

Who Bears the Burden of Indonesia's Waste Emergency? Risk Society, Governance Capacity Gaps, and the Crisis of Ecological Citizenship

Adilita Pramanti¹, Syamsiah Baduddin²

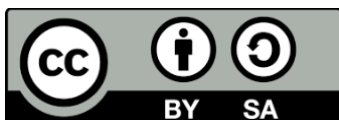
Department of Sociology, Faculty of Social and Political Sciences, Universitas Nasional, Jakarta,
Indonesia^{1,2}

adilita.pramanti@civitas.unas.ac.id^{1*}, syamsiahbadruddin0234@gmail.com²

Abstract

Indonesia is facing a recurring waste emergency in which the accumulation of municipal solid waste increasingly exceeds the capacity of local systems to collect, process, and safely dispose of it. This is not merely a technical failure of waste management infrastructure, but a sociological problem concerning who is exposed to waste-related risks, who has access to adequate services, who bears the costs of governance gaps, and whose voice is represented in decision-making. Official data illustrate the scale of the problem: the Ministry of Environment reported 56.63 million tonnes of waste generation in 2023, with 60.99% unmanaged, while SIPSN recorded 34.21 million tonnes in 2024 from 317 districts and cities, with 40.26% classified as unmanaged. By the end of 2025, 336 districts and cities had been identified as experiencing waste emergencies. This article employs an integrative literature review and policy document analysis to examine how waste risks are produced, distributed, and governed. The analysis integrates risk society, environmental justice, governance capacity gaps, and ecological citizenship. Findings indicate that waste emergencies reflect cumulative environmental and health risks, unequal exposure and service access, fragmented coordination, weak institutional capacity and enforcement, and the reduction of citizenship to behavioral responsibility. The article proposes a triple burden of waste emergency framework comprising exposure burden, service burden, and voice burden, arguing that a just transition requires redistributing not only waste flows, but also institutional responsibilities, resources, decision-making power, and protection.

Keywords: Waste Emergency, Risk Society, Governance Capacity Gaps, Ecological Citizenship, Environmental Justice



<https://creativecommons.org/licenses/by-sa/4.0/>

INTRODUCTION

Waste has become one of the defining infrastructures of contemporary urban life: it is produced by ordinary consumption, moved through largely invisible logistical systems, and concentrated in spaces that are socially and geographically distant from many of those who generate it. Globally, municipal solid waste is projected to increase from approximately 2.1 billion tonnes in 2023 to 3.8 billion tonnes by 2050, while the combined direct and hidden costs of inadequate waste management already include substantial health, environmental, climate, and economic burdens (United Nations Environment Programme [UNEP] & International Solid Waste Association [ISWA], 2024). The World Bank's latest global assessment similarly shows that waste generation is outpacing the capacity of many municipal systems, especially where infrastructure, financing, and institutional capability are weakest (Cook et al., 2026). These trends reinforce a long-standing conclusion in the waste-governance literature: solid waste management is a socio-technical system in which infrastructure, institutions, finance, user practices, labor relations, and political authority are deeply interdependent (Abarca Guerrero et al., 2013; Marshall & Farahbakhsh, 2013; Wilson et al., 2012).

Indonesia offers a particularly important setting for sociological analysis because waste governance combines rapid urbanization, uneven municipal capacity, decentralized authority, a large informal recycling economy, and ambitious national targets for waste reduction and handling. Official data must be interpreted carefully because coverage differs between reporting systems and years. The Ministry of Environment's 2025 National Waste Awareness Day circular reported an estimated 56.63 million tonnes of national waste generation in 2023, of which 60.99% was categorized as unmanaged, and noted that final disposal sites in 306 regions 54.44% of the reported total were still operated through open dumping (Ministry of Environment, 2025a). Separately, the National Waste Management Information System (SIPSN) reported 34.21 million tonnes of waste generation for 2024 based on submissions from 317 districts/cities, with 40.26% classified as unmanaged (Ministry of Environment, 2025b). These figures should not be read as a simple year-to-year trend because their geographic coverage and aggregation frames differ; instead, they indicate the persistence of a large management gap and the importance of improving data completeness and comparability.

The language of 'waste emergency' has become more than a rhetorical device. In late 2025 and 2026, municipal authorities in several Indonesian locations confronted landfill and collection disruptions that generated explicit emergency responses. Waste emergency is not simply a sudden failure of waste collection or landfill capacity; it is the accumulated outcome of demographic, consumption, infrastructural, and governance pressures (Pramanti & Chotim, 2019). In South Tangerang, for example, Mayor's Decision No. 600.1.17.3/Kep.21-Huk/2026 established an emergency waste-management status from 20 January to 20 July 2026, explicitly citing the need for mitigation and coordinated emergency measures (Mayor of South Tangerang, 2026). Recent sociological research on Yogyakarta likewise argues that the 'garbage emergency' should be understood not as a discrete disposal failure but as a socio-ecological crisis linked to spatial inequality, institutional neglect, and the externalization of urban waste burdens to peripheral communities (Mahaswa et al., 2026). The recurrence of such emergencies raises a fundamental question: when waste systems fail, who bears the burden?

