

Waste and Urban Environmental Crisis in Cochin: The Case of Brahmapuram Landfill

JUSTIN MATHEW

Department of History, Hansraj College, University of Delhi, Delhi.

Abstract

In urban context, solid waste management is not merely a question of bureaucratic efficiency but a deeply political issue, entangled in various forms of socio-environmental contradictions. In Cochin, a major port city and industrial urban space in Southwest India, the issue of urban waste circulation intersects with urban land commodification, industrialisation of leisure, water management, and urban planning. Government-led urban waste management programmes, especially the clean city initiatives, promote hygienic urban citizenship through intensive campaigns, moral appeals to reduce waste production, and educational efforts targeting waste collection and processing works. The existing studies on the issues of urban waste production and landfill focuses on the administrative spaces of the cities. This study analyses the politics of urban waste through the theoretical lens of environmental history and political ecology. By analysing the debates and movements related to the Brahmapuram landfill, the article argues that the 'green city' initiatives contributes to the elimination and dispossession of marginalised social groups – including peasants, fishers, and migrant workers - as well as the degradation of ecologically sensitive areas such as backwaters, rivers and marshlands. By adopting multi-scalar geographical frames of analysis, this paper argues that solid waste management is not limited to a city. The study carried out qualitative field visits to understand the complex spatialities of waste production and circulation in the context of Cochin. Informed by the concept of urban social metabolism concept, this paper argues that the production, circulation and the processing of waste constitutes a geographically extended urban process. This process, in turn, generates precarious environments for people located outside of visible boundaries of the city. The research underscores the need to frame urban waste production and circulation as a question of the right to the city and the right to sustain indigenous modes of life, which are increasingly getting toxified. In doing so, it challenges the commodification landforms as mere landfills spaces and proposes an alternative discourse on the issues of the right of everyone to access the city as non-commodified nature.



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CONTACT Justin Mathew ✉ justinmathew@hrc.du.ac.in 📍 Department of History, Hansraj College, University of Delhi, Delhi.



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Introduction

Polluted air and water are among the most pressing urban-environmental problems globally. These issues draw considerable attention from the municipal authorities and the regional governments, as the impact of dust, smoke, and contaminated water affects the majority of urban residents. At the same time, governmental authorities and experts often treat the solid waste produced by residential households and industrial production as problems of technical management and a city-level administrative issue. Primarily a byproduct of the massive urbanisation of energy resources—spanning food products, raw materials, petroleum for transportation and industrial production—solid waste production as a defining feature of urban experience receives considerably less attention, as most solid waste is transported to the urban periphery. Existing studies on Brahmapuram, based primarily on scientific analysis, examine various issues, including the air quality impacts of fire events,¹ effects on urban fresh water systems,² and the limitation of regionally managed state sustainable development programmes.³ Additionally, there are case studies exploring possible locally specific strategies to reclaim landfill sites for urban development.⁴ By framing the issue of solid waste as an issue of urban problem, dominant narratives on its production and circulation often overlook how waste shapes multiscale geographies of urbanisation. Drawing on theoretical insights from the political ecology of waste production and circulation, as well as the emerging field of urban-environmental history, this study examines the geographies of waste in the context of Cochin. It uses waste⁵ as a lens for understanding the contemporary urban-environmental problems, highlighting how socioenvironmental issues extend beyond the boundaries of the city.

The massive and everyday transfer of solid waste from the cities to its peripheral landscapes leads to the formation of massive landfills. Often portrayed as empty spaces, these landfill sites eliminate livelihood resources of social groups those who directly depend on nature for survival. Consequently, solid waste creation and its circulation become a social problem. While offering major investment opportunities for private capital, waste dumping sites create disparity in terms of health and hygiene as well as rural and urban experiences. The subregional transfer of solid

waste to keep the urban centres clean space for industries and commerce intersects with issues of race, caste and class as well as values of the lives of non-human animals and landforms. The landfill is a domain of social conflicts created by the politics of urban planning and governance.

Materials and Methods

By conceptualising waste as a medium for studying urban socio-environmental processes,^{6,7,8} this paper examines the processing the urban household and industrial waste in the context of the Brahmapuram landfill, a peripheral landfill site in Cochin. The objectives of the study include exploring the environmental history landfill formation through the memories and experiences of local inhabitants, documenting lived experiences of waste production and circulation, and analysing patterns of resistance and adaption among those directly affected by landfill formations. Additionally, the study seeks to contribute to the emerging field of urban-environmental history by examining how the process of waste production, circulation and disposal reshape urban spaces. By placing the case study of local inhabitants' resistance against the landfill as an environmental justice movement, this study argues that capitalistic urbanisation produces deeper socio-metabolic rifts, which are manifested spatially through the production of toxic landscapes. Adopting an interdisciplinary perspective, this study situates urban solid waste management within the broader framework of environmental justice. It integrates concepts and perspectives from the emerging sub-field of the political ecology of urban solid waste management⁹ and the urban-environmental history of pollution.¹⁰ The study also draws on the theoretical approach of 'metabolic rift'^{11,12} to analyse urbanisation as a process of socio-environmental transformation that produces geographies of difference.

