamuna, examining, among others, how the current pollution of this sacred river affects

religious practices of worship.[16] A number of popular works, such as Julian Crandall Hollick's *Ganga* (2007), Sarandha Jain's *In Search of Yamuna* (2011), and Cheryl Colopy's *Dirty, Sacred Rivers* (2012), also furnish rich insights into India's worsening river pollution crisis, combining travelogue and analysis in engaging ways.[17] Apart from these publications, countless press reports keep track of ongoing developments and help build and maintain public awareness.[18] However, with regional Hindi newspapers there is a strong tendency to emphasise the comparatively negligible amounts of pollution caused by religious worship rather than to name the major culprits, i.e. industrial and municipal waste. This uncritical approach owes itself to a variety of reasons, including the lack of scientific knowledge among journalists and the frequent linkages between newspaper owners and industrialists.[19]

Within recent scholarly and popular environmental discourse, the origins of India's river pollution crisis have been commonly traced back to the early decades of Independence. Most certainly, this period represents an environmental watershed. Under Jawaharlal Nehru, independent India embarked on an agenda of rapid economic development, with particular emphasis on industrialisation and large infrastructure projects.[20] Like many leaders of formerly colonised nations, Nehru looked towards economic growth as the means to remove poverty, and to 'develop' India along Western standards. This overwhelming preoccupation with productivity and production left little room for environmental concerns. Industrialisation, coupled with massive population growth and urbanisation, put unprecedented pressures on the environment by accelerating the overuse and pollution of natural resources. As a result, immense amounts of human, industrial and agricultural wastes got dumped into water bodies, and most of India's major streams turned into nothing short of sewers. In 1968, this situation came to light dramatically in Bihar, when a large stretch of the Ganges at Munger caught fire due to the excess discharge of oil wastes by the Barauni Oil Refinery.[21] At around the same time, investigations into the water quality of the Ganges at Banaras and Kanpur highlighted the severe pollution caused by municipal sewage and tannery effluents.[22]

However, in order to uncover the roots of independent India's river pollution crisis we have to look more deeply into the past. As this book is going to show, post-Independence developments built on a colonial legacy of river pollution that emerged from British policies on wastewater disposal during the late nineteenth and early twentieth centuries. Even though India as a whole was predominantly rural and not industrialised at the time,[23] sources of river pollution did very much exist, since several settlements along the Ganges had developed into major urban centres by the end of the nineteenth century. Banaras, an important Hindu pilgrimage site and home to a thriving textile industry for many centuries, counted around 200,000 inhabitants by 1890.[24] Allahabad, also a major Hindu pilgrimage site and the administrational seat of the North-Western Provinces, had a population of over 170,000 by 1901.[25] And Kanpur, still a small town of less than 60,000 in 1847, developed into a city of almost the same size like Banaras in less than four decades, as the British turned it into a major military

station and a centre for leather and textile industries.[26] The major metropolis, however, was Calcutta, the imperial capital until 1911 and the centrepiece of imperial commerce. At the beginning of the twentieth century, the city counted roughly 850,000 inhabitants and was home to dozens of jute mills and other factories situated within a small area along the river.[27]

Growing urban populations and expanding industries put increasing pressure on their environment. Additionally, the colonial government during the second half of the nineteenth century introduced the technology which today contributes the largest pollution load to the Ganges and other Indian rivers: municipal sewerage systems. Modern sewerage systems were first built in Great Britain in the 1840s as part of the British sanitary movement's agenda to reduce sickness and mortality rates by improving urban living conditions. The provision of clean water and the removal of all sorts of filth were viewed as paramount. Thus, sanitary reformers championed large networks of water-flushed underground sewers as the most convenient and efficient method to get rid of excreta, domestic and other wastes. However, by mixing these wastes with large amounts of water, they created a new problem: sewage. Against initial proposals to utilise sewage as a liquid fertiliser in agriculture, most British municipalities ended up discharging it into adjacent streams, and within a few years most of the nation's rivers had turned into open sewers. For many decades, river pollution and sewage disposal remained highly controversial subjects in Britain, occupying administrators and scientists alike, and causing numerous municipal and national inquiries.[28]

In British India, Bombay and Calcutta were the first to build sewerage systems in the 1860s, which primarily served the needs of European quarters. In Bombay, the sewage was conveyed directly into the sea; in Calcutta it was put into the Bidyahari river, a stream discharging into the Bay of Bengal after a short distance.[29] Elsewhere, excreta and other wastes were collected and transported to the countryside for trenching, much as they had been in Europe for centuries.[30] The advance of sewerage systems beyond the two great port cities started once the North-Western Provinces under Lieutenant-Governor Sir Auckland Colvin (1887–92) embarked upon an ambitious agenda of urban sanitary reform, declaring the introduction of water supplies and sewerage systems in their major cities a priority. Significantly, all these cities – Kanpur, Allahabad, Banaras, Lucknow and Agra – were situated on the banks of the Ganges or one of its main tributaries, which according to Auckland Colvin and other officials naturally offered themselves as sewage receptacles. The North-Western Provinces' earliest sewerage projects, devised for Banaras and Kanpur, therefore envisaged the disposal of untreated city sewage straight into the Ganges.

Sir Auckland Colvin's agenda sparked the first extensive Indian debates around river pollution.[31] Colonial officials found themselves confronted with the same questions British administrators had been facing for many decades: What impact did the discharge of untreated sewage have on river water quality? Did sewage-laden rivers present a potential health hazard for the many people who drank their water? What was the nature of the disease agents introduced by sewage? Could rivers purify themselves from sewage and disease agents?

Or was it necessary to treat sewage beforehand, and if yes, by what method? A similar dispute flared up with full force a few years later in Calcutta, when European jute factories along the Hooghly installed septic tank latrines for their workforce and discharged the resulting septic tank effluents straight into the river above and within city limits.[32] The heated controversy that ensued not only involved colonial officials but also the Indian public at large.

The debates colonial officials and members of the Indian public fought among each other drew strongly on British precedents. In India, however, one additional contentious issue was added: the question whether it was appropriate to discharge excreta-containing sewage, viewed by Hindus as a ritually highly impure substance, into a river worshipped as sacred, as the immanent form of the Hindu goddess Ganga.

While river worship has been a feature of Hindu tradition since the beginnings of the Indus valley civilization, it has become most pronounced in the case of the Ganges over time.[33] According to various scriptures, the Ganges is the immanent form of the goddess Ganga, who descended to Earth from heavenly realms. The Ramayana narrates that Ganga was called to Earth by a devotee named Bhagiratha to purify the remains of his ancestor King Sagara's 60,000 sons, who had been burnt to ashes by *ṛṣi* (sage) Kapila. Responding to Bhagiratha's prayers, Ganga fell on the matted locks of Shiva on a high peak in the Himalayas. From there she followed Bhagiratha through the North Indian plains, reached Kapila's hermitage near the Bay of Bengal where the ashes lay, and purified them by her touch. Then she flowed further and merged with the ocean.[34] Another principal account of Ganga's descent is contained in the Bhagavata and Vishnu Puranas. According to the Bhagavata Purana, Vishnu incarnated as a dwarf, Trivikrama, to free the world from the rule of the demon Bali. Trivikrama requested Bali to grant him a gift marked by three paces. When Bali agreed, Trivikrama grew to gigantic size. With the first step, he covered the entire Earth, with the second, he reached the heavens, and with the third, he pierced the roof of the universe, entering the heavenly realms where Ganga flowed. From that crevice, Ganga poured down to Earth.[35] On Earth, the Vishnu Purana states, she 'washed away the dirt, in the form of the sins of the whole of the world, by her touch, and yet, herself remained pure'.[36] Both these myths stress one major theme: the purificatory power of the goddess in her immanent form as a river, which absolves those who come into contact with her from sin. For living devotees therefore, to bathe in the Ganges and to use its water during various rituals is an essential part of their religious practice. For the dying, it is most desirable to be cremated along the Ganges's banks and have their ashes strewn into it, as the goddess purifies their souls and provides them with a smooth transition into their next life, or even guides them to liberation.[37]

The identification of the river Ganges with the goddess Ganga, and her intricate relation to notions of purity and pollution, decisively shape debates on the pollution of the river by sewage and other human-generated wastes. As British anthropologist Mary Douglas has observed, notions of dirt, pollution and uncleanness are cultural constructs, and the reason why certain things are

labelled as such is that they are perceived as 'matter out of place', i.e. matter standing outside of a culturally constructed order.[38] Scholars writing on the environmental pollution of the Ganges after Indian Independence highlight the major importance of cultural understandings of 'pollution' for people's perspectives on environmental pollution and the outcome of government clean-up programmes. Thus, the English term 'pollution', which carries a wholly secular meaning oriented along scientific standards of water quality, fails to reflect the cognitive and semantic differentiations made by Hindus to identify different forms of 'pollution'. Essentially, Hindus distinguish between two main forms of 'pollution': material uncleanness and dirtiness, for which they use the terms *gandagī* and *asvacchatā*, and sacred, or ritual, impurity, denoted by the terms *apavitratā* and *aśuddhatā*. In many ritual contexts, material cleanness/uncleanness and sacred purity/impurity are closely linked, and yet something that is considered as materially clean is not necessarily considered ritually clean.[39] On the background of this multi-layered understanding of 'pollution' and the Ganges's own ascribed purity and sacredness, the environmental pollution of the river opens a complex discursive field: What substances are considered polluting, and in what way? What happens when a polluting substance is put into the Ganges, both to the goddess Ganga – who is immanent in the Ganges – and the polluting substance itself? Sewage presents a specifically problematic case in this context as it contains human excreta, which Hindus generally consider as one of the most impure substances from a ritual point of view.[40]

Kelly D. Alley and Lena Zühlke, whose studies represent the most thorough analyses of post-Independence debates, both argue that religious notions of 'pollution' strongly counteract efforts aimed at environmental preservation.[41] Most Hindus translate the Ganges's spiritual power of purification to the material plane, holding that the goddess is also capable of doing away with material pollution, while her own sacred purity remains untouched by it. Another, similarly problematic, religious perspective is the increasing tendency to distinguish between the goddess and the river, from which follows that the goddess is not affected by material pollution. The case studies presented in this book unfurl a somewhat different picture for the colonial period, showing that religious perspectives around the turn of the twentieth century tended to reinforce movements to keep the Ganges free from sewage, rather than weaken them. However, there are also remarkable continuities. Government clean-up programmes until very recently have generally ignored the relevance of religious viewpoints, and this has been a major reason for their failure according to scholars and environmentalists. Religious perspectives, they contend, have to be positively harnessed and integrated into environmental programmes, since the majority of people will not accept or understand arguments that singularly build on a scientific worldview. As we will see, this official disregard for religious perspectives, characteristic of recent debates and government programmes, perpetuates a pattern that emerged in the course of colonial debates.

Despite many disagreements, colonial policies on sewage disposal into the Ganges and other Indian rivers took on a definite shape between 1890 and 1910,

and acquired certain enduring features that set the course for the future development of river pollution in India. Essentially, the problematic aspects around sewage disposal into rivers, so evident from European experience, were largely ignored in the colonial context. Due to a range of ideological and financial reasons, colonial officials supported the introduction of the cheapest available sewerage technologies, which were technologies causing extensive pollution. Efforts to adopt less polluting technologies and to operate them efficiently failed for the same reasons. By the early twentieth century, cities along the Ganges found themselves with insufficient, ill-maintained sewerage systems, and river pollution steadily worsened on the background of expanding urban populations and industries. At the eve of Independence, the colonial legacy of river pollution was thus clearly set out.

The following study analyses colonial river pollution policy and its major determining factors in detail. First, it demonstrates how the Indian government's prolonged resistance against germ theory and waterborne disease aetiologies caused colonial officials to deny the potential dangers involved in discharging untreated sewage into rivers.[42] Moreover, the majority of colonial officials believed that sewage disposal into Indian rivers had to be assessed fundamentally different from sewage disposal into British rivers. This attitude built on what I call the 'Indian paradigm', a concept that first emerged during early debates around an Indian river pollution law and came to be well established by the turn of the twentieth century. The 'Indian paradigm' was moored in a long-standing colonial ideology that categorised the Indian environment as 'tropical', and thus as inherently different from the 'temperate' environments of Europe.[43] Thus, advocates of sewage disposal into Indian rivers held that the harmful effects of sewage on river water quality were reduced by the specific, 'tropical' characteristics of the Indian environment, such as the rivers' large water volumes, the hot climate, and the intensity of sunlight. Even though the 'Indian paradigm' was controversial and disputed by many, it decisively influenced and directed colonial policies on sewage disposal into rivers for many decades.

Second, decisions about sewerage technology were strongly determined by colonial fiscal policies, which have been referred to as 'fiscal conservatism'.[44] Generally, the colonial state reserved the bulk of its revenues for the military, and to cover the ever raising home charges (providing, for example, for the pensions of British colonial officials) and the 'India debt'. To the state, urban planning and development were of little interest, unless a city held strategic and/or commercial importance, and was home to a significant number of Europeans. In the 1870s, the Government of India and the state governments transferred the financial responsibility for urban sanitary infrastructures to the municipalities, without however providing them with the means to raise adequate funds. In the North-Western Provinces and elsewhere, the main source of municipal income was the octroi tax,[45] which rendered municipal incomes sensitive to economic fluctuations and made it hard to budget for sanitary expenditure. The only way to finance expensive large-scale infrastructure projects such as waterworks and sewerage systems was to introduce new taxation and to raise loans or grants-in-aid

from the central and provincial governments. However, new taxation was prone to provoke violent protests from urban populations, while the central and provincial governments' willingness to issue loans and grants-in-aid as requested by municipalities varied.[46]

Under these circumstances, municipal governments were forced to choose the cheapest sewerage technology available. Initially, this meant the construction of waterborne sewerage systems without including purification facilities such as sewage farms, and to discharge untreated sewage into rivers below city limits. From the turn of the twentieth century, biological sewage treatment promised to offer a much cheaper and at the same time more viable alternative, enabling the purification of sewage at existing outfalls within city limits and thus obviating the need to build extensive sewer networks.[47] However, the implementation of biological treatment methods turned out to be more difficult than expected. In the North-Western Provinces, experiments with various methods failed completely, and neither the Government of India nor the provincial government were ready to defray the necessary funds for sewage treatment research and the training of a requisite staff of 'sewage specialists'. Subsequently, the province more keenly promoted sewage and sullage farms, of which some were effectively built. But these operations, too, were characterised by the lack of adequate funds and sufficient numbers of trained staff, with the consequence that farms were often ill-maintained and not capable to cope with increasing amounts of wastewater.

In Calcutta, fiscal conservatism was less of a determining factor. Here, the precipitous adoption of septic tanks by factories along the Hooghly during the early 1900s added another grave source of river pollution in the form of septic tank effluents. Driven by an ideology of 'modernisation' and 'progress',[48] and under the suasion of Calcutta's European industrial lobby, the Bengal government failed to efficiently control septic tank installations and implement measures to control river pollution. In both the provinces, the 'Indian paradigm' held a persistent influence over river pollution policy, justifying the continued discharge of untreated sewage and septic tank effluents.

The influential role played by Calcutta's European mill owners points to the fact that early colonial river pollution policy did not develop in a secluded administrative world, but was actively shaped by local political, social and economic contexts. This book therefore takes a closer look at the 'ground-level' of the city, assessing the extent to which local interest groups tried and were able to codetermine policy. Based on source availability, Banaras and Calcutta have been chosen as case studies. A major point of interest here is the role of Indian, and more specifically Hindu, citizens and administrators. How did Hindus react to the proposed discharge of sewage into the Ganges, a river viewed as the immanent form of the goddess Ganga on Earth and thus holding enormous spiritual significance in Hindu religion? Did they attempt to pressurise government into adopting a different course, e.g. to construct sewage farms? As the sources suggest, Hindu attitudes towards this issue were in no way homogenous, but the colonial government's dominant ideologies and policies were indeed repeatedly attacked

by Indian politicians, journalists and riparian residents. They considered the discharge of sewage into the Ganges (generally, or at certain locations) not only as a potential health hazard, but also as a tremendous religious sacrilege because of the great amounts of excreta contained in sewage. With this, they challenged government policy as such, and, more fundamentally, questioned the sole validity of scientific definitions of 'pollution' on which government policies built. In their perspective, Hindu notions of 'pollution' carried as much, if not more, importance. Overall however, British colonial officials refused to accept the validity of religious objections, and religious protest failed to exert any lasting influence.

Even though the roots of India's present struggle with river pollution can thus be traced back to colonial rule, it would be wrong to blame today's situation entirely on the colonial state. Independent India has perpetuated many of the structural problems responsible for river pollution during the colonial period, most importantly the lack of municipal administrational and financial autonomy.[49] This continuity of colonial policies is just one among many that affect India's environmental politics today and will be discussed in more detail at the end of the book.[50]

The colonial legacy of river pollution has only very recently begun to attract some attention from scholars. Meenakshi Sharma, for instance, has rightly claimed that colonial policies of modernisation and development present a major cause for the Ganges's environmental deterioration. However, she does not provide much further information to support this statement.[51] The first to treat the subject in more detail is Awadhendra Sharan, who includes some sections on early colonial river pollution debates revolving around the North-Western Provinces in his urban environmental history of Delhi.[52] Sharan concludes that with regard to wastewater disposal, the colonial government in the nineteenth and early twentieth centuries developed

> a fairly global conception of water bodies and their capacities to act as sinks, captured best in the notion of assimilative capacity – the ability of natural waters to absorb, dilute, and disperse wastes – that promoted a controlled use of receiving waters as part of waste treatment and disposal structures.

At the same time, he points out that this conception was marked by colonial difference, as the potential harm ensuing from such a practice was evaluated differently in England and India.[53] While agreeing with Sharan's major argument, this book presents a much more comprehensive analysis, tracing debates and policy-making through the central, provincial and municipal layers of the colonial administration, and analysing argumentative strategies in-depth. This approach not only reveals, for instance, the more specific argumentative strategy of the 'Indian paradigm' as against the general ideology of colonial difference, it also highlights colonial fiscal conservatism as a key factor in the continuous neglect of sewage treatment. Moreover, it shows how local interest groups, such as Hindu citizens and industrialist lobbies, actively influenced official policies, and thus points towards the important agency of the 'ground-level' of the city.

A second important study on India's colonial river pollution history is Pratik Chakrabarti's latest article on Calcutta, which investigates urban discourses around water purity and pollution after the introduction of municipal water supplies in the 1860s.[54] This presents a highly significant contribution to India's urban environmental history, and is the first to bring to light Calcutta's septic tank controversy. However, by keeping an exclusive focus on Calcutta, Chakrabarti does not situate this urban discourse within the larger context of colonial river pollution policy as it emerged from the late 1880s. Moreover, he is primarily concerned with Hindu and official viewpoints on river water 'purity' and 'pollution' and related conflicts, which, as this book is going to show, were just one among many factors to shape colonial river pollution policy.

Accordingly, this book offers the first extensive historical study on the evolution of colonial river pollution policy and its impact on the future of India's rivers. It clearly shows that individual debates around sewage disposal and river pollution in cities such as Calcutta and Banaras must not be treated as isolated discourses, but as components within an overarching process of policy formation.

The near absence of research on India's colonial river pollution history is part of one of the biggest lacunae within the historiography on South Asia's environmental history: the lack of studies on urban environments and, more specifically, pollution. Other than in the US and Europe, where urban environmental history is a well-established field of research today,[55] historians writing on environmental issues in South Asia still maintain a very strong rural bias, predominantly focussing on forestry, irrigation, land use and wild life.[56] The leading American environmental historian Joel A. Tarr lists five primary themes of urban environmental history: (i) the impacts of the built environment and human activities on the natural environment; (ii) society's response to these impacts and efforts to alleviate environmental problems; (iii) the impacts of the natural environment on the city; (iv) city-hinterland relationships; and (v) investigations of gender, class and race in regard to environmental issues.[57] Most of these issues have not or have hardly been touched upon in the context of Indian colonial cities. As per urban environmental pollution, the only monograph available till today is Awadhendra Sharan's urban environmental history of Delhi. Other than that, only a counted few articles exist that deal explicitly with the subject, including Michael Anderson's study on air pollution in Calcutta and Christine Furedy's work on wastewater disposal in the same city.[58] Moreover, Robert G. Varady in his article on land use and environmental change in the Banaras region during the nineteenth century includes a short paragraph on environmental pollution (particularly river pollution through religious practices) in Banaras city.[59] More recently, Michael Mann with his study on water supply and excreta removal in Delhi has highlighted the importance of situating colonial policies on urban sanitation within a larger environmental context, rightly pointing out that 'the history of urbanization in (British) India is constantly reduced or restricted to a history of sanitation'.[60] A similar concern has been expressed by John Broich in his study on the introduction of urban water supplies in colonial Bombay.[61] Other

important recent works include Pratik Chakrabarti's article on Calcutta, Amal Das' contribution on industrial pollution in the same city, and David Arnold's lucid investigation into the evolution of colonial discourses on pollution and toxicity in Calcutta and Bombay.[62] Thus, colonial urban environmental history has remained a largely untapped field, and existing studies moreover have mostly concentrated on the major Indian cities Calcutta, Bombay, and Delhi. In contrast, this book highlights the important role played by smaller cities such as Banaras and Kanpur in the formation of colonial river pollution and sewage disposal policies.[63]

The reasons for South Asian environmental history's continued neglect of urban environments are open to speculation. For one, it seems to mirror the colonial state's own priorities. The colonial administration clearly emphasised revenue-producing agriculture and forestry over urbanisation and industrialisation, which is why administrational records produced on the former are comparatively much more copious. Guided by source availability, historians have come to buttress the colonial perspective on India as a predominantly rural landscape.[64] Another important factor directing historians' attention to rural landscapes seems to be the implicit equation of 'environment' with 'nature'. Consequently, the city is excluded from the scope of environmental history, as it is categorised as man-made, as an expression of the 'cultural' in opposition to the 'natural'. This approach, however, is problematic for several reasons. As Michael Mann notes in his latest review essay (till date the only work containing a theoretical discussion on the issue in the context of South Asian environmental history) the differentiation between the 'natural' and the 'cultural' is arbitrary. There exists hardly any 'natural' environment that has not been shaped and transformed by human interaction some way or other. Even in remote areas such as deserts and mountains, peasants, pastoralists and nomads constantly leave their imprints on 'nature'. Moreover, 'nature' itself is dynamic, continually transformed by earthquakes, volcanic action and the like, and thus far from the static, pristine entity it is often taken to be. Thus, the 'natural' and the 'cultural', and the sharp differentiation between the two, are essentially ideological and/or social constructs.[65]

A look at US environmental history can serve to give us some inputs here. Similar to South Asian environmental history today, US environmental history was initially dominated by a strong rural perspective, put forward by leading scholars such as Donald Worster and Alfred Crosby. In a programmatic article, Worster maintained that environmental history was about 'the role and place of nature in human life'. Despite this broad definition, he explicitly excluded the city from the scope of the environmental historian by drawing a line between a 'natural' and a 'cultural' sphere, at the same time admitting the somewhat arbitrary nature of this distinction. Built environments, in his view, were man-made and 'wholly expressive of culture'. Environmental history instead should concentrate on natural, i.e. rural environments and human interactions with these.[66] Worster and others reiterated the 'agro-ecological' approach in the March 1990 issue of the *Journal of American History*, which contained a roundtable of articles aimed at demarcating the field.[67] A number of urban environmental