The Sociology Day material that forms the conceptual starting point of this article frames the waste emergency as a crisis of citizens' environmental rights, rooted in weak policy, institutional coordination, insufficient public participation, and the unequal distribution of ecological risk. It also identifies five practical problem areas: weak or poorly recognized complaint channels, limited public access to waste-management information,

insufficient socialization of emergency waste mitigation, education and training that do not necessarily translate into behavior change, and weak legal follow-through on waste-management neglect. Rather than treating these observations as primary empirical findings, this article uses them as sensitizing propositions for a broader evidence synthesis. This distinction is methodologically important: the presentation material establishes the sociological problem and policy questions, while the article tests, refines, and contextualizes those propositions using peer-reviewed research and official documents.



Figure 1. Initial visualization of 'Indonesia's Waste Emergency' from the SOD presentation materials. The graph serves to illustrate problem framing rather than representing national statistics, as the source material did not specify measurement methodology or data metadata. Source: SOD presentation materials by Adilita Pramanti, Sociology Day, February 20, 2026.



Figure 2. Illustration of waste accumulation in urban areas and the landscape of final disposal/processing sites from the SOD materials. The visuals highlight that the waste crisis encompasses service, spatial, and ecological exposure dimensions. Source: Research materials, January 10, 2026.

The first theoretical anchor is Ulrich Beck's (1992) concept of risk society. Modernization does not merely produce wealth; it also produces manufactured risks whose causes, effects, and accountability are distributed across complex systems. Waste is paradigmatic: consumption, packaging, urban growth, industrial systems, and convenience generate material residues whose hazards are displaced through collection, dumping, burning,

landfilling, and informal recovery. Open burning can release hazardous air pollutants and particulate matter (Wiedinmyer et al., 2014), while poorly managed waste is associated with multiple pathways of health risk in developing-country contexts (Giusti, 2009; Ziraba et al., 2016). Plastic leakage links terrestrial waste-management failures to marine ecosystems at planetary scale (Borrelle et al., 2020; Jambeck et al., 2015; Lau et al., 2020). Yet risk-society theory alone does not explain why some communities are more exposed than others.

For that purpose, environmental justice provides a second analytical pillar. Contemporary environmental justice scholarship emphasizes distributive justice who receives environmental benefits and burdens alongside recognition and procedural justice whose identities and knowledge are respected, and who can participate meaningfully in decisions (Agyeman et al., 2016; Schlosberg, 2004). In waste systems, the distributive question concerns proximity to landfills, collection gaps, pollution, and occupational exposure. Recognition concerns the status of waste pickers and communities that are frequently stigmatized despite providing environmental services. Procedural justice concerns access to information, complaint mechanisms, compensation decisions, facility siting, and policy design. Recent Indonesian research shows how these dimensions intersect. Studies of waste pickers in Bantargebang and other landfill economies reveal unsafe living and working conditions, economic dependence, and the need for formal recognition and social safeguards (Al Furqan et al., 2026; Sasaki et al., 2014, 2022). A 2026 analysis of landfill compensation policy in Bantargebang similarly highlights persistent justice concerns despite long-running compensation schemes (Tamba et al., 2026).

The third pillar is governance capacity. The original Sociology Day framing used the term 'state failure.' That language captures the seriousness of the crisis but is analytically too broad if it implies that the state as a whole has ceased to function. A more precise concept is sector-specific governance capacity: the ability of public institutions to formulate, coordinate, finance, implement, monitor, enforce, learn, and adapt (Fukuyama, 2013; Pahl-Wostl, 2009). Waste systems are inherently multi-level and multi-actor. National regulations can establish targets, but collection, transport, treatment, and disposal depend heavily on local government capability, intergovernmental coordination, budget reliability, infrastructure, market conditions, producer behavior, citizen cooperation, and the informal sector. Collaborative and polycentric governance theories therefore help explain why rules can exist without producing consistent outcomes (Ansell & Gash, 2008; Emerson et al., 2012; Ostrom, 2010).

The fourth pillar is ecological citizenship. Dobson (2007) argues that environmental citizenship extends beyond conventional political membership by linking rights, duties, ecological footprints, and responsibilities across space. This perspective is useful for waste because households are simultaneously rights-holders, service users, consumers, waste generators, and potential participants in reduction and sorting. However, ecological citizenship must not become a language for shifting institutional failures onto individuals. Calls for citizens to sort, reduce, recycle, and behave responsibly are legitimate only when governments and producers provide accessible services, information, infrastructure, incentives, market pathways, and accountability. In other words, responsibility must be reciprocal rather than one-directional.

Existing Indonesian waste research is rich but fragmented. Technical and systems studies examine municipal performance and treatment options; community-based research addresses source reduction and waste banks (Dhokhikah et al., 2015; Trihadiningrum et al., 2017); scholarship on the informal sector examines integration, livelihoods, and exclusion (Sembiring & Nitivattananon, 2010; Simpson et al., 2025); and environmental studies analyze health, plastic leakage, and technology. Recent work has also begun to examine the justice implications of circular-economy transitions and waste-bank networks, including the possibility that interventions that improve material recovery can still exclude vulnerable waste

pickers from valuable waste flows (Amin et al., 2026; Budiarto et al., 2025; van Leeuwen & Surya, 2024). What remains less developed is an integrated sociological framework linking manufactured risk, governance capacity, environmental justice, and ecological citizenship to explain how a 'waste emergency' redistributes burdens among citizens.

This article addresses that gap through three research questions: (1) How are the environmental, social, and livelihood risks of Indonesia's waste emergency distributed among citizens and waste-sector actors? (2) Which governance capacity gaps transform a chronic waste-management deficit into a crisis of environmental rights and ecological citizenship? and (3) What institutional design can move waste policy from recurrent emergency response toward preventive, circular, and socially just governance? The article's principal contribution is the 'triple burden of waste emergency' framework: exposure burden, service burden, and voice burden. By distinguishing these dimensions, the analysis shows that waste injustice is not only about who lives near pollution; it is also about who lacks reliable services and who lacks effective voice in the institutions that govern waste.

RESEARCH METHODS

This study employed an integrative literature review combined with policy and document analysis. An integrative design was chosen because the research problem crosses disciplinary boundaries: municipal waste systems are simultaneously environmental, sociological, administrative, technological, labor, and public-health phenomena. Unlike a systematic review designed to answer a narrowly specified intervention question, an integrative review allows theoretical works, empirical studies, policy documents, legal instruments, and official statistics to be synthesized around a common analytical problem. The study therefore does not claim exhaustive coverage of every publication on waste in Indonesia; instead, it prioritizes conceptual coherence, source quality, empirical relevance, and transparency in selection.

The initial analytical categories were derived from the Sociology Day material prepared for 20 February 2026. Five practical concerns complaint mechanisms, access to information, emergency mitigation communication, the limited behavioral impact of socialization and training, and weak enforcement were treated as sensitizing propositions rather than verified primary data. The presentation's conceptual triad of risk society, state failure/governance, and citizenship was retained but refined. 'State failure' was operationalized as governance capacity gaps; environmental justice was added to specify unequal burden distribution; and ecological citizenship was used to connect environmental rights, public participation, and responsibility.

Literature discovery focused on peer-reviewed journal articles and authoritative reports accessible through academic discovery tools, journal publisher platforms, DOI/Crossref metadata, and official institutional repositories. Search combinations included 'Indonesia municipal solid waste governance,' 'waste emergency Indonesia,' 'open dumping Indonesia,' 'waste picker Indonesia,' 'waste bank Indonesia,' 'community participation waste Indonesia,' 'waste-to-energy Indonesia,' 'environmental justice waste,' 'risk society waste,' 'ecological citizenship waste,' and 'circular economy waste governance.' Contemporary empirical studies from approximately 2010–2026 were prioritized, while earlier foundational theoretical works were retained where necessary. International literature was included to situate Indonesia in broader debates on integrated waste management, health risk, circular economy, and governance.

Sources were included when they met at least one of four criteria: (a) peer-reviewed research directly addressing municipal solid waste governance, environmental and health risks, informal recycling, citizen participation, or waste technology; (b) empirical research focused on Indonesia or comparable developing-country waste systems; (c) foundational peer-

reviewed theory relevant to governance, environmental justice, or ecological citizenship; or (d) official Indonesian legal, statistical, planning, or emergency-management documents. Sources were excluded when bibliographic provenance was unclear, when they were purely promotional, when they duplicated stronger evidence, or when technical detail had no clear relevance to governance or social consequences. The final reference set deliberately exceeds the requested 65% share of reputable international peer-reviewed journals.

The qualitative analysis combined deductive and inductive coding. Deductive codes were derived from the integrated framework: risk production and distribution; institutional capacity and coordination; distributive, recognition, and procedural justice; citizen access and voice; enforcement and accountability; informal-sector inclusion; technological pathways; and circular-economy transition. Inductive coding captured recurring mechanisms that cut across those categories, such as spatial externalization, responsabilization of households, data fragmentation, livelihood displacement, and emergency normalization. Evidence was then compared across source types to identify convergence, contradiction, and limits of inference.

Data validity was strengthened through source triangulation. