

THE PEOPLE WHO BEAR THE CITY'S WASTE: DELHI AND PHNOM PENH

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Abstract : The world's remaining urbanisation growth will be in Asia and Africa, and in urban areas that are already struggling to cope with the waste produced by the urbanisation process. The goodness or badness of urban life in terms of wellbeing has less to do with the city per se, and much more to do with who pays the price for the waste that cities build. The article makes a comparison between the two cities which are at the two extremes points of the development trajectory of Asia, according to the understanding of United Nations Development Programme (UNDP) on environmental security, namely, Delhi and Phnom Penh. In Delhi, the regulation of waste is based on national waste management rules; in Phnom Penh it is done through city-wide contracts with private sector actors. It has been assumed that what is seen and heard in Delhi is as likely as what is written about Phnom Penh, hence these two collections of sources have been used. The capacities mismatch is present in both cities: lack of devolved processing and mismatch of capacities for devolved collection at Sangkats (better practices) and Ward level. Payment for collection services has been linked with the implementation of the moving waste fee from the electricity bill to app-based payment from 2020 in Phnom Penh, but narrow streets in urban poor settlements have not been accessible for collection trucks, causing the waste arrears to be significant. Much of the recovery that there is in both cities is accomplished by waste pickers, who are on low and precarious incomes and have no health or social protections. Environmental security is a diagnosis of that damage, but possibly a depoliticisation of damage, and introduces standing as the connecting thread to environmental justice and provides for conditional remedies: a public awareness, a graduated two-sided enforcement process, secure payout for waste workers, health insurance and digital tools with offline counterparts.

IndexTerms - environmental security, solid waste management, waste pickers, circular economy, environmental justice, Delhi, Phnom Penh

I. INTRODUCTION

More than half of humanity now lives in cities, and nearly all of the urban growth still to come will occur in Asia and Africa (United Nations Department of Economic and Social Affairs [UN DESA], 2019). The urban share of the world's population, 55 per cent in 2018, is projected to reach 68 per cent by 2050. The waste that accompanies this transition is growing faster still. Cities generate about 2.01 billion tonnes of municipal solid waste a year, a figure projected to reach 3.40 billion tonnes by 2050, and at least a third of it is not managed in an environmentally safe manner (Kaza et al., 2018). Waste grows with consumption as well as population, so it accelerates fastest in cities that are growing economically as well as demographically.

The urban transition is usually described in two contradictory registers. Cities are engines of opportunity, concentrating employment, education and services at a scale no other settlement form has achieved. They are also sites of ecological strain, where growth outpaces the institutions meant to manage it. Both descriptions are accurate, and the question of whether urban living is a boon or a bane cannot be settled for the city as a whole. It is distribution that is different. There are two residents who live in two different neighbourhoods, planned and unplanned, exposed to two different sides of the same neighbourhood in the air they breathe, the water they draw and the wastes that surround them. But the problem isn't to move to the cities – the problem is that cities were never meant to be destinations and the problem is that the balance is not done evenly.

This distribution is most obvious for solid waste. Waste is left where it is generated and the landfills are always situated near some communities that grow up where waste is generated. Thus, waste governance determines, neighbourhood-by-neighbourhood, who remains in the city with its waste. Yet comparative research on waste governance in Asia seldom pairs cities across development tiers, and scholarship on environmental security rarely descends to the municipal scale at which this risk is allocated. The article addresses both gaps through a comparison of Delhi and Phnom Penh.

The crux of the argument is that although there are two distinct approaches – rules based in Delhi and contract based in Phnom Penh – there is one common vulnerability: obligations are set without the means to fulfil. This obligation–capacity gap is not accomplished in uniform scale. It endangers those who live in peri-urban areas, in informal settlements, and on landfills, as well as the informal waste pickers who harvest a significant proportion of the material in both cities and for whom the experiences of living in cities and in precarious conditions differ. Three research questions have been used as the basis for the analysis. The first questions are: How does the two regimes translate into a capacity to collect, process and dispose waste and where is the gap between the two? The second is related to how this risk is being allocated among residents, settlements and workers and what the headline numbers (settlement coverage, for example) may be obscuring. The third one asks: What is the role of informal waste workers in each of the regimes and does the discourse of 'environmental security' reflect or obscure the risk of informal workers?

The article makes three contributions. Empirically, it compares Delhi under India's Solid Waste Management Rules, 2026 with Phnom Penh after the 2020 separation of its waste fee from the electricity bill and the 2021 restructuring of its collection contracts. Conceptually, it names the obligation–capacity gap as a structural feature shared by very different regimes. Theoretically, it proposes standing as the link between environmental security and environmental justice. The sections that follow review the literature and set out the framework, describe the research design and introduce the two cities. Three sections of findings examine the gap itself, the

distribution of risk and the position of informal labour. A discussion of security and dispossession precedes a section on remedies and a conclusion.

II. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

A. *Environmental Security Beyond the State*

Wolfers (1952) observed that “national security” was an ambiguous symbol, capable of meaning different things to different people. The ambiguity proved productive. The Human Development Report of 1994 relocated security from the territory of the state to the lives of people, identifying seven interlocking dimensions of human security, among them economic, health and environmental security (United Nations Development Programme [UNDP], 1994). Environmental security, in this sense, is freedom from chronic environmental threats to health, livelihood and the basic conditions of life, and not only from armed conflict. Brauch (2005) extended the concept toward hazards and vulnerability, and Dalby (2009) toward the everyday environmental changes produced by modern economies.

Two features of this tradition matter for the analysis. The first is that environmental harm is treated not as an unavoidable cost of growth but as a risk whose incidence depends on governance choices, and therefore as something distributed. The second is attention to chronic rather than spectacular harm. Nixon’s (2011) notion of slow violence, harm that is gradual, dispersed and largely invisible, describes well the leachate that seeps from a landfill into groundwater, the smoke of routine waste burning and the illnesses of children in settlements where waste accumulates. Such harms rarely register as emergencies, which is part of why they persist.

B. *The Securitisation Critique*

There are critics of the broadening of security. Buzan et al. (1998) demonstrated that when an issue is labelled a security problem, this might shift it out of routine discussion and into the area of emergency management and expertise. In effect, as Deudney (1990) has previously argued, there is a misreading of both the security and the environmental problems when they are framed as security issues: Security institutions and habits are not the appropriate tools for tackling environmental questions. Here it helps that the harms discussed below are those which befall the voices that aren’t heard. To frame those harms as a security issue would call for an administration rather than a challenge, leaving the frame that the discussion should undo out of reach. This tension is re-visited in the discussion of Section VII.

C. *Environmental Justice and Standing*

The concept of environmental justice scholarship offers a vocabulary for such politics. Schlosberg (2007) identifies three ‘dimensions’ to environmental justice including the distribution of environmental goods and harms, the recognition of who bears them, and their involvement in the decisions that allocate them. Fraser (2009) adds a prior question of framing: who counts as a subject of justice at all, and who is entitled to make claims within a given political space. The article draws these together in the concept of standing, meaning the recognised capacity of a person or group to make a claim about an environmental harm and to have that claim heard. Standing may be legal, as when residents can petition a court; contractual, as when a party can enforce a contract; or political, as when a group is recognised as a stakeholder. Those who lack it can be harmed without the harm being registered as a wrong.

D. *Informality and the Work of Waste*

In South and Southeast Asian cities, much of the work of waste is informal. Roy (2009) argues that informality is not the absence of planning but a mode of it, through which the state decides what is permitted and what is ignored. The argument fits both Delhi’s unauthorised colonies and Phnom Penh’s peri-urban settlements, which are governed by being left partly outside formal provision. Gidwani (2015) describes waste work in India as an infra-economy on which the formal city depends, and Medina (2007) documents the scale of scavenging and informal recycling across the Global South. In Delhi, Hayami et al. (2006) found waste picking to be dominated by poor migrants for whom it was an occupation of last resort. Demaria and Schindler (2016) show how waste-to-energy incineration in Delhi set the formal disposal system against informal recyclers’ access to materials. The right to the city (Harvey, 2008; Lefebvre, 1996) provides the broader register in which residents and workers claim a share in the city they help sustain.

E. *Circular Economy in the Urban South*

The circular economy has become a dominant frame for waste policy, although Kirchherr et al. (2017) show how loosely it is defined. Mandpe et al. (2023) set out its promise for Indian waste management, emphasising the value recoverable from organic and recyclable fractions. Much of this literature treats circularity as a future efficiency gain to be engineered. In both cities, there is already a circular system, but it is informal, practiced by waste pickers and small scale dealers who salvage materials that would otherwise be buried by the formal system in Delhi and Phnom Penh. The question is thus not just about how to make circularity, but also about whose terms are existing circularity recognised.

F. *The Framework: The Obligation–Capacity Gap*

The obligation–capacity gap is defined here as the difference between the duties a waste regime assigns and the capacity it provides at the tier that must discharge them. The framework follows a chain (Figure 1). Formal obligations are set by rules in Delhi and by contracts in Phnom Penh. Responsibility for collection is devolved to the ward or Sangkat, which lacks the capacity to process waste. This deficiency turns into risk through remixed wastes, insufficient collection and full landfills, and this risk lies in the peri-urban, unauthorised and landfill-adjacent areas. Standing will determine whether or not it can be disputed. Environmental security can tell you where the risk is, and environmental justice can tell you who might disagree, and at the point of distribution, the two converge.

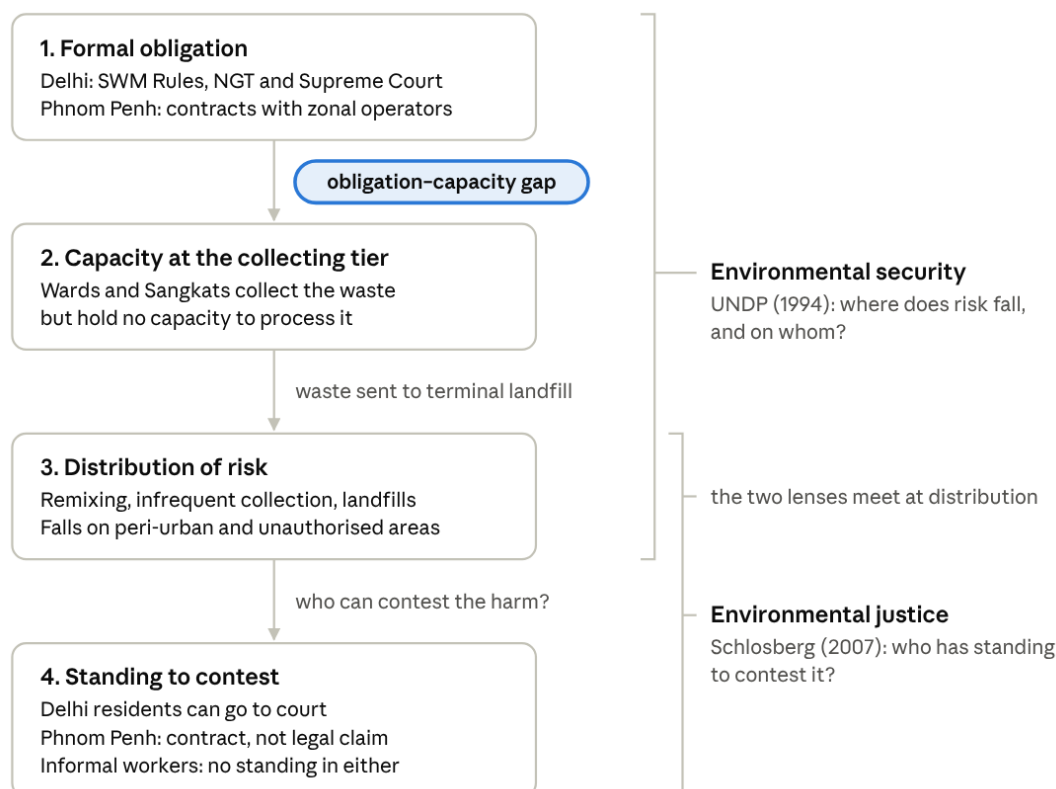


Figure 1: From obligation to standing: the obligation–capacity gap framework

Note. NGT = National Green Tribunal; SWM = solid waste management.

III. RESEARCH DESIGN AND METHODS

A. An Asymmetric Comparison

The study follows a most-different-systems logic (Przeworski & Teune, 1970; Seawright & Gerring, 2008). With respect to waste which could be important in terms of institution, Delhi and Phnom Penh differ in almost all aspects. Delhi is the capital of the largest economy in South Asia, and has a set of clear national rules for waste management, a special environmental court and an active higher judiciary that regulate waste. Phnom Penh is the capital of a LDC, which has a relatively weak statutory basis for waste governance and management, primarily based on contracts between the municipality and private distributors. If two regimes, as different as these, can lead to the same outcomes (repositories of a handful of landfills, disparities with informal labor and no protection for workers), then there is more at play here than simply a lack of development, or regulation. It's not an error that the asymmetry is there, it's a way of working.

The window of analysis is the timeframe 2015–2030, which is the Sustainable Development Goals (SDG). The targets covered in the evaluation are SDG 11.6 (Indicator 11.6.1 share of municipal solid waste collected and managed in controlled facilities), SDG 12.5 (Indicator 12.5 reduce waste through prevention, reduction, recycling and reuse) and SDG 8.8 (Protect labour rights and promote safe working environments for all workers, including migrant workers).

B. Evidence Base

The study is based on observation during the fieldwork in selected areas of Delhi, including the market areas of Sarojini Nagar and Lajpat Nagar and the areas near Hailey Road, Jama Masjid and Connaught Place, and during visits to the Municipal Corporation of Delhi (MCD) in the month of June 2026. Highlighted the collection chain (who & how); source-segregated waste kept segregated at transfer; frequency of supply of peripheral areas. These are compiled alongside the documentary sources like the Solid Waste Management Rules of 2016 and 2026, Supreme Court's observations during its proceedings, and observations made by various officials in their statements. Structured questionnaires were developed for the larger doctoral project and given to households, market vendors and municipal officials for interview. The findings of these interviews are not presented here.

The research relies on written data sources: peer-reviewed studies on Phnom Penh's collection coverage and detailed waste composition (Mongtoeun et al., 2023; Seng et al., 2011; Spoann et al., 2019), analysis of solid waste service policies based on the collection concession (Denney, 2016), and a 2024 civil society survey of solid waste services (CamboJA News, 2024), as well as municipal notifications and media reports on fees, contracts and landfill capacity.

C. Limits and Ethics

The two cities do not have equal weight in terms of providing evidence. Delhi is analysed directly as well as by the documents and Phnom Penh by documents only. It is important to emphasize that the data obtained from the Delhi observations are not rates, but patterns and hypotheses. Where appropriate, information is cross-tabulated across sources: for very recent data, the information is reported from the press, e.g., fee arrangements, for which academic literature is yet to reach. While these contribute to an evaluation of the SWM Rules, 2026, at the time of writing the Rules have been in effect for just a few months and therefore the analysis is more of a structural prediction. There were no interviews carried out as part of the field observation reported here and no individuals identified.

IV. SETTING: TWO CAPITALS, TWO REGIMES

The two cities seem to be located at extremes of some kind of a spectrum (Table 1). Delhi's operating waste regime is very much laced with law – there are national laws governing waste under the Environment (Protection) Act, the case is being heard before the National Green Tribunal, decades of Supreme Court litigation. Phnom Penh's regime is organised through contracts. From 2002 a single company, CINTRI, held a 49-year contract to collect waste in nine Khans (Denney, 2016). After years of complaints the government revoked that monopoly in October 2019, and from 1 July 2021 collection was divided among three zonal operators (CamboJA News, 2021).

Table 1: Comparative profile of Delhi and Phnom Penh

Dimension	Delhi	Phnom Penh
National status	Capital of India	Capital of Cambodia, scheduled to graduate from the Least Developed Country category on 19 December 2029
Municipal authority	Municipal Corporation of Delhi, reunified in May 2022	Phnom Penh Capital Administration, with provincial-equivalent status
Collection tier	12 zones and 250 wards	14 Khans and 105 Sangkats
Governance form	National rules (SWM Rules 2016, replaced by the SWM Rules 2026); National Green Tribunal and Supreme Court oversight	Municipal contracts: CINTRI single-provider contract from 2002; three zonal operators from July 2021
Daily waste	More than 11,000 tonnes generated against 8,073 tonnes of processing capacity	About 3,000 to 3,600 tonnes
Terminal disposal	Legacy landfills at Bhalswa, Ghazipur and Okhla; Bawana integrated facility	Dangkor landfill, in use since 2009 and close to saturation; new engineered landfill under construction
Household fee collection	Service obligations under national rules and local bye-laws	Billed with electricity until 2019; paid separately through apps and banks from 2020
Evidence in this study	Fieldwork (June 2026) and documents	Published studies, municipal notices and press reporting

Note. SWM = solid waste management.

Beneath this contrast lies a shared structure. Both cities devolve collection to a fine-grained tier: the ward in Delhi and the Sangkat in Phnom Penh, which holds its own legal personality and revenue. Neither devolves processing capacity to that tier. The unit closest to the waste is responsible for moving it but has no means of treating it, so almost everything travels outward to a terminal site. The collection chain is therefore only as strong as its final link, and in both cities that link is under strain.

V. THE OBLIGATION–CAPACITY GAP

Opposite institutional forms have produced the same gap between what each regime requires and what it can deliver. This section traces the gap through generation and processing capacity, dependence on terminal landfills and the two governance models, and then considers India's new rules.

A. Generation Against Capacity

Delhi generates more than 11,000 tonnes of municipal solid waste a day against processing capacity of about 8,073 tonnes, leaving close to 3,000 tonnes untreated each day. These figures were before the Supreme Court in July 2024, when the Court observed that, on the timelines offered by the MCD, adequate treatment facilities would not exist before 2027 (The Tribune, 2024). Phnom Penh's volumes are smaller but its processing capacity is far thinner. The city disposed of about 2,700 tonnes a day in 2019 (Phnom Penh Post, 2019a) and generated about 3,000 to 3,600 tonnes a day by 2024 and 2025 (Chhum & Meng, 2024; Egis, 2025), of which only about a fifth was recycled (Chhum & Meng, 2024). There is no significant waste processing facility in the city and almost all waste generated in the city is disposed of in landfill.

An increase of tonnage in Phnom Penh must be interpreted with caution. The growth after 2021 may be partly attributable to the fact that the whole collection is now available under the new contract, as generation only. If it does, it's a new foul on one landfill. When not designed as a chain it becomes a strain at one linkage point for some improvement at another.

B. Single-Point Dependency

Both cities have a few terminal sites which are where the risk accumulates. The untreated waste is dumped at Delhi's landfills, which have been overrun and out of design capacity since long time ago at Bhalswa, Ghazipur and Okhla. This behaviour is not a rare event and will likely occur again in these locations, because these sites have a high volume of mixed organic wastes decomposing and compacting in a remediation environment, and the resulting leachate will lead to a recurrence of fires. Delhi also has a waste to energy plant – Bawana integrated facility where waste to energy facility, composting system and engineered landfill are all combined. That takes place in 12 zones and 250 wards, but is limited to a few centralised plants.

Since 2009, when it replaced the former dumpsite, Stung Meanchey, Phnom Penh has been relying on the Dangkor landfill (Bryson, 2016). In 2025 Dangkor was called "almost full" and a new engineered sanitary landfill was built outside the city, with a capacity of almost 35 million cubic metres and a life span of ~25 years (Egis, 2025). The new location, which does not affect the model, will expand the waste disposal capacities. Compared to the daily production of about 3,600 tonnes (Egis, 2025), its processing investment of 100 tonnes a day composting plant is small. The location of the terminal site is the organisation of the system and its institutional focus around Delhi has not led to a different structure.

C. Rules Without Enforcement: Delhi

The government of Delhi is not lacking in regulations. According to SWM Rules, 2016, LBs have to perform segregation at source, door-to-door collection and scientific processing of garbage (Ministry of Environment, Forest and Climate Change [MoEFCC], 2016). The National Green Tribunal kept a watch on compliance, while Supreme Court of India supervised the management of waste in the case of *M.C. Mehta v. Union of India* which commenced in 1985. In July 2024, the Court labeled the situation of waste treatment in the capital as “a sorry state of affairs” which could result in a public health emergency (The Tribune, 2024). Court orders have continually been issued over the years to ensure basic compliance. There were rules but there wasn’t the ability to do them and enforce them.

D. Contracts Without Oversight: Phnom Penh

The government of Phnom Penh put the operational details into a contract, instead of legislation. Since 1997, household fees had remained flat under the CINTRI concession, and some communities under CINTRI did not have services at all (Denney, 2016). The restructuring in 2021, maintained three operators, where each operator is expected to provide about 1,000 tonnes of biomass per day to Dangkor for a period of 10 years (CamboJA News, 2021). These contracts track tonnage delivered in at the landfill. They give virtually no insight into the quality of their services, frequency in suburbs or conditions of workers.

In this model, the responsibility of accountability is from the operator to the municipality. No direct contact with the dwelling’s inhabitant or directly with the environment. For a home, failure of service does not require or lead to a legal claim, but to political pressure. In Delhi, on the other hand, residents and civil society is able to and does litigate. The distinction is a one of kind, not of degree: whether or not environmental protection can be enjoyed as a right by the residents.

E. The Solid Waste Management Rules, 2026

The SWM Rules, 2026, notified in January 2026 and in force from 1st April 2026, superseded the Rules, 2016 in India (Press Information Bureau [PIB], 2026). The new rules mandate segregation into 4 streams — wet, dry, sanitary waste, and special-care waste; extended producer responsibility; polluter pays principle with environmental compensation for violations; and on-site processing of wet waste by bulk generators, which are identified by either floor area or water consumption or daily waste beyond the thresholds. Most importantly, only non-recyclable, non-energy-recoverable and inert waste can be disposed of in landfills (PIB, 2026).

But once it is no longer possible to just throw away all wet waste, capacity to process no longer becomes a performance metric, but rather a requirement that must be met. The substantial quantity of organic fraction, currently landfilled in the city of Delhi is no longer only shortfall but violation of the suggested rules. The 2026 Rules are a more robust ruleset which addresses the serious deficiencies in the current rules, but the heavier performance comes with an implementation problem. There has been a question raised on the part of commentators about the ability of urban local bodies to run the enlarged compliance system without any significant additional staff, or administrative capacity and monitoring systems (Bose, 2026). Capacity cannot be changed through notification, rules can.

VI. HOW RISK IS DISTRIBUTED

The obligation–capacity gap does not fail evenly. This section follows it from the transfer point to the peripheral street and the household bill, and shows how the indicators used to track service conceal where it fails.

A. Transfer-Point Remixing in Delhi

The Delhi fieldwork offers an observation rather than a quantified finding. In the wards observed in June 2026, MCD vehicles and privately contracted vans collected waste from the same neighbourhoods. Several cases were observed where there was mixing at the time of transfer of waste collected from householders and shop owners who have segregated waste at the source, to the secondary collection markets of Sarojini Nagar and Lajpat Nagar.

If this occurs at any scale, household compliance is being nullified by the logistics downstream. The regulatory failure is then located not primarily with the citizen but in the chain between collection and disposal, and streams are remixed because there is nowhere for separated material to go. Establishing how often remixing occurs would require a dedicated study of transfer points; the observation is offered as a hypothesis that the quantitative record does not currently capture.

B. What Coverage Conceals

Headline coverage figures suggest near-universal service. A 2023 study of Phnom Penh found that 97.5 per cent of respondents used waste collection services, but also that service reached 95 per cent of households in the urban core against 80 per cent in the peri-urban belt (Mongtoeun et al., 2023). Earlier work found that collection in peri-urban communities occurred only once or twice a week, even where the operator claimed high coverage, and that 20 of 41 outer Sangkats had no households registered for collection at all (Spoann et al., 2019). In Delhi, peripheral wards and unauthorised colonies observed during fieldwork received markedly less frequent service than planned central zones, and ward-level frequency is not systematically published.

A coverage figure measures registration, that is, whether a household is on the list, and not frequency or reliability. A household served twice a week and one served daily are both counted as covered. Indicators reported against SDG 11.6.1 can therefore overstate service precisely where it is weakest. The consequence is material as well as administrative. Waste held for two or three days in tropical heat putrefies, and wet waste contaminates the dry fraction stored beside it, reducing what can be recovered. Irregular collection degrades the material, not only the service, and it does so in the settlements where recovery infrastructure is weakest.

C. Where the Truck Does Not Reach

For many of Phnom Penh’s poorest residents, the problem is not infrequent collection but none. A 2024 survey by the housing-rights organisation Sahmakum Teang Tnaut found that collection trucks could not enter the narrow streets of urban poor settlements in several Khans, including Chamkarmon, Meanchey, Russey Keo, Pur Senchey, Dangkor and Chbar Ampov (CamboJA News, 2024). About a quarter of respondents reported that there were not enough places to dispose of waste, which led to dumping in public

spaces. Some residents would collect their rubbish in settlements and take it to collection points or markets, and in some settlements, volunteers would collect rubbish using small carts but without any official backing – every day. The residents linked the waste produced to incidents of odour and children’s illnesses, such as colds, diarrhoea and fever (CamboJA News, 2024).

The heart of the argument which is distributed. Yes, it is contracted, rated and reported on an urban basis, but where the street gets a bit narrower is as far as it goes, and the street is narrower in the places where the poor people live. The hard hitters are the uncollected waste, and the hardest hit are those households which cannot deal with it – and it slowly eats into them, and their situation is little documented.

D. Paying for a Service That Does Not Arrive

Then there’s the fee system in Phnom Penh! The waste collection fee was collected until the end of 2019 on the electricity bill of Electricité du Cambodge. Although bundling added certainty to revenue, it also resulted in collection not being provided to households which they were still being charged for (Transparency International Cambodia, 2019b). The waste fee was added to the electricity bill as of 1 January 2020, when the Prime Minister announced to remove the fee from the electricity bill after the CINTRI’s licence cancellation in October 2019 (Phnom Penh Post, 2019b). From February 2020, residents were asked to pay separately, at \$1 a month for ordinary households, through electronic payment applications, with fines threatened for late payment (Cambodianess, 2020). Fees were later revised, and payment continued through mobile apps, banks and microfinance institutions using the household’s electricity customer number (Phnom Penh Post, 2022).

Separation restored a link between paying and being served, but payment fell short. In 2023 a municipal official reported that about \$1.3 million a month was collected against the \$1.8 million needed to pay the operators, leaving a monthly deficit of about \$500,000, and payment was described as voluntary (Nhoek, 2023). By 2024, unpaid waste collection bills owed by residents were reported to exceed \$40 million, and residents cited a lack of awareness of their obligation and of where to pay (Chhum & Meng, 2024). The civil-society survey found the converse problem as well: households billed for arrears accumulated since 2022 despite irregular or absent service (CamboJA News, 2024).

The two arrangements fail in opposite directions. Bundling with electricity secured payment but charged the unserved. App based payment is a great concept in the sense of “you pay for what you use” but for that to happen, people need to be aware and the means for payment needs to be via an app, and the car needs to come to them. None of these conditions are as low as in the settlements that the truck is unable to access. The result is a circular deficit: operators are underpaid, unprofitable areas are served least, and the households in those areas have the least reason and the fewest means to pay.

VII. INFORMAL CIRCULARITY, PAY AND STANDING

The actors doing the most to make these cities circular hold the least standing in the structures that govern them. This section examines who performs recovery, on what terms, and why formalisation alone will not improve those terms.

A. Who Does the Recovery

In both cities a substantial share of material recovery is performed by informal workers: kabadiwala networks and itinerant buyers in Delhi, and waste pickers who work the streets and the landfill in Phnom Penh. They are not municipal employees, not parties to the collection contracts, not counted in official diversion figures and not covered by occupational safety provisions. An estimate from around 2011 put the number of waste pickers in Phnom Penh at about 2,000, a figure likely to have grown since; street pickers are predominantly women and predominantly migrants from rural areas, many of whom work six to ten hours a day, seven days a week (Eitel, 2018). Between 1,000 and 1,500 people were reported working at the city’s landfill in 2014, among them children who had left school (Woodside, 2014). In Delhi, Hayami et al. (2006) found waste picking to be dominated by poor migrants for whom it was an occupation of last resort.

B. Pay, Health and Security

The earnings of waste pickers are low, irregular and unprotected. Pickers are paid not a wage but the price a dealer offers for what they recover, which depends on the material, on commodity prices and on the number of buyers. In 2014 pickers at the landfill were paid about \$0.35 a kilogram for tin and about \$3.20 for copper, and described their earnings as enough to survive on and no more (Woodside, 2014). After the closure of the Stung Meanchey dumpsite, and pickers switched to the Dangkor site, the government allowed only one recycling dealer to purchase from the Dangkor site, eliminating competition, thus reducing the incomes of the pickers (Bryson, 2016). Bryson (2016) also showed that some were offered fees similar to those of the workers in the garment industry, and flexibility as self-employed people was a priority. What an irony – not a comfort – there is a juxtaposition there because this money excludes the minimum wage, regular hours, and social security that someone would get with a formal factory job.

The work is risky, as well. Documented risks at the landfill are disease, injury from bulldozers and the close vicinity of the site to unexploded ordnance (Woodside, 2014), whilst on the street, abuse and insecurity occurs to street pickers (Eitel, 2018). With the exception of the recent national waste pickers scheme in India mentioned in Section IX, neither city has consistently distributed protective gear or health-care coverage or a safe means of accessing these materials that supply their livelihood. Their work is essential for the economy, but also unrecognised by the institutions.

C. The Economic Case for Circularity

The value of recognising this work is very much an economic one. The majority of waste streams comprise organic waste. Waste data from 2003 to 2017 shows that organics’ data in Phnom Penh city on average accounted for 57 per cent of the waste, according to Mongtoeun et al. (2023), which is in line with results obtained from Seng et al. (2011) that food waste made up 63.3 per cent of the domestic waste in Phnom Penh city. This fraction is the most neighbourhood friendly fraction to compost and the least effective manner in which a city can manage this fraction is find a single terminal site. Diverting it takes the biggest bulk out of landfill, and delays the expense of new disposal sites. An example is Petalinguyen where recovered materials are used again for manufacture – rather than paying for twice: at purchase and at burial. The products of composting and biogas can be sold, and processing generates

not only a cost, but also labour intensive, which gives rise to creating jobs at the low capital end of the urban economy (Mandpe et al., 2023).

D. The Formalisation Caution

Formalisation is the conventional policy approach. It assumes that recovery in the formal sector will improve the situation for those who do it and it just isn't so. Exclusion of present workforce through licensing thresholds alongside a concerted effort towards recovery that results in transfer of contracts to firms which displace workers are examples that can be cited. This tension is seen in Delhi where Demaria and Schindler (2016) report on contexts where waste-to-energy plants were competing for the same materials as the informal scavengers, which in the absence of a competing dealer leads to the diminishment of pickers' livelihoods in Dangkor, as described by Bryson (2016). This formalisation could evolve into an accumulation by dispossession as described by Harvey (2003).

There is a more limited outlook here. There needs to be follow the job through recognition, which is where waste workers can negotiate how waste work can be incorporated. Table 2 summarises the distribution of standing and exposure among the principal actors.

Table 2: Standing and exposure of actors in the waste chain

Actor	Role in the chain	Formal standing	Exposure to harm
Municipal authorities (MCD; Phnom Penh Capital Administration)	Hold the formal mandate	Full, but constrained by finance and enforcement capacity	Low
Private operators	Collect and transport under contract	Contractual, with obligations measured mainly in tonnage delivered	Low for firms; collection crews handle mixed waste without protection
Households	Segregate at source and pay fees	Delhi: statutory and judicial routes. Phnom Penh: political pressure only	Uneven: highest in peri-urban, unauthorised and unreached settlements
Waste pickers (kabadiwalas; street and landfill pickers)	Perform much of the actual material recovery	None in either city	Highest occupational exposure; low and volatile earnings

Note. MCD = Municipal Corporation of Delhi.

VIII. DISCUSSION: SECURITY OR DISPOSSESSION?

Environmental security has done real analytical work in this article. It has shown that the harms of urban waste are distributed by governance rather than by the city as such, and it has directed attention to chronic harms, such as the smell of uncollected waste, the smoke of burning and the illnesses of children, that do not register as emergencies. Yet the securitisation critique warns that the same language invites management, expertise and administration (Buzan et al., 1998; Deudney, 1990). The harms described here, concentrated on migrant and informal workers and on poor settlements with no standing to contest them, look less like a failure of management than a problem of dispossession, in which the costs of the city's consumption are displaced onto those least able to refuse them.

One resolution is a division of labour between the two lenses. Environmental security can serve as a diagnostic lens, showing where risk falls and on whom. Environmental justice can serve as a normative lens, asking who may contest that allocation and on what terms (Schlosberg, 2007). The hinge is a statement transformed into a claim – it's what's between them. The "people" – unidentifiable by Fraser – of unreachable streets and the waste pickers of Dangkor are misframed. They are impacted by decisions on waste and yet not part of the group of parties that can raise claims on waste.

This is highlighted in the comparison. Although the standing has made the voice of the people of Delhi audible in the proceedings in the Supreme Court, it has not yet created capacity. They are not transformed into rights-holders and, on their own, do not have a voice on the changes in the fees with the operators, who are Phnom Penh's inhabitants. But in isolation this is insufficient – it must be coupled with capacity at the waste collection point. Another register – suggested by the entitlement approach of Sen (1981) – is one in which deprivation may not be due to absolute scarcity but may be due to the loss of entitlements. The trash IS collected somewhere; those who do not get the collection and those who do not get the value they extract are some of the residents and workers.

The impact is far reaching and over the SDG period. Reward is given for step one and two (collection and controlled disposal) - frequency is not a measure of success/failure, nor are conditions of workers. The scheduled graduation from Least Developed Country by December 2029 (UN DESA, 2024) coincides with the development of the waste regime in Phnom Penh that will be a test for the design of waste regime in the country.

IX. TOWARD REMEDIES: AWARENESS, ENFORCEMENT, DECENT WORK AND DIGITAL INCENTIVES

A four-fold description indicates solutions. Each is helpful, but each has a precondition which is called into question by the obligation capacity gap; these are also presented sequentially with conditions and summarised in Table 3.

A. Public Awareness

The underlying basis of segregation and payment is to make people aware of the situation. In Phnom Penh, residents' lack of awareness of the need to pay, and where to pay was cited as one of the factors to the city's arrears (Chhum & Meng, 2024), with the environment department of the municipality increasing awareness through door-to-door awareness sessions in markets and neighbourhoods (Phnom Penh Post, 2019a). When doing campaigns, it's important to talk about issues that can be addressed, collection timetable, where and how to pay and how to complain when it doesn't happen. The four-Stream segregation is one of the first conditions to be fulfilled under the Rules of 2021 for Delhi which are to be enforced in 2026.

A certain level of awareness but not a great deal. Families who have sorted well and see their waste being sorted for re-use at the transfer station, or those whose block doesn't get the truck service, don't see the point in sorting their waste. Therefore, awareness must come on the heels of reliable service; it must not be a service substitute.

B. Governance and Graduated Penalties

There's a time and place for harsh punishment. According to the sub-decree from the year 2015 in Cambodia, the non-authorized dumping of waste during designated time and location can get him/her a fine ranging from 20,000 riel to 400,000 riel, which is equivalent to \$5–\$100 (Phnom Penh Post, 2019a; Royal Government of Cambodia, 2015). The Rules of 2026 in India have introduced environmental compensation, based on the Polluter Pays principle and paved the way for non-binding duties to households, institutions, bulk generators and producers. Penalties give a clear indication that responsibilities are a reality and can make up for the costs of non-compliance by big generators.

Penalties are valid only if the obligation is reasonably practicable. The fine for dumping imposed on a household whose street the truck does not enter is a fine on the unserved because of the failure to serve. Enforcement should thus be progressive and reciprocal. Those non-segregating and dumping should be penalized, both households and bulk generators, where regular service is provided; and operators should be penalized for missed collections, remixing segregated waste and for not servicing areas, while municipal bodies should be held to published service standards. In Phnom Penh, this involves contracts that track frequency and reach, in addition to tonnage delivered to the landfill. In Delhi it involves monitoring at Transfer point and in the household.

C. Wages, Security and Health for Waste Workers

Waste pickers require stable employment, health care and acknowledgment. Partially there are some precedents in India. In June 2024 the national NAMASTE scheme was extended to waste pickers, providing occupational identity cards, protective equipment, safety training, capital subsidies for collection vehicles and health cover under Ayushman Bharat (PM-JAY); by September 2025 about 42,000 waste pickers had been validated against a target of 250,000 (PIB, 2025). The SWaCH cooperative, an outgrowth of the waste pickers' union Kagad Kach Patra Kashtakari Panchayat, had been working on door-to-door collection since they conducted a pilot project with the municipal corporation in 2005. It's funded by user fees collected from households and has a card of identity and insurance cover endorsed by the municipality (SWaCH, n.d.). This type of cooperative combines recognition and standing – workers stand up together and negotiate as an organised party (Gutberlet, 2016).

In the case of Phnom Penh, this would involve setting-up a register of waste pickers and issuing them ID cards; ensuring that they are able to access recyclable materials at the transfer stations and at the new landfill; enabling competition between waste buyers; paying community waste collectors from the revenues generated from waste fees, where trucks cannot access; providing protective gear to all pickers, and periodic health checks, and extending health protection to informal waste workers. The challenge is to expand the NAMASTE model in Delhi and to bring Delhi's waste-pickers in the systems that the Rules 2026 mandate. The challenge here is the scaling of the implementation of NAMASTE and the need for Delhi's waste pickers to be written into the systems in which they need to be written, as per Rules 2026. These measures are a direct contribution towards SDG 8.8 and are the means of standing the recognition.

D. Apps and Rewards

Digital solutions can help to some extent to close the divide between the paying and served. A digital platform launched in Battambang in 2023 enabled residents to access collection schedules and bills and monitor the truck's GPS location, which increased residents' satisfaction and rate of payment and boosted revenue significantly (Asian Development Bank [ADB], 2025). The operators of Phnom Penh have been considering a similar application that monitors collection, reviews bills and settles fees (Phnom Penh Post, 2021). Rewards can also be used to incentivize segregation and recycling, e.g. in Singapore, earning points for smart recycling boxes is rewarded with access to shopping vouchers (ADB, 2025). Application that provides a readable overview of a household when the truck arrives, and it keeps track of missed pickups and rewards segregated and recyclable waste, will restore payment and standing a tiny dose of visibility – and a grievance path.

Limits as with awareness. The families that the truck can't reach are likely to be some of those that have among the lowest rates of smartphone ownership and digital payment. This means that there is a need for offline counterparts to the apps, including a number of paid community collectors who coordinate the collection of the narrow streets, and payment at the Sangkat (ward office) and community collection points for streets that trucks can't reach. But the data of the apps published at ward and Sangkat level would allow for frequency or reach to be monitored, in addition to registering.

Table 3: Remedies and the conditions under which they work

Problem	Remedy	Precondition	Evidence or example
Low fee payment and weak segregation	Awareness campaigns on segregation, schedules, payment channels and complaints	Regular, visible service; no remixing downstream	Arrears above \$40 million and low awareness in Phnom Penh (Chhum & Meng, 2024)
Illegal dumping and non-compliance	Graduated, two-sided penalties for households, bulk generators and operators	Service actually available to those fined; contracts that monitor frequency and reach	Fines of 20,000–400,000 riel in Cambodia (Phnom Penh Post, 2019a); environmental compensation under India's 2026 Rules (PIB, 2026)
Low, volatile pay and hazardous work	Registration, identity cards, access to materials, fair prices, protective equipment and health cover	Recognition with standing, ideally through workers' cooperatives	NAMASTE extension to waste pickers (PIB, 2025); SWaCH, Pune (SWaCH, n.d.)
Payment detached from service; unreached streets	Apps with schedules, truck tracking, complaints, e-payment and rewards	Offline alternatives and paid community collection for households without digital access	Battambang platform; Singapore reward-based recycling (ADB, 2025)

X. CONCLUSION

There are 4 claims that come from the comparison. Firstly, there are laws in Delhi that were not effectively enforced and there are contracts in Phnom Penh that were not effectively monitored. These are opposite institutional forms that result in a similar imbalance in capacity, because for either there is no processing capacity at the collection location of waste. Second, India's Rules 2026 need the processing power as a legal precondition for compliance, but capacity simply cannot be banned with a notification. Thirdly, the gap is spread: through mixing at transfer points; through being masked by the coverage figure, which slums are unable to get to; through the inability of the vehicles to get into the poor areas of the city and, in Phnom Penh, through a fee system where at times the passenger had to cover the fare leaving nothing for the vehicle operator. Fourth, the circular development of converting waste into assets is already in place, outside the grasp of waste pickers, on low and volatile incomes and without health safety, and is not part of either governance forum.

But there are solutions, and some are already being put in place in the region, including awareness campaigns, graduated penalties, registration of those collecting the waste and health cover, cooperatives financed by user fees and smart technologies enabling users to see what they are paying for. Those that are applied to households and workers that are not served by the system, will not work. All are required to follow rather than lead good quality service at the ward and Sangkat level.

There are three further lines of research which follow: If transfer points were evaluated, frequency of mixing the segregated waste would be known. However, what the data on collections hides could be assessed by a household survey on collection frequency, not registration. Primary research (with waste pickers and residents of unreached settlements) would be conducted in Phnom Penh to supply evidence to diversify and allow the new landfill and fee system to be evaluated as it expands.

By itself, urban life is neither good nor bad. Depending on the perspective of specific residents, it becomes one or the other as soon as a city's growth is not managed for the purpose of ensuring environmental rights for all, but is allowed to grow as a risk to be dealt with by the least able – and that is the council.

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