



The Bantargebang Landslide and the Invisible Crisis: Who Bears the Cost of the Urban Waste System?

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Abstract

Urban waste management is often presented as a technical challenge involving collection, transportation, treatment, and disposal. Yet the environmental risks generated by urban waste systems are distributed unevenly across social and geographic spaces. This article examines the Bantargebang landfill as a case through which to understand the hidden social and ecological costs of metropolitan waste management. Recurrent landslides and other hazards associated with landfill operations reveal the vulnerability of waste pickers and residents living around disposal sites, while the consumption patterns generating enormous volumes of waste are largely concentrated elsewhere. The article explores this spatial separation between waste production and waste exposure and asks who ultimately bears the risks associated with urban consumption. Particular attention is given to waste pickers, surrounding communities, environmental health, and the unequal distribution of infrastructure and environmental protection. Using environmental-justice and urban political-ecology perspectives, the study argues that landfill communities effectively subsidize the consumption patterns of larger metropolitan populations through their exposure to pollution, instability, and health risks. The Bantargebang case therefore challenges the idea that waste disposal is merely an endpoint in an otherwise neutral urban system. A just waste system requires reduction at source, producer responsibility, safer working conditions, stronger community protection, and a redistribution of environmental burdens across the entire urban economy.

[Pengelolaan sampah perkotaan seringkali disajikan sebagai tantangan teknis yang melibatkan pengumpulan, pengangkutan, pengolahan, dan pembuangan. Namun, risiko lingkungan yang dihasilkan oleh sistem sampah perkotaan tersebar tidak merata di berbagai ruang sosial dan geografis. Artikel ini mengkaji tempat pembuangan sampah Bantargebang sebagai studi kasus untuk memahami biaya sosial dan ekologis tersembunyi dari pengelolaan sampah metropolitan. Tanah longsor yang berulang dan bahaya lain yang terkait dengan operasi tempat pembuangan sampah menunjukkan



kerentanan para pemulung dan penduduk yang tinggal di sekitar lokasi pembuangan, sementara pola konsumsi yang menghasilkan volume sampah yang sangat besar sebagian besar terkonsentrasi di tempat lain. Artikel ini mengeksplorasi pemisahan spasial antara produksi sampah dan paparan sampah dan mempertanyakan siapa yang pada akhirnya menanggung risiko yang terkait dengan konsumsi perkotaan. Perhatian khusus diberikan kepada para pemulung, komunitas di sekitarnya, kesehatan lingkungan, dan distribusi infrastruktur dan perlindungan lingkungan yang tidak merata. Dengan menggunakan perspektif keadilan lingkungan dan ekologi politik perkotaan, studi ini berpendapat bahwa komunitas di sekitar tempat pembuangan sampah secara efektif mensubsidi pola konsumsi populasi metropolitan yang lebih besar melalui paparan mereka terhadap polusi, ketidakstabilan, dan risiko kesehatan. Oleh karena itu, kasus Bantargebang menantang gagasan bahwa pembuangan sampah hanyalah titik akhir dalam sistem perkotaan yang netral. Sistem pengelolaan sampah yang adil memerlukan pengurangan di sumbernya, tanggung jawab produsen, kondisi kerja yang lebih aman, perlindungan masyarakat yang lebih kuat, dan redistribusi beban lingkungan di seluruh perekonomian perkotaan.]

Keywords: Bantargebang, urban waste, environmental justice, waste pickers, spatial inequality

Introduction

Urban waste is often treated as an administrative and technological problem: cities generate waste, municipal authorities collect it, transportation systems move it, and disposal or treatment facilities process what remains. This framing, however, obscures the political and ecological relationships embedded in the waste system. Waste does not simply disappear when it leaves the household or commercial establishment. It is displaced into particular territories where land, labor, infrastructure, and communities absorb the material consequences of urban consumption. From an environmental-justice perspective, this displacement raises a fundamental question: who receives the benefits of urban consumption, and who bears the environmental risks generated by it? Schlosberg (2007) argues that environmental justice must be understood through distribution, recognition, and participation rather than through the distribution of material goods alone. Urban political ecology similarly emphasizes that urban environments are produced through flows of resources, waste, capital, labor, and power that connect seemingly distant places (Swyngedouw and Heynen 2003; Heynen, Kaika, and Swyngedouw 2006). The management of municipal waste therefore represents not merely a technical service but a political process through which environmental burdens are geographically and socially allocated.

The Bantargebang landfill provides a particularly important setting for examining these dynamics. Located in Bekasi, West Java, Bantargebang receives

waste generated predominantly by Jakarta, making the site an essential component of the metropolitan waste system while being geographically separated from much of the population responsible for generating that waste. This spatial separation creates what can be described as an urban waste burden asymmetry: waste production is dispersed across millions of consumers, whereas exposure to landfill-related hazards is concentrated in a comparatively small territory. Such concentration becomes especially significant when landfill operations involve risks associated with slope instability, leachate, air pollution, traffic, odors, fires, and occupational hazards. The problem is not simply that waste exists, but that the infrastructure required to manage it creates particular forms of environmental exposure for communities located near disposal facilities. This reflects a broader pattern identified in environmental-justice research, in which undesirable infrastructures are disproportionately located in communities possessing weaker political and economic power (Bullard 1990; Mohai, Pellow, and Roberts 2009).

The recurrence of landslides and landfill instability at Bantargebang makes this question especially urgent because the physical hazards of waste disposal are inseparable from the social organization of urban consumption. Large landfill bodies are dynamic geological and technological systems rather than passive piles of discarded material. Their stability depends upon waste composition, moisture, slope geometry, compaction, drainage, landfill-cell management, and operational practices. When these systems become overloaded or inadequately managed, physical instability can generate consequences for workers and nearby residents. Yet a purely engineering interpretation of landslides risks overlooking the question of why particular communities are repeatedly exposed to such hazards in the first place. Urban political ecology directs attention toward the wider metropolitan processes that produce this vulnerability: population growth, consumption patterns, land scarcity, municipal waste policies, infrastructure investment, and the political geography of disposal (Heynen, Kaika, and Swyngedouw 2006; Robbins 2012). The landfill therefore becomes a point where metropolitan economic activity is materially deposited and socially concentrated.

The issue is particularly important because Bantargebang is not an isolated waste facility but part of a metropolitan system involving Jakarta and surrounding urban areas. Jakarta's high levels of consumption generate enormous quantities of municipal solid waste, while the physical space available for waste disposal within the metropolitan core is extremely limited. The resulting dependence on Bantargebang reflects a broader process of waste outsourcing within metropolitan space. Such outsourcing can make waste management less visible to consumers while making its environmental consequences more visible to communities near disposal facilities. The apparent disappearance of waste from affluent or densely populated urban neighborhoods therefore does not represent disappearance in material terms; it represents geographical displacement. This is consistent with the political-ecological understanding of cities as socio-natural systems in which environmental transformations occurring in one location are connected to

economic and social processes elsewhere (Swyngedouw 2004). Bantargebang can thus be understood as an externalized ecological space of metropolitan Jakarta.

This spatial separation raises questions of distributive justice. Environmental burdens are not necessarily distributed according to the quantity of waste generated by particular communities or businesses. Instead, they tend to be concentrated where disposal infrastructure is located. The result is a mismatch between responsibility for waste generation and exposure to waste-related risks. Residents surrounding Bantargebang may generate relatively little of the waste deposited at the site while experiencing the environmental consequences of managing it. Meanwhile, consumers throughout the metropolitan region can benefit from the removal of waste from their immediate surroundings without directly experiencing the hazards associated with its final disposal. This resembles the broader phenomenon of environmental externalization, whereby the costs of economic activity are transferred to groups or places with limited capacity to resist them (Martinez-Alier 2002). The landfill therefore performs an important but politically undervalued service for the metropolitan economy: it absorbs the material consequences of consumption while its social and ecological costs remain spatially concentrated.

Waste pickers occupy an especially complex position within this system. They are simultaneously economically marginalized workers and essential participants in material recovery. By collecting, sorting, and selling recyclable materials, waste pickers contribute to reducing the quantity of material requiring final disposal and facilitate the circulation of recyclable commodities within the urban economy. Yet their contribution frequently remains under-recognized because waste management systems tend to prioritize formal infrastructure and technological solutions. Research on informal waste economies demonstrates that waste pickers provide significant environmental services while often working under hazardous and insecure conditions (Medina 2007; Wilson, Velis, and Cheeseman 2006). Their position therefore illustrates the multidimensional character of environmental injustice: they may experience occupational hazards, social stigma, insecure incomes, and limited access to formal protection while simultaneously providing labor that benefits the wider urban economy. In Bantargebang, the question of justice must consequently include not only where waste is deposited but also whose labor makes the waste system function.

The marginalization of waste pickers also illustrates the importance of recognition within environmental justice. A purely distributive approach might ask whether workers receive adequate income or whether pollution levels exceed acceptable thresholds. A recognitional approach asks a deeper question: are waste pickers recognized as legitimate environmental workers whose knowledge and labor are necessary to the functioning of the urban waste system? Schlosberg (2007) argues that environmental injustice often emerges when particular groups are institutionally or culturally marginalized. Their exclusion from decision-making can make their contributions invisible while leaving them exposed to environmental

risks. This is especially relevant in waste management because informal workers often possess detailed practical knowledge about material flows, recycling markets, and the composition of discarded materials. Ignoring such knowledge can produce policies that are technically sophisticated but socially disconnected from the realities of waste work.

The vulnerability of surrounding communities must also be considered beyond direct exposure to landfill hazards. Environmental risks can affect household health, property values, access to clean water, mobility, livelihood opportunities, and perceptions of safety. These impacts may accumulate over time, creating what environmental-justice scholars describe as the unequal distribution of environmental risks and capabilities (Walker 2012; Schlosberg and Collins 2014). Moreover, communities surrounding waste facilities may face a form of infrastructural inequality in which the territory performs a metropolitan function without receiving equivalent levels of environmental protection or public investment. The city that depends upon a landfill may benefit from waste-removal infrastructure while the host community bears the consequences of that infrastructure. This creates a paradox: the landfill may be indispensable to the metropolitan system while the community that hosts it remains comparatively vulnerable within that same system.

The Bantargebang case also raises questions about the adequacy of Indonesia's legal and institutional framework for waste governance. Law No. 18 of 2008 on Waste Management establishes principles of waste reduction, handling, environmental protection, and community participation. The law represents an important shift away from treating waste exclusively as something to be collected and disposed of. It promotes a broader approach involving reduction at source, reuse, recycling, and environmentally sound management. Government Regulation No. 81 of 2012 further establishes a framework for household waste and household-like waste management. Nevertheless, the persistence of landfill dependence demonstrates the difficulty of translating these principles into metropolitan waste practices. The continuing importance of final disposal suggests that waste reduction and circular-economy approaches have not yet displaced the dominant collect–transport–dispose model.

The legal issue becomes particularly important when landfill capacity and safety are considered. Indonesia's waste-management framework places responsibilities on governments and waste-management operators to ensure that waste facilities comply with environmental and technical standards. Yet regulatory compliance should not be evaluated solely through the existence of permits or operating procedures. From an environmental-justice perspective, compliance must also be assessed through outcomes: whether workers are protected, whether neighboring communities are exposed to unreasonable risks, whether environmental information is accessible, and whether affected residents possess meaningful avenues for participation and remedy. This distinction between formal legality and substantive justice is central to the Bantargebang case. A landfill can

be legally authorized and economically necessary while still producing environmental inequalities that require policy correction.

The problem becomes even more significant when viewed through the principle of extended producer responsibility. Conventional waste governance places substantial responsibility on municipalities and households after products have been consumed. Yet many waste streams are generated by products whose design, packaging, and marketing are determined upstream by producers. If the financial and environmental costs of managing these materials are transferred primarily to municipalities, workers, and landfill communities, the waste system effectively subsidizes producers and consumers through public expenditure and localized environmental exposure. Extended producer responsibility attempts to correct this imbalance by shifting part of the responsibility for post-consumption impacts toward producers (Lindhqvist 2000). In the Indonesian context, Presidential Regulation No. 97 of 2017 and subsequent policy instruments on waste reduction provide a broader policy basis for reducing waste at source. However, the effectiveness of these measures depends upon implementation, enforcement, corporate accountability, and the capacity to prevent waste generation rather than merely manage its consequences.

The concept of urban metabolism provides another useful analytical lens. Cities depend upon continuous flows of materials and energy: resources enter urban systems, are transformed through production and consumption, and eventually leave as waste and emissions (Kennedy, Cuddihy, and Engel-Yan 2007). From this perspective, Bantargebang represents the downstream end of an urban metabolism in which materials consumed throughout Jakarta eventually accumulate in a geographically concentrated location. The landfill is therefore not an isolated “waste problem”; it is a material expression of the broader metropolitan economy. A city that consumes more materials necessarily produces more residuals unless consumption patterns, product design, reuse, and recycling systems change. Focusing exclusively on landfill management consequently risks treating the symptom rather than the structural cause. The environmental burden of Bantargebang cannot be separated from the consumption patterns, commercial systems, and production decisions that generate the waste entering the facility.

This perspective changes the meaning of the Bantargebang landslide. Rather than treating a landslide as an unfortunate technical incident occurring at the edge of the city, it can be interpreted as a moment when the hidden costs of urban consumption become physically visible. The disaster exposes the material consequences of a system that normally keeps waste out of sight. What appears to be a local hazard is therefore connected to metropolitan consumption, municipal policy, infrastructure investment, informal labor, and patterns of environmental inequality. In this sense, the landslide represents an “invisible crisis” becoming visible. The crisis was not created at the moment of slope failure; rather, the failure reveals vulnerabilities accumulated through the organization of the waste system over time.

The central argument of this article is therefore that Bantargebang should be analyzed as a case of environmental injustice produced through metropolitan waste governance. The key problem is not simply the existence of a large landfill or the technical difficulty of managing municipal solid waste. It is the unequal distribution of responsibility, risk, recognition, and decision-making power across the metropolitan waste system. Waste generators, producers, municipalities, waste workers, landfill operators, and host communities occupy very different positions within this system. Yet conventional waste governance frequently treats them as components of a single technical chain rather than actors with unequal power and unequal exposure. Environmental justice provides a framework for making these differences visible, while urban political ecology helps explain how metropolitan consumption is materially connected to localized environmental sacrifice.

Accordingly, this article asks three interconnected questions: Who bears the environmental and social costs of Bantargebang's waste burden? Why are these costs concentrated among waste workers and nearby communities rather than distributed across the metropolitan economy that generates the waste? And what institutional reforms are necessary to transform waste governance from disposal-oriented management toward a more just and sustainable system? The article argues that the Bantargebang problem cannot be solved through landfill engineering alone. Technical improvements remain necessary, particularly for preventing slope failure and protecting workers and residents, but they must be accompanied by waste reduction at source, producer responsibility, recognition and protection of waste pickers, stronger community participation, transparent environmental monitoring, and a more equitable distribution of waste-management infrastructure. The broader objective is to shift the analytical focus from "How can cities dispose of their waste?" to "How can cities organize consumption, production, labor, and waste in ways that do not systematically transfer environmental risks to the least powerful?"

Literature Review and Theoretical Framework

1. Previous Studies on Bantargebang and Urban Waste Inequality

Previous studies on Bantargebang have generally approached the site through environmental management, public health, waste-picker livelihoods, or the technical capacity of the landfill. These studies are important because they demonstrate that Bantargebang is not merely a disposal facility but a complex socio-ecological space in which waste management intersects with human health, informal employment, and environmental change. Research on urban waste in developing countries has similarly shown that landfills frequently become spaces where environmental risks and social marginalization overlap (Wilson, Velis, and Cheeseman 2006; Medina 2007). Waste pickers, for example, provide important material-recovery functions but often operate under insecure working conditions and limited institutional recognition. Such findings are particularly relevant to Bantargebang because the landfill's operation depends not only upon formal infrastructure but also upon a large informal labor force. The existing literature

therefore provides an important foundation for examining the landfill as a social institution rather than simply a technical endpoint for municipal waste.

A significant body of research has also examined the relationship between waste disposal and community health. Landfills can generate multiple exposure pathways through air emissions, leachate, contaminated water, dust, odors, and physical hazards. The risks may be particularly significant for communities living close to disposal facilities because exposure is continuous rather than episodic. However, the health dimension of landfill governance is often treated separately from questions of urban inequality. This separation can obscure the structural reason why certain communities experience greater exposure than others. Environmental-justice scholarship demonstrates that health risks cannot be fully understood without examining the distribution of infrastructure, political power, income, and recognition (Mohai, Pellow, and Roberts 2009; Walker 2012). In Bantargebang, the relevant question is therefore not simply whether landfill operations produce health risks, but why those risks are concentrated in a particular locality while the benefits of waste removal are distributed throughout the metropolitan region.

Research on waste pickers adds another dimension to the analysis. Informal recyclers occupy an ambiguous position within urban waste systems because they can simultaneously be marginalized workers and important contributors to environmental sustainability. Wilson, Velis, and Cheeseman (2006) argue that informal recycling systems can make substantial contributions to waste recovery in developing countries, while Medina (2007) demonstrates that waste picking provides livelihoods for economically vulnerable populations across the Global South. This literature challenges the assumption that informal waste workers are merely an obstacle to modernization. Instead, they should be understood as participants in the urban metabolism who perform economically valuable and environmentally significant labor. The difficulty is that this labor frequently occurs without adequate occupational safety, legal protection, social security, or institutional recognition. Bantargebang therefore provides an opportunity to examine a contradiction at the center of modern waste management: the people who help recover value from discarded materials may themselves remain socially and economically undervalued.

Another important strand of research concerns the relationship between landfill location and spatial inequality. Waste facilities require substantial amounts of land and often generate undesirable externalities, making their location politically contentious. Environmental-justice scholarship has repeatedly demonstrated that hazardous or undesirable infrastructures may become concentrated in communities with comparatively limited political influence (Bullard 1990; Mohai, Pellow, and Roberts 2009). This does not mean that every landfill is necessarily the result of intentional discrimination. Rather, inequality can emerge through cumulative institutional decisions concerning land availability, planning, property values, infrastructure, and political representation. Bantargebang illustrates this broader

process because metropolitan waste generated across Jakarta is physically concentrated in a particular peripheral territory. The spatial organization of waste therefore creates an asymmetry between where waste is generated, where it is consumed, and where its risks are experienced.

The literature on urban political ecology provides a particularly useful explanation for this asymmetry. Urban environments are not independent from nature; they are produced through flows of materials, energy, labor, capital, water, food, and waste (Swyngedouw and Heynen 2003; Heynen, Kaika, and Swyngedouw 2006). From this perspective, Bantargebang should be interpreted as part of Jakarta's broader socio-natural metabolism. Waste generated through consumption in offices, households, restaurants, markets, and commercial centers is transported outward and concentrated at the landfill. The landfill consequently functions as an infrastructural extension of the metropolitan economy. What appears geographically external to Jakarta is materially integrated into its daily operation. This perspective challenges the common conceptualization of waste disposal as a final stage that is separate from urban production and consumption. Instead, disposal is part of the same metabolic system that makes urban consumption possible.

Despite these important contributions, previous research leaves several analytical gaps. First, studies focusing on the technical management of Bantargebang can underemphasize the political distribution of environmental risks. Second, research focusing on waste pickers may emphasize livelihoods without fully connecting informal labor to metropolitan consumption patterns. Third, public-health research can identify exposure without sufficiently examining the political processes through which exposure becomes geographically concentrated. Fourth, urban planning studies may address spatial management without explicitly asking whether the spatial organization of waste constitutes a form of environmental injustice. This article addresses these gaps by connecting the physical hazard of landfill instability, the social vulnerability of waste workers and surrounding residents, and the metropolitan consumption patterns that produce the waste burden.

The present study therefore moves beyond a narrow landfill-centered analysis. Rather than asking only whether Bantargebang is technically capable of receiving metropolitan waste, it asks whether the broader waste system is socially and environmentally just. This requires connecting three analytical scales. At the household level, the analysis examines exposure, health, livelihood, and working conditions. At the landfill level, it considers environmental hazards, infrastructure, and institutional management. At the metropolitan level, it examines consumption, waste generation, transportation, producer responsibility, and the geographical distribution of disposal infrastructure. These scales are interconnected. A landslide at Bantargebang may appear to be a local event, but its underlying causes and consequences are embedded in a much larger metropolitan system. The analytical contribution of this article lies precisely in making those connections explicit.

2. Environmental Justice: Distribution, Recognition, and Participation

Environmental justice provides the principal normative framework for this study. Early environmental-justice scholarship emphasized the unequal distribution of environmental hazards among socially and economically marginalized communities (Bullard 1990). Over time, however, the concept expanded beyond distribution to include recognition, participation, capabilities, and restoration. Schlosberg (2007) argues that environmental justice should be understood multidimensionally because environmental inequalities are not produced exclusively through unequal exposure to pollution. Communities may also experience injustice when their identities, knowledge, and political claims are ignored. Walker (2012) similarly emphasizes that environmental justice concerns the relationships between environmental harms, social inequalities, institutional processes, and political power. This broader framework is essential for Bantargebang because the landfill's injustice cannot be measured solely through pollution levels. It must also be examined through questions of labor recognition, community participation, access to information, and the distribution of decision-making authority.

The first dimension is distributive justice. It asks how environmental benefits and burdens are allocated. In the Bantargebang context, the benefits of waste disposal are metropolitan: households and businesses can remove unwanted materials from their immediate environments, while municipal authorities can maintain urban cleanliness and public order. The burdens, however, are geographically concentrated. Communities surrounding the landfill live closer to environmental hazards, while waste pickers encounter occupational risks through direct interaction with discarded materials. This creates a structural imbalance between metropolitan benefit and localized exposure. Martinez-Alier (2002) describes similar processes through the concept of ecological distribution conflicts, in which environmental costs are transferred across social groups and geographical spaces. Bantargebang can therefore be interpreted as a site where the ecological costs of urban consumption are disproportionately localized.

The second dimension is recognitional justice. Recognition requires institutions to acknowledge the legitimacy, dignity, and knowledge of affected communities. This is especially relevant for waste pickers. Conventional waste policy can classify informal workers as an undesirable or temporary component of waste management even when their labor contributes significantly to recycling and material recovery. Such institutional framing can make their contribution invisible while simultaneously exposing them to hazards. Schlosberg (2007) argues that misrecognition itself constitutes an environmental injustice because marginalized communities can be excluded from the political processes that define environmental problems and appropriate solutions. In Bantargebang, recognizing waste pickers as environmental workers would have significant policy implications: occupational safety, social protection, access to health services, and participation

in waste-management planning would become central components of environmental governance rather than peripheral social programs.

The third dimension is procedural justice, which concerns participation in decision-making. A waste-management system cannot be considered just merely because authorities comply with formal procedures. Meaningful participation requires access to information, opportunities to influence decisions, and mechanisms through which communities can challenge decisions that threaten their interests (Walker 2012). This is particularly important in large infrastructure systems where technical expertise can create significant power asymmetries between authorities, corporations, and residents. Communities living around Bantargebang may possess experiential knowledge regarding odors, flooding, traffic, fires, water conditions, and other environmental changes that cannot always be captured by formal monitoring systems. A participatory approach should therefore treat local knowledge as a legitimate component of environmental governance rather than as anecdotal information.

These three dimensions are interconnected. A community may receive financial compensation but remain procedurally excluded. Waste pickers may be recognized as economically useful while remaining occupationally unprotected. Residents may participate in consultations while possessing little influence over the final decision. Environmental justice therefore requires simultaneous attention to distribution, recognition, and participation. In Bantargebang, the central analytical question becomes whether the metropolitan waste system distributes risks fairly, recognizes the people who absorb and manage those risks, and provides them with meaningful influence over the system that affects their lives. This multidimensional framework prevents the analysis from reducing justice to compensation alone.

3. Urban Political Ecology and the Metabolism of Waste

Urban political ecology complements environmental justice by explaining how environmental inequalities are produced through urbanization. Swyngedouw and Heynen (2003) argue that cities are socio-natural formations in which social power and ecological processes are continuously intertwined. Urbanization transforms nature through infrastructures that organize flows of water, food, energy, materials, and waste. These flows are not politically neutral because they reflect decisions about who controls resources, who receives services, and who bears environmental costs. Heynen, Kaika, and Swyngedouw (2006) similarly emphasize that urban nature is produced through political and economic relations. Applying this perspective to Bantargebang means understanding the landfill not as an external space where waste is simply deposited but as an essential component of Jakarta's urban metabolism.

The concept of urban metabolism makes the relationship particularly visible. Kennedy, Cuddihy, and Engel-Yan (2007) conceptualize cities as systems through which materials and energy enter, circulate, and eventually exit as waste. From this perspective, waste is not an accidental by-product but an inevitable component of

urban economic activity. The quantity and composition of waste reflect patterns of production and consumption. Bantargebang therefore represents the downstream material expression of metropolitan consumption. Every kilogram of waste transported to the landfill is connected to upstream activities involving extraction, manufacturing, distribution, marketing, consumption, and disposal. The landfill is consequently embedded in a much wider network of economic relationships.

This perspective also exposes the problem of spatial externalization. Waste becomes less visible to consumers when it is transported away from densely populated areas. The physical distance between waste generation and waste disposal can produce the illusion that consumption has few environmental consequences. Yet transportation does not eliminate environmental burdens; it relocates them. Martinez-Alier (2002) emphasizes that ecological conflicts frequently arise when environmental costs are displaced geographically or socially. Bantargebang embodies this process because the metropolitan system effectively transfers a portion of its material burden to a specific host territory. The resulting spatial inequality is not simply a matter of geography; it is produced through economic and political decisions concerning land, infrastructure, municipal responsibility, and urban planning.

The urban-political-ecology perspective therefore shifts the analytical focus from the landfill itself to the entire waste chain. This chain includes production, packaging, consumption, collection, transportation, sorting, recycling, disposal, and environmental remediation. Problems at the landfill cannot be solved sustainably if upstream processes remain unchanged. A city that continues to increase material consumption while relying predominantly on final disposal will reproduce pressure on landfill infrastructure regardless of improvements in operational efficiency. This is why waste reduction at source and circular-economy strategies are central to environmental justice. They can potentially reduce the volume of material entering disposal sites and consequently reduce the environmental burden transferred to host communities.

The framework also helps explain why technical solutions alone are insufficient. Improving landfill engineering can reduce certain physical risks, but it does not automatically address the unequal political economy of waste. If the metropolitan waste stream continues to grow, the system may simply require larger facilities or additional disposal sites. Similarly, technological treatment can reduce some environmental impacts without changing who controls waste-management decisions or who benefits economically from waste-related infrastructure. Urban political ecology therefore asks a more fundamental question: what social relations make particular environmental arrangements possible? In Bantargebang, answering this question requires examining municipal governance, private contractors, informal workers, producers, consumers, land ownership, and communities living near the landfill.

4. From Waste Disposal to Environmental Justice

Combining environmental justice with urban political ecology produces a framework capable of explaining both the distribution of waste-related risks and the political-economic processes that produce that distribution. Environmental justice identifies the normative problem: some groups bear disproportionate environmental burdens. Urban political ecology identifies the structural mechanism: metropolitan material flows are organized through unequal relations of power, infrastructure, labor, and space. Together, these approaches allow Bantargebang to be analyzed as a metropolitan environmental-justice problem rather than simply as a landfill-management problem.

This theoretical combination also changes the meaning of responsibility. Responsibility for waste cannot be assigned exclusively to the municipal government or to households after consumption. Producers influence product design and packaging; retailers influence distribution; consumers determine demand; municipalities organize collection and disposal; workers recover materials; and landfill communities absorb localized environmental risks. The distribution of responsibility should therefore correspond to the distribution of control across the waste chain. Extended producer responsibility is important in this regard because it seeks to internalize post-consumer environmental costs into production systems rather than leaving municipalities and communities to absorb them (Lindhqvist 2000). Such an approach can potentially transform waste governance from a system based on externalization toward one based on shared accountability.

The framework developed here leads to the central proposition of the study: Bantargebang's environmental crisis is not merely a consequence of inadequate waste technology but an expression of unequal metropolitan environmental governance. Landslides, pollution risks, and occupational hazards become socially significant because they occur within a system in which waste production and waste exposure are spatially separated. The people who benefit from waste removal are dispersed across the metropolitan region, while those exposed to the consequences are concentrated around the landfill. Waste pickers further complicate the picture because they contribute to material recovery while occupying a socially marginalized position. A just waste system must therefore address not only the physical safety of landfill operations but also the social organization of urban consumption and disposal.

This framework establishes the analytical foundation for the subsequent sections of the article. The next section will examine the Bantargebang waste system and the spatial production of environmental risk, focusing specifically on the landfill's role within Jakarta's metropolitan metabolism, the concentration of waste, physical instability and landslide hazards, and the unequal geography of exposure. The analysis will then move toward waste pickers and surrounding communities before examining Indonesian waste law, governance failures, and the possibility of a more just urban waste system.

Bantargebang and the Spatial Production of Environmental Risk

1. Bantargebang as Metropolitan Waste Infrastructure

Bantargebang should not be understood simply as a landfill located on the administrative margins of Jakarta. It functions as a critical infrastructure through which the metropolitan region externalizes and manages the material consequences of urban consumption. Waste generated by households, commercial establishments, offices, markets, restaurants, and other activities is removed from the places where it is produced and transported toward a geographically concentrated disposal system. This arrangement produces an important spatial distinction between waste generation and waste exposure. For most metropolitan residents, waste becomes invisible shortly after collection. For workers and communities around Bantargebang, however, waste remains a persistent material presence. Urban political ecology helps explain this contradiction because urban environments are produced through flows that connect apparently distant locations (Swyngedouw and Heynen 2003; Heynen, Kaika, and Swyngedouw 2006). Bantargebang is therefore not outside Jakarta's urban metabolism; it is one of the infrastructures that makes Jakarta's consumption-oriented urban life possible.

The metropolitan character of Bantargebang is important because it changes how responsibility should be understood. If waste were generated and disposed of within the same social and geographical space, the relationship between consumption and environmental consequences would be relatively visible. In metropolitan systems, however, waste can be displaced from politically and economically powerful areas toward peripheral territories. This geographical separation creates what can be described as a politics of invisibility. Consumers experience the benefit of cleaner streets, homes, offices, and commercial areas without directly confronting the material consequences of their consumption. The physical distance between consumption and disposal consequently reduces the political visibility of waste. Bantargebang makes this process particularly evident: its role is essential to metropolitan functioning precisely because it allows waste to be moved elsewhere.

The resulting spatial arrangement reflects broader patterns identified in studies of urban metabolism. Cities require continuous material throughput, and every input eventually generates residual flows that must be absorbed somewhere (Kennedy, Cuddihy, and Engel-Yan 2007). A metropolitan economy therefore cannot be separated from its waste infrastructure. The more intensive the consumption of packaged food, plastics, construction materials, household products, and other commodities, the greater the residual burden that must be managed. If the system relies primarily on final disposal, the growth of urban consumption translates into greater pressure on landfill infrastructure. Bantargebang thus represents the downstream endpoint of a much larger chain of production and consumption. Its environmental problems cannot be resolved sustainably without addressing the upstream conditions that generate the waste stream.

This is precisely where the concept of ecological distribution becomes relevant. Martinez-Alier (2002) argues that environmental conflicts frequently emerge because the costs and benefits of economic activities are distributed unevenly. In Bantargebang, metropolitan residents and economic actors obtain the immediate benefit of waste removal, whereas the host territory receives a disproportionate share of the environmental burden. The landfill may generate employment and economic activity, but these benefits do not necessarily compensate for the cumulative environmental and social risks associated with hosting metropolitan waste. Justice therefore requires an assessment of the entire distribution of benefits and burdens rather than an assumption that the existence of employment or compensation automatically resolves environmental inequality.

2. Waste Concentration and the Geography of Exposure

The concentration of waste at Bantargebang creates a particular geography of exposure. Environmental risks associated with waste disposal are not evenly distributed throughout Jakarta. They are concentrated around the infrastructure where waste accumulates. Residents near the landfill may experience odors, dust, traffic, noise, water-related concerns, fires, and other environmental disturbances more directly than residents located far from the disposal site. Waste pickers experience an even more direct relationship with waste because their livelihoods depend upon entering, sorting, collecting, and recovering materials from the waste stream. This demonstrates that environmental exposure is structured by social position as well as geography. The same waste that represents an abstract environmental issue to an urban consumer can become an occupational hazard or daily environmental condition for another person.

The geography of exposure becomes more problematic when considered alongside socioeconomic inequality. Environmental burdens do not automatically become unjust simply because they are geographically concentrated. The issue becomes one of justice when the groups experiencing those burdens possess fewer resources to avoid, mitigate, or influence them. Walker (2012) emphasizes that environmental justice concerns the relationship between environmental risks and social inequality. A household with greater economic resources may be better able to relocate, obtain healthcare, install protective infrastructure, or reduce exposure. Poorer households may have fewer such options. This creates a form of constrained environmental choice, in which people remain in risky environments not because they prefer them but because their economic circumstances limit alternatives.

The situation of waste pickers illustrates this problem particularly clearly. Their exposure is connected directly to livelihood dependence. Leaving the landfill environment may mean losing access to income, while remaining exposes workers to occupational and environmental risks. This creates a difficult trade-off between economic security and environmental safety. Medina (2007) demonstrates that waste picking in many developing cities is fundamentally a livelihood strategy for populations with limited employment opportunities. Wilson, Velis, and Cheeseman

(2006) likewise emphasize that informal recyclers can make significant contributions to waste management despite their marginalized institutional status. The appropriate policy response, therefore, cannot simply be to remove waste pickers from landfill areas in the name of modernization. Such a strategy could eliminate their livelihood without addressing the socioeconomic conditions that made waste picking necessary in the first place.

The spatial concentration of waste also creates an issue of political representation. Communities hosting undesirable infrastructure may have limited influence over metropolitan decisions concerning waste generation and disposal. Decisions about urban waste systems are frequently made at governmental or metropolitan levels, while the consequences are experienced locally. This creates a scale mismatch between decision-making and environmental exposure. Swyngedouw and Heynen (2003) emphasize that urban environmental processes are deeply connected to questions of scale and power. In Bantargebang, the metropolitan scale determines the volume and movement of waste, while the local scale experiences the environmental consequences. Effective environmental justice therefore requires mechanisms through which local communities can influence decisions made at larger administrative scales.

3. Landslides, Landfill Instability, and the Materiality of Risk

The significance of Bantargebang becomes particularly visible when landfill instability produces landslides or other physical hazards. A landfill is not an inert mound of material. It is a dynamic structure containing heterogeneous waste with varying levels of moisture, density, decomposition, and structural stability. Its safety depends on engineering design, slope management, drainage, compaction, waste placement, and monitoring. When these factors become inadequate relative to the volume and characteristics of accumulated waste, the possibility of slope failure increases. The materiality of the landfill therefore matters. Environmental injustice is not simply a social or political phenomenon; it can become physically embodied in unstable landscapes. The people living and working around the landfill experience the consequences when accumulated waste becomes a source of physical danger.

However, a purely technical interpretation of landslides is insufficient. Engineering analysis can explain how slope instability occurs, but it does not explain why the volume of waste has reached a level that places pressure on the system or why particular communities are located in proximity to the resulting hazard. Political ecology encourages analysis of the relationship between material processes and political-economic structures (Robbins 2012). The physical instability of a landfill can therefore be understood as the material expression of decisions concerning waste generation, infrastructure investment, land allocation, regulatory enforcement, and metropolitan planning. A landslide is not necessarily caused by “poor management” in isolation; it can emerge from a larger system that continually produces pressure on a disposal infrastructure.

The concept of accumulated vulnerability is useful here. Vulnerability is not simply exposure to a physical hazard; it is shaped by the capacity of individuals and communities to anticipate, withstand, and recover from environmental disturbances (Adger 2006). A landfill worker without adequate protective equipment, a resident with limited access to healthcare, or a household economically dependent on the landfill may experience the same physical event differently from a more economically secure population. Consequently, the consequences of a landslide cannot be assessed solely by measuring the physical volume of displaced waste. The analysis must also consider who is exposed, what resources they possess, and whether institutions provide adequate protection and recovery mechanisms.

This distinction is critical because disasters frequently reveal pre-existing inequalities rather than creating them from nothing. A landslide may be sudden, but vulnerability develops over time. It can result from prolonged exposure, inadequate infrastructure, insecure livelihoods, limited access to information, and weak political representation. The environmental-justice perspective therefore asks not only what happened during the landslide, but whose prior vulnerability made the event particularly harmful. This shifts attention from disaster response toward prevention and structural risk reduction. In Bantargebang, preventive justice requires reducing both the physical probability of landfill instability and the social vulnerability of people living and working around the facility.

4. Waste Pickers and the Hidden Labor of Urban Cleanliness

Waste pickers occupy a paradoxical position within the Bantargebang system. On the one hand, they are frequently associated with the informal and undesirable aspects of waste management. On the other hand, their work contributes directly to material recovery and reduces the quantity of recyclable material requiring final disposal. Wilson, Velis, and Cheeseman (2006) demonstrate that informal recycling can represent an important component of waste-management systems in developing countries. Medina (2007) similarly shows that waste picking should be understood as an economic activity embedded within broader labor and commodity markets. The presence of waste pickers at Bantargebang therefore reveals that urban waste management depends on forms of labor that remain insufficiently recognized by formal institutions.

The invisibility of this labor is closely related to the invisibility of waste itself. Consumers often perceive waste as something that has ceased to possess economic value. Waste pickers, however, identify materials that remain valuable within recycling markets. They transform discarded materials into commodities that can re-enter production systems. Their work therefore represents a form of informal circularity operating within a predominantly disposal-oriented waste system. Yet the economic value created through this activity does not necessarily translate into social protection. Workers may face occupational injuries, exposure to hazardous materials, unstable income, and stigma. The contradiction is profound: the

metropolitan economy benefits from material recovery while the workers performing that recovery remain vulnerable.

This situation raises a recognitional question. If waste pickers are understood merely as people who “scavenge” at a landfill, policy may focus on controlling or eliminating their presence. If they are recognized as environmental workers, however, policy priorities change. Occupational health and safety, protective equipment, access to healthcare, social security, fair compensation, and participation in waste-management planning become legitimate governance objectives. Recognition therefore has material consequences. Schlosberg (2007) emphasizes that injustice can occur when institutions fail to recognize particular communities as legitimate subjects of environmental decision-making. Bantargebang's waste pickers illustrate how social recognition can become a prerequisite for effective environmental protection.

Their position also demonstrates why formalization must be approached carefully. Integrating informal workers into formal waste-management systems can improve working conditions and social protection, but formalization can also exclude workers who lack documentation, capital, or institutional connections. A just transition should therefore not simply replace informal workers with formal contractors. It should create pathways through which existing workers can obtain stronger rights while retaining access to livelihoods. This is particularly important because waste management is not merely an environmental sector; it is also a labor market supporting households that may have few alternative employment opportunities.

5. The Urban Consumer and the Displaced Environmental Cost

The most significant implication of the Bantargebang case is that the landfill cannot be isolated from the consumption practices of the metropolitan population. Waste is produced upstream through patterns of production, packaging, purchasing, and consumption. Once discarded, however, it becomes institutionally defined as a municipal management problem. This division can obscure the role of producers and consumers in creating the material burden. Extended producer responsibility offers one mechanism for correcting this imbalance by requiring producers to assume greater responsibility for products and packaging after consumption (Lindhqvist 2000). Without such mechanisms, municipalities may remain responsible for managing waste whose quantity and composition are largely influenced by private production and consumption decisions.

The issue is therefore not simply whether Jakarta needs a larger or more technologically advanced landfill. Expanding disposal capacity without changing waste generation patterns can reproduce the same structural problem at a larger scale. From an urban-metabolic perspective, increasing disposal capacity treats the downstream symptom while leaving upstream material flows relatively unchanged (Kennedy, Cuddihy, and Engel-Yan 2007). From an environmental-justice perspective, it may also extend the period during which a particular community is

required to absorb metropolitan environmental burdens. A more just approach must therefore prioritize waste prevention, reuse, recycling, producer responsibility, and circular material flows before final disposal.

The Bantargebang landslide consequently becomes analytically important because it interrupts the normal invisibility of the waste system. It makes visible the material consequences of consumption that are normally geographically displaced. The event should therefore be interpreted not only as a landfill safety problem but also as a warning about the limits of a metropolitan model that separates consumption from disposal. The deeper question is whether a city can legitimately describe itself as clean and sustainable when its cleanliness depends upon concentrating environmental burdens in communities located beyond the immediate visibility of its consumers. Environmental justice suggests that the answer must depend upon whether those burdens are fairly distributed, whether affected communities are recognized, and whether they possess meaningful influence over the decisions that produce their exposure.

The evidence and theoretical analysis presented in this section establish the basis for examining Bantargebang as an environmental-justice conflict rather than merely a waste-management challenge. The next section should therefore move from spatial exposure and landfill risk toward the legal and governance structure that permits this distribution of burdens to persist. In particular, the analysis needs to examine Indonesia's Law No. 18 of 2008 on Waste Management, Government Regulation No. 81 of 2012, the national waste-management policy framework, environmental-protection obligations, producer responsibility, and the extent to which these legal instruments provide meaningful protection for waste pickers and communities surrounding Bantargebang.

Law, Governance, and Environmental Justice in the Bantargebang Waste System

1. From Disposal-Oriented Management to the Legal Right to a Healthy Environment

Indonesia's legal framework provides a significant normative basis for questioning whether the existing waste system adequately protects communities exposed to landfill-related risks. The 1945 Constitution recognizes the right to a good and healthy environment, while Law No. 32 of 2009 on Environmental Protection and Management establishes environmental protection as an integral component of sustainable development. Law No. 18 of 2008 on Waste Management further shifts the legal understanding of waste away from an exclusively disposal-oriented approach by emphasizing both waste reduction and waste handling. This legal architecture is important because it establishes that waste management is not simply an administrative service but a matter involving environmental protection and public welfare. From an environmental-justice perspective, however, the existence of legal rights does not automatically guarantee their substantive realization. The central issue is whether people living and working

around Bantargebang can effectively enjoy the environmental protections that Indonesian law formally recognizes.

Law No. 18 of 2008 is particularly important because it establishes waste reduction as a component of waste management rather than treating final disposal as the inevitable endpoint of urban consumption. The distinction between waste reduction and waste handling has significant implications for Bantargebang. Reduction addresses the generation of waste through limitations on consumption, reuse, recycling, and related measures, whereas handling concerns collection, transportation, processing, and final disposal. If policy remains disproportionately focused on handling after waste has already been generated, the legal objective of reducing waste at source becomes structurally weakened. The continued dependence on landfill infrastructure therefore raises a governance question: whether Indonesian waste policy has sufficiently shifted from managing waste after production toward preventing unnecessary waste before it enters the municipal system.

This distinction also has implications for environmental justice because the failure to reduce waste at source can increase the burden placed on disposal communities. Each additional volume of waste requiring final disposal creates additional demand for land, infrastructure, transportation, workers, and environmental monitoring. The costs are not distributed equally. Producers and consumers may experience only a marginal increase in disposal costs, whereas communities near disposal facilities can experience cumulative exposure to environmental risks. The environmental burden thus grows through a process in which the metropolitan population collectively generates waste but a smaller population absorbs the consequences of its concentration. Environmental justice requires that this asymmetry be recognized as a structural policy issue rather than treated as an unavoidable feature of urbanization (Schlosberg 2007; Walker 2012).

The constitutional dimension reinforces this argument. The right to a healthy environment should not be interpreted merely as a prohibition against extreme pollution. It should also inform the design of infrastructure and public services that determine environmental exposure. A waste-management system that consistently transfers substantial environmental risks to a particular community raises questions about whether the benefits and burdens of environmental governance are being fairly distributed. This is especially significant where affected communities have limited ability to relocate or influence metropolitan policy. The legal right to a healthy environment therefore needs to be connected to substantive equality: environmental protection should not become stronger for communities that possess greater political or economic resources while remaining weaker for communities located around essential but undesirable infrastructure.

2. Environmental Protection, Landfill Safety, and the Problem of Regulatory Implementation

The legal framework governing waste management cannot be separated from Indonesia's broader environmental-protection regime. Law No. 32 of 2009 establishes principles concerning environmental sustainability, pollution prevention, environmental monitoring, public participation, and administrative as well as legal accountability. Government Regulation No. 22 of 2021 subsequently provides a more detailed regulatory framework for environmental protection and management. These instruments create obligations concerning environmental standards, environmental approvals, monitoring, and institutional responsibility. For Bantargebang, such provisions are relevant because landfill operations potentially affect soil, water, air quality, ecosystems, and human health. More importantly, the occurrence of physical hazards such as landslides raises questions about whether preventive environmental governance is sufficiently effective.

The critical problem is therefore not simply whether regulations exist but whether they are implemented before harm occurs. Environmental regulation can become reactive when authorities respond to accidents, pollution, or public complaints only after impacts have already materialized. Environmental justice requires a preventive orientation because marginalized communities may lack the resources to recover from environmental harm. A wealthy household can potentially move away from a polluted area, obtain private healthcare, or install protective technologies. A low-income household dependent upon local employment may have none of these options. Prevention is consequently not merely a technical environmental principle; it is a distributive justice requirement.

The issue becomes particularly important for landfill stability. A landfill's environmental safety depends upon continuous operational management rather than a one-time licensing decision. Waste placement, slope geometry, drainage, compaction, leachate management, gas control, and monitoring must be maintained throughout the facility's operational life. Regulatory governance should therefore evaluate cumulative risk rather than simply whether a facility complied with requirements at a particular point in time. If waste volumes continuously increase, previously acceptable conditions may become unsafe. This demonstrates why environmental governance must be adaptive. Regulations should be capable of responding to changing waste volumes, climatic conditions, landfill age, and technological performance.

Climate variability further complicates landfill risk. Intense rainfall can increase water infiltration, influence leachate generation, and potentially affect the stability of accumulated waste. This does not mean that every landfill landslide should be attributed to climate change. Rather, climatic conditions can interact with existing infrastructural and operational vulnerabilities. An environmental-justice approach therefore requires attention to compound risk, in which environmental hazards emerge from the interaction between natural processes and human systems. The concept of vulnerability developed by Adger (2006) is relevant here because

vulnerability depends not only upon exposure but also upon sensitivity and adaptive capacity. Bantargebang's workers and neighboring residents may face greater consequences from environmental disturbances when their socioeconomic capacity to adapt is limited.

3. Community Participation and Procedural Environmental Justice

Indonesian environmental and waste legislation formally recognizes the importance of public participation, but formal recognition does not necessarily produce meaningful participation. Procedural environmental justice requires affected communities to have access to information, opportunities to express concerns, and realistic opportunities to influence decisions. Participation becomes especially important in the context of Bantargebang because decisions about metropolitan waste infrastructure are often made at scales larger than the communities that experience the resulting environmental impacts. This creates a democratic problem: those who experience the consequences may possess less influence over decisions concerning the volume, movement, and management of waste.

From an environmental-justice perspective, consultation should therefore not be confused with participation. A meeting held after major decisions have already been made may satisfy a procedural requirement without providing communities with meaningful influence. Schlosberg (2007) and Walker (2012) emphasize that justice requires attention to the political capabilities of affected communities. Participation should enable communities to influence risk assessment, environmental monitoring, operational standards, emergency preparedness, compensation, and long-term planning. In Bantargebang, local residents and waste workers should not be treated merely as recipients of government programs; they should be recognized as stakeholders with legitimate knowledge and interests concerning the waste system.

Local knowledge is particularly important for environmental monitoring. Residents and workers interact with the landfill environment on a daily basis and may observe changes in odors, water quality, flooding, waste movement, fires, traffic, or slope conditions before such changes become apparent through periodic institutional monitoring. Incorporating this knowledge does not mean replacing scientific measurement with anecdotal evidence. Rather, it means creating institutional mechanisms through which local observations can complement technical monitoring. Such integration can strengthen early-warning systems and increase public trust. It can also reduce the knowledge hierarchy through which technical institutions automatically privilege formal expertise over community experience.

Procedural justice also requires transparency concerning the distribution of metropolitan waste. Communities should be able to access information concerning waste volumes, waste composition, landfill capacity, environmental monitoring, incidents, emergency procedures, and future development plans. Transparency

matters because environmental risks cannot be meaningfully contested when relevant information remains inaccessible. It also allows researchers, journalists, civil-society organizations, and affected communities to evaluate whether government commitments are being fulfilled. In this sense, information is not merely an administrative resource; it is a condition of environmental citizenship.

4. Waste Pickers, Labor Rights, and the Limits of Formalization

The legal governance of Bantargebang must also address waste pickers because environmental justice cannot be achieved while essential waste-management labor remains inadequately protected. Informal recycling contributes to material recovery and reduces the quantity of waste entering final disposal, yet informal workers frequently operate outside the institutional protections available to formal employees (Wilson, Velis, and Cheeseman 2006; Medina 2007). Their exposure to sharp objects, contaminated materials, hazardous substances, traffic, fires, and unstable landfill conditions demonstrates that occupational justice is inseparable from environmental justice.

The central policy challenge is to improve working conditions without destroying livelihoods. A simplistic formalization strategy could prohibit informal waste picking and replace workers with formal contractors. Such an approach may improve administrative control but could simultaneously deepen unemployment and poverty among workers whose income depends upon recyclable materials. A more just strategy would involve gradual integration through cooperatives, recognition of waste-picking organizations, access to protective equipment, occupational health services, social security, training, and guaranteed participation in recycling systems. Formalization should therefore mean formalizing rights and protections, not merely formalizing control over labor.

This approach is consistent with the broader environmental-justice principle of recognition. Waste pickers should be recognized as environmental workers whose labor creates public value. Their activities contribute to recycling and resource recovery, while their knowledge of material flows can improve waste-management efficiency. Their exclusion from formal planning therefore represents both a social injustice and a missed institutional resource. Integrating their knowledge and labor into circular-economy policies could reduce landfill dependence while simultaneously improving livelihood security. The transition toward a more sustainable waste system should consequently include waste pickers as participants rather than treating them as remnants of an outdated system.

5. Producer Responsibility and the Redistribution of Waste Costs

A major limitation of conventional municipal waste governance is its tendency to place responsibility for post-consumption waste primarily on households and local governments. Yet the characteristics of modern waste are strongly influenced by producers, especially through packaging, product design, material composition, and marketing practices. Extended producer responsibility (EPR) offers a

mechanism for shifting part of this responsibility upstream. Lindhqvist (2000) conceptualized EPR as a policy principle intended to extend producer responsibility across the life cycle of products. Its relevance to Bantargebang is straightforward: if producers contribute to the generation of difficult-to-recycle or excessive packaging waste, they should participate financially and organizationally in reducing and recovering that waste.

This principle has implications beyond recycling rates. EPR can redistribute the financial burden of waste management across actors who benefit from the production and consumption system. Without producer responsibility, municipalities may need to allocate increasing public resources to collection, transportation, and disposal. The host community then bears localized environmental risks, while producers retain the benefits of sales and consumers enjoy the convenience of consumption. EPR can potentially interrupt this chain of externalization by making environmental costs more visible in product systems.

Indonesia's waste-management framework has increasingly incorporated waste reduction and producer responsibility principles, but the effectiveness of such policies depends upon enforcement and measurable obligations. A just system should establish clear targets for packaging reduction, recyclability, take-back systems, material recovery, and producer financing. It should also ensure transparency concerning corporate performance. Otherwise, producer responsibility can remain largely rhetorical while municipalities continue to bear the operational burden. From an environmental-justice perspective, effective EPR should therefore be evaluated according to whether it actually reduces the amount of waste transferred to disposal communities.

6. Governance Fragmentation and the Metropolitan Scale

Bantargebang also exposes a fundamental institutional problem: waste flows do not necessarily follow administrative boundaries. Waste generated in Jakarta can create environmental consequences in Bekasi, meaning that the ecological geography of waste extends beyond the administrative geography of government. This creates a governance challenge because responsibilities may become fragmented between provincial governments, municipal governments, operators, communities, and private-sector actors. A decision made in one jurisdiction can produce environmental consequences in another. Urban political ecology helps explain why such fragmentation matters: ecological flows frequently exceed the territorial boundaries within which political institutions operate (Swyngedouw and Heynen 2003).

A metropolitan waste system therefore requires metropolitan-scale coordination. Waste volumes, transportation, landfill capacity, environmental monitoring, emergency response, recycling infrastructure, and long-term waste reduction strategies cannot be effectively managed when each institution considers only its own administrative territory. The absence of integrated governance can produce what might be called institutional displacement, in which each actor

manages its own responsibilities while the cumulative environmental burden remains concentrated in the host community. Justice requires coordination not only for operational efficiency but also for distributing responsibility.

The metropolitan scale also matters for financial accountability. If Bantargebang provides an essential service for Jakarta, the costs of environmental protection should not be borne disproportionately by local communities. The principle of fair burden-sharing suggests that metropolitan beneficiaries should contribute to environmental safeguards, community development, health protection, monitoring, and restoration. Compensation alone, however, is insufficient. Monetary transfers should complement, not replace, preventive measures and community participation. Otherwise, compensation can become a mechanism through which environmental burdens are effectively purchased rather than prevented.

7. From Legal Compliance to Substantive Environmental Justice

The analysis suggests that Bantargebang requires a shift from compliance-oriented governance toward justice-oriented governance. Compliance asks whether operators satisfy prescribed standards and whether government institutions have fulfilled formal administrative requirements. Justice asks whether the overall system distributes risks fairly, protects vulnerable groups, recognizes marginalized workers, and allows affected communities to influence decisions. These are related but not identical objectives. A facility may comply with formal regulations while still generating an unequal distribution of environmental burdens.

This distinction is especially important because environmental injustice can emerge through cumulative effects rather than a single regulatory violation. Repeated exposure to odors, traffic, pollution, occupational hazards, and insecurity may collectively produce substantial social costs even when individual impacts remain below a particular regulatory threshold. Environmental governance therefore needs to incorporate cumulative-impact assessment and community-level vulnerability. This would align environmental regulation more closely with the multidimensional understanding of justice advanced by Schlosberg (2007) and Walker (2012).

The same principle should guide responses to landfill landslides. After a landslide, emergency response is essential, but justice requires more than repairing damaged infrastructure. Authorities should investigate the structural conditions that allowed vulnerability to develop, identify affected groups, provide adequate health and livelihood support, strengthen prevention systems, and ensure that affected communities participate in decisions about future landfill operations. Otherwise, disaster management risks becoming a cycle of response without structural reform.

8. Toward a Just Urban Waste Transition

A more just Bantargebang system requires interventions at multiple levels. At the upstream level, waste generation must be reduced through producer

responsibility, packaging reduction, reuse, and circular-economy strategies. At the intermediate level, collection and recycling systems should be strengthened while waste pickers are incorporated into formal systems with meaningful social and occupational protections. At the downstream level, landfill operations require rigorous safety standards, environmental monitoring, emergency preparedness, and ecological safeguards. These interventions are mutually dependent. Increasing recycling without protecting workers can reproduce labor injustice, while improving landfill engineering without reducing waste can simply postpone the structural problem.

The concept of a just transition is therefore useful even outside the conventional energy-transition debate. A transition toward a more circular urban economy will alter the livelihoods of waste pickers, municipal workers, waste contractors, producers, and communities hosting disposal facilities. Policies that seek to reduce landfill dependence must anticipate these socioeconomic consequences. Workers should not be required to absorb the costs of environmental modernization. Instead, transition policies should provide training, social protection, participation, and alternative livelihood opportunities where existing activities become unnecessary.

Ultimately, Bantargebang demonstrates that urban cleanliness is not an environmentally neutral achievement. A city can appear clean because waste has been effectively removed from public view, while the environmental burden has simply been transferred elsewhere. The justice question is therefore not whether waste has disappeared from the streets but whether the entire waste system distributes responsibility and risk fairly. Law No. 18 of 2008 provides an important foundation by emphasizing waste reduction and environmentally sound management, while Law No. 32 of 2009 and Government Regulation No. 22 of 2021 provide broader environmental safeguards. The challenge is to transform these legal principles into a governance system in which prevention, participation, worker protection, and accountability are prioritized alongside technical disposal capacity.

The Bantargebang case consequently demonstrates a broader principle of urban environmental governance: the endpoint of a waste system is also the political endpoint of metropolitan consumption. What arrives at the landfill embodies decisions made by producers, consumers, governments, and institutions across the city. If those decisions continue to externalize environmental risks onto workers and host communities, the waste system will remain structurally unjust regardless of improvements in technical efficiency. A genuinely sustainable system must instead redistribute responsibility across the entire waste chain and recognize that protecting landfill communities is inseparable from changing the metropolitan patterns of production and consumption that create the waste burden in the first place.

Conclusion

The Bantargebang landfill demonstrates that urban waste is not merely a technical matter of collection, transportation, and disposal but a question of environmental justice. The analysis shows that the environmental risks associated with landfill operations are spatially and socially concentrated, while the benefits of waste removal are distributed across the wider Jakarta metropolitan population. Waste pickers and surrounding communities occupy particularly vulnerable positions because they experience direct exposure to landfill-related hazards while possessing comparatively limited political and economic capacity to influence the system that produces those risks. From an environmental-justice perspective, this represents an imbalance in distribution, recognition, and participation (Schlosberg 2007; Walker 2012). From an urban political-ecology perspective, Bantargebang is part of Jakarta's wider urban metabolism, absorbing the material consequences of consumption that occur elsewhere (Swyngedouw and Heynen 2003; Heynen, Kaika, and Swyngedouw 2006). The landslide and other environmental hazards should therefore not be interpreted simply as isolated technical failures. They reveal vulnerabilities accumulated through a metropolitan waste system that separates the places where waste is generated from the places where its environmental consequences are experienced. The central injustice lies in this unequal relationship between metropolitan consumption and localized exposure.

Addressing the Bantargebang crisis consequently requires a transformation of the waste system rather than merely improving landfill capacity or responding to individual accidents. Indonesia's legal framework, particularly Law No. 18 of 2008 on Waste Management and Law No. 32 of 2009 on Environmental Protection and Management, already provides important principles for waste reduction, environmental protection, public participation, and sustainable management. The challenge is to translate these principles into substantive environmental justice. This requires reducing waste at source, strengthening extended producer responsibility, expanding reuse and recycling, integrating waste pickers into safer and more socially protected systems, improving landfill monitoring and safety, and ensuring meaningful participation of surrounding communities in environmental decision-making. The costs of waste management should also be distributed across the metropolitan economy that generates the waste rather than concentrated disproportionately among landfill workers and host communities. Bantargebang ultimately demonstrates that a city cannot be considered environmentally sustainable merely because its streets are clean and its waste is removed from public view. A genuinely just urban waste system must ensure that the cleanliness enjoyed by the metropolitan population is not achieved by transferring environmental risks to communities with less power to resist them.

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