Developing on perspectives from political ecology, critical urban history,¹³ and critical urban studies^{14,15} this study examines solid waste management in Brahmapuram as a multi-scalar socio-political process. The study employs an interdisciplinary approach, integrating concepts from environmental history and political ecology. The article discusses case studies, interviews and policy reports, newspaper articles and other secondary sources on the issues related the movements against landfill expansion in

Brahmapuram. It develops an urban environmental history perspective to analyse waste circulation and urbanisation in Kochi.

The study carried out qualitative field research to understand the complex geographies of waste production, circulation, and processing in an urban context. Drawing insights from oral-environmental histories,¹⁶ field visits provided historical depth to the analysis by examining how people recollect landscape transformations resulting from waste disposal. This methodological approach enabled an examination of how local inhabitants' memories of landfill formation are tied to their life experience, highlighting the significance of oral accounts in writing an environmental history of landfill development. Additionally, the study gained insights from policy papers on waste management, and newspaper reports, analysing how scientists, policy makers, and environmental activists perceive these narratives of lived experiences.

Results and Discussion

Landfills and Environmental Justice Movements

In March 2023, a massive fire at the Brahmapuram waste mountain led to hazardous smoke pollution in Cochin. This was the latest in a series of fires at the landfill, following major incidents in 2013, 2019, and 2020. State authorities struggled to control the fire for more than a week. Consequently, the issue became a major topic in the ongoing political debate in Kerala on the dynamics of capitalist development and environmental degradation. Over the past decade, innumerable struggles by people contributed significantly to shaping the public debates on the issue of capitalist development in Kerala. These socio-environmental justice movements have sought to protect fundamental resources such as water, biomass, energy and habitats, groundwater extraction for industries, mega infrastructure projects- including seaports and highways - dams, urban pollution, and coastal erosion. Unlike mainstream environmentalism, which often focuses on conservation, preservation and technological solutions, these movements frame environmental struggles through the lens of caste, gender, ethnicity, and the urban-rural divide, locating them as fundamental socio-environmental justice issues.

The issues related to the Brahmapuram landfill fire in Kerala transformed urban solid waste management into a political problem, with various interest groups trying to influence the process.¹⁷ Key stakeholders include the state government, municipal corporations, garbage contractors, workers engaged in waste collection and separation, engineers and technicians maintaining solid waste treatment plants, and the people who lost land and livelihood resources due to the hazardous expansion of landfills. The involvement of multiple actors and varied interests underscores the need to move beyond the current emphasis of considering the Brahmapuram landfill as a local problem specific to an urban area. Instead, understanding the problem requires examining the interplay of multi-scalar interests that shape the landfill as a hazardous landscape within global, national, regional, and local scalar configurations.

The establishment of landfills in Brahmapuram was closely linked to a strong current of anti-garbage movements in the city of Cochin in the 1990s and the early 2000s, a time when the disposal of household and industrial waste became a major concern for public health and sanitation. A pressure group composed of the city's urban middle and upper classes started demanding cleaner and greener urban spaces. The conflict surrounding waste disposal, however, was not free of the existing social contradictions based on caste, community and wealth. The social perception of waste is deeply intertwined with cultural notions of clean spaces. Consequently, the concept of purity connected to class, caste and ethnicity plays a crucial role in deciding where waste is disposed of.

The Brahmapuram landfill, described by experts as a legacy landfill, contains over 100,000 tonnes of waste spread across approximately 16 acres. Located near the Chitrapuzha and Kadambrayar rivers, the site is a critical source of fresh water for over six surrounding villages. In 1998, the Kochi Municipal Corporation acquired more than 37 acres to establish a solid waste treatment plant. They also obtained a permission from the Puthenkurishu Panchayath, the concerned local panchayat authority, to start a waste separation plant. However, the plan did not quickly materialise, primarily due to strong

opposition from residents. Most of the local inhabitants depended on agriculture and livestock for their livelihoods. Subsequently, the Kochi Municipal Corporation sent 27 tipper trucks, fully loaded with un-segregated waste escorted by police. On June 25, 2007, the trucks arrived in Chellipadam village, at Bhramapuram in Vadavukode-Puthenkurishu Panchayat. The local residents, determined to prevent the waste from being dumped, attempted to block the truck's entry. However, the state machinery with the help of the police could overpower the protests. As a result, the site, located 17 kilometres from Kochi, became an urban waste disposal ground. Environmentalists Suchitra M and Venugopal P. N. estimated that 53 families, with over 200 people, became refugees in their own villages overnight.¹⁸ These families were forced to abandon their homes and livelihoods due to the severe environmental impacts of the accumulating waste.

The dispossession of local inhabitants in the name of urbanisation has a long history in the context of Kochi. Started as a small Portuguese trading port in the early 1500 C.E., Kochi has evolved into one of the fastest-growing metropolitan cities in South Asia. The Portuguese, followed by the Dutch, established trade connections with southwest India, making Kochi an important spice export market. Later, in the nineteenth century, the British colonial authorities, especially the Government of Madras made Cochin their haven in southwest India. The urban space became a free trade zone surrounded by the monopoly trade spaces of the local princely states. In the 1920s, joint infrastructural enterprises of the colonial government of Madras, and the local princely states of Travancore and Cochin made the port of Cochin a deep water harbour with associated transport and industrial infrastructures. After Independence, the attempt of the Government of India to promote an import-substituting industrialisation model significantly transformed the urban landscape of Kochi. Over time, the city's economic foundation expanded to include chemical industries, agro-processing units, consumer goods industries as well as sectors like information technology, real estate, and tourism. Kochi now can be characterised a fast-growing, dynamic second-tier cities in the Indian subcontinent. The contemporary image of the city is shaped by its

several sleek high-rise apartments, shopping complexes, and tourist destinations. A remarkable inflow of capital investment by non-resident Malayali Indians contributes to the growth of the real estate and construction industries.

A century-long industrialisation and urbanisation process led to the emergence of a harsh reality of a rapid phase of socio-environmental transformations in Kochi. The majority of the Chemical industries were built on natural advantages offered by the sea and the backwaters. The construction of a new container shipping terminal, which involved massive reclamation of backwaters, elevated Kochi to the status of major oceanic entrepôt in the western Indian Ocean. The existence of a seaport heavily depends on the appropriation of natural resources, including the substantial consumption of freshwater. However, the expansion of shipping activities also contributes to water pollution, creating a significant environmental burden on the port and surrounding areas. The expansion of the port city as a space for container shipping attracted other forms of capital investments. In the early 2000s, a remarkable influx of approximately Rs. 25,000 crores in public and private investments significantly reshaped the city's economic landscape. These massive infrastructural projects included the large-scale expansion of the Cochin International Airport, the smart city project, the Cochin Metro, overbridges, highways, cross river and backwater bridges, backwater reclamation projects, a host of private tech parks, and numerous high-rise apartments and malls.

The expansion of urban spaces has turned solid waste generated by industrial and household activities into significant urban challenges. Waste has to be perceived as a by-product of a massive concentration of energy, resources, and people in densely concentrated spaces. The urban appropriation of energy relies heavily on a continuous influx of natural resources, while nature's metabolic process necessitates the recycling of waste to restore the nutrients in the soil. However, contemporary urban planning lacks sufficient infrastructure to direct the waste produced by urban consumption back to its source of origin. In the early 2000s, the city of Kochi produced more than 400 tons of waste daily, including hazardous biodegradable materials and plastic waste. Due to a shortage of sufficient

waste processing facilities, the city administration considered shifting the solid waste to the outskirts as a cost-effective solution to maintain a clean urban environment. However, the presence of the sea and backwaters makes it difficult to prevent water and soil contamination, especially during the monsoon season. Managing solid waste became a major problem for the corporation. Moving around the solid waste was the immediate solution identified by the municipal authority. For instance, in 1998, the Kochi Municipal Corporation had to give up its waste disposal site at Cheranellure Gram Panchayat due to opposition from the local residents. Consequently, the corporation authorities identified a waterfront area on Willingdon Island, home to the the Navy headquarters and the Cochin port, as a new dumping site. However, the Cochin Naval Authority withdrew its permission in November 2006. As a result, waste disposal remained a major issue in Kochi during the early 2000s.

The task of municipal waste collection and processing services struggled to keep pace with the remarkable increase of the urban population and the expansion of market activities. The population of Cochin increased from 633,553 in 2011 to an estimated population of 929,493 in 2021.¹⁹ This population surge resulted in a wider range of waste, particularly from processed foods and higher-end consumer goods consumed by urban middle and upper classes. As a result, a significant portion of residential and industrial wastes went uncollected. Residents of the newly built high-rise apartments encountered the issue of waste disposal issues due to limited spaces, leading many to dump waste in public areas. Canals, abandoned wells, and discarded railway tracks became common sites for urban waste disposal. In houses with compounds, people started burning solid waste due to the lack of proper disposal infrastructure. Urban solid waste included food waste from restaurants, slaughterhouse wastes, and bio-waste from hospitals. Burning plastics on the shores of backwaters and along roadsides became common practice in Kochi in the early 2000s. The insufficient facilities to collect and process waste across much of the city created new environmental and health hazards. Water-borne diseases began to spread as the urban poor were left with no choice but to consume contaminated water. In an attempt to reduce

waste accumulation, municipal authorities began sending waste to nearby states, particularly remote villages in Tamil Nadu and Karnataka. However, this practice was halted when the Tamil Nadu Police intercepted and returned trucks full of waste.

The issue of waste dumping became a major issue when the previous landfill sites and the option to transport it to nearby states stopped as possible options. Civil rights activists began drawing public and legal attention to the health hazards posed by improper waste disposal. In response to a Public Interest Litigation, a division bench of the Kerala High Court issued a directive in 2007, instructing the Cochin Corporation to deposit or store solid waste from the urban area at Brahmapuram and to establish a waste treatment plant there. Despite strong opposition from the local inhabitants, the government acquired additional land from the residents in Chellipadam to expand the dump yard area to 110 acres. Subsequently, in 2007-08, a treatment plant was set up under the Jawaharlal Nehru National Urban Renewal Mission project. Nevertheless, the treatment plant worked effectively only for a couple of years due to the excessive quantity of urban waste it had to handle. Subsequently, the plant stopped functioning in 2011 due to overload and a lack of proper maintenance facilities.

Since 2012, solid waste from nearby urban areas -- particularly the municipalities of Aluva, Thrikkakara, Angamaly, Tripunithura and Kalamassery, Cheranalloor and Vadavucode -Puthencruz panchayats – has also been redirected to Brahmapuram. This shift was in accordance with the central and state government regulations on municipal solid waste processing. Enforcement of these regulations was the responsibility of state-level Pollution Control Board. As a result, the plant began receiving 383 tonnes of waste daily. These regulations reemphasised the perception of waste as a threat to urban environmental quality. The solution proposed by urban elites - to shift solid waste to urban periphery – disproportionately affected the marginalised social sections. However, the growing waste crisis also contributed to the rise of a new environmental consciousness, one that emphasised the value of clean and green urban spaces as key to enhancing quality of life.

Waste Collection as Urban Citizenship Responsibility

The interventions made by the Kochi Municipal Corporation to develop logistics for waste circulation were equally a process of redefining the urban citizens' relationship with the city. This involved the privatisation of waste collection and management by outsourcing these responsibilities to private contractors. Additionally, civil society organisations encouraged community-based initiatives for local-level waste collection and processing. A key player in the effort was Kudumbashree, a women empowerment programme under the guidance of the Kerala State Poverty Education Mission, which was involved in collecting waste from households. However, these initiatives were limited to the waste collection process. The solid waste collected from households is transported to a dumping yard in Brahmapuram. The nature of solid waste circulation created an unequal urban environment in Cochin by simultaneously producing green spaces and a hazardous landscape. By the early 2010s, the amount of solid waste generated in the city had exceeded 325 tons per day, while less than 315 tons were being collected. With less than 2000 sanitary workers and 50 trucks, it was impossible to cover about 100 square kilometre area daily. The treatment plants in the early 2010s could process only 250 tons of waste per day. The combination of these limitations and the rapid phase of urbanisation made Brahmapuram a "solid waste mountain," accumulating nearly 100,000 tons of waste.

The uncontrollable process of waste generation and circulation led to a shift in urban sensibilities, promoting a new awareness among city dwellers about the intricate relationship between the city and the environment. The state bureaucracy, municipal authorities, and various citizens' collectives, including the residents' welfare association engaged in awareness campaigns to disseminate information about effective ways to collect and process waste. Urban solid waste entered a new political sphere when political parties began framing waste processing as an essential environmental service. Slogans such as 'clean city, free from garbage' became part of public discourse. However, these messages were socially manifested by making the sanitation workers and inhabitants of the urban poor neighbourhood responsible for keeping the city clean. This new environmental consciousness,

focused on keeping the city clean, reinforced power dynamics by stigmatising the urban poor, particularly those in marginalised neighbourhoods, as unhygienic and responsible for health issues. The campaign, which largely relied on women and children from lower-caste groups to manage waste, reveals how urban waste acquires cultural meaning in a larger social setting shaped by caste and gender-based social fabrics.

The Brahmapuram plant lacks sufficient mechanised devices for managing the dangerous activities of primary segregation. Workers engaged in waste processing encounter a severe lack of basic facilities, making it significant a workplace justice issue. Meanwhile, open dumping has led to health hazards, triggering widespread public protests. In response to pressure from activists and local residents, the National Green Tribunal noted in 2016 that the open dumping of urban waste at Brahmapuram was not legally permitted, as its authorisation was not valid after 2011. The National Green Tribunal also observed that the Kochi Municipal Corporation broke the Solid Waste management rules issued by the Ministry of Environment and Forests of the Government of India in 2000. It subsequently directed authorities to implement remedial measures to reactivate the waste processing facility. In 2018, the Tribunal imposed a heavy fine of one crore rupee on the Kochi Municipal Corporation for not implementing its order. In addition to this, the Government of Kerala's Pollution Control Board started legal action against Kochi's urban administration for not following the required safety measures and standards required for waste collection and processing. The state government further noted that the Corporation had violated the State Water Management Rules, 2016, as well as Section 24 of the Water (Prevention and Control of) Pollution Act, 1974. These interventions underscored waste as an issue of environmental crisis. However, the solutions proposed by the experts and the state authorities often leaned toward privatising solid waste management, raising concerns about long-term collective social responsibility to maintain the city as a space accessible to everyone.

The ruling elites promoted the privatisation of waste processing by highlighting the mismanagement of the existing waste management infrastructures. Brahmapuram also faced the issue of non-

biodegradable legacy waste spread over sixteen acres. To address this, the municipal administration proposed involving private contractors was the most efficient solution for managing non-biodegradable waste. However, the privatisation of waste management posed a serious threat to the livelihood needs of the people who accessed landfills for materials and energy sources. This included waste pickers and recyclers who made their livelihood out of the waste circulation process. The neoliberal ideologies of governance framed waste as a problem to be eliminated from the city. However, this perspective overlooked the broader role of waste circulation in regenerating social hierarchies and multi-scalar spatial inequalities produced by the circulation of hazardous urban solid waste. In 2013, the Government of Kerala appointed a Committee headed by R. V. G. Menon to explore advanced waste management technologies. Based on the Committee's recommendation, the Government of Kerala decided to initiate efforts to develop technologies to generate energy from waste at Brahmapuram. Ignoring oppositions from the environmental activists, the government entrusted G. J Eco Power, a private firm, with executing the project at an estimated cost of 295 crore rupees. However, in 2020, the Government cancelled the contract, citing the company's failure to achieve financial closure. The perception of waste as a resource for value generation was visible in the attempt by the state authorities to promote waste-to-energy projects. In this context, it is possible to assess how forms of social power especially the state-government agents, municipal corporations, local waste contractors, and resident communities participate in reshaping the circulation of waste. The attempt to project waste as a source of energy often obscures the diverse forms of socio-environmental hazards connected to waste dumping.

Conclusion

The hazardous effects of landfills are typically assessed through scientific methods, focusing on the measurement of chemical components and their impacts on human health and ecological equilibrium. However, a historically informed critical political ecology perspective shifts focus to the broader dynamics of waste production and the creation of landfills within the larger framework of the politics of environmental governance. The issue of waste

management crisis in Cochin highlights key issues related to political power, socio-environmental marginality, and urban inequality. The patterns of waste circulation assume the political nature of environmental degradation. The idea of waste as a resource benefits certain stakeholders, while the accelerated phase of urbanisation creates new urban waste frontiers. As a socio-environmental issue, waste management invites the attention of political ecologists and environmental historians to examine its link to the production of urban social fabrics that included the gentrification, real estate control, as well as the forceful accumulation of landscapes and livelihood resources.

The ongoing conflict between the people who are dispossessed in the process of urbanisation and the authoritarian approach of the municipal corporations – who transform landscapes of livelihoods into urban waste landfills- illustrates the nature of capitalist urbanisation, where both landscapes and people are valued primarily in market terms. The case of Cochin highlights how the production of commercial complexes and luxury apartment complexes is intrinsically linked to a process of creating urban peripheries and hazardous landfills. The struggles of those living in urban peripheries against the capitalistic strategies of accumulation by dispossession shaped historical trajectories of urbanisation. These struggles primarily revolved around the human right to access land, preserve living spaces, and safeguard access to nature as non-commodified resources – essential elements such as water, food, biomass, and sources of energy.

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The sole author was responsible for the conceptualization, methodology, data collection, analysis, writing, and final approval of the manuscript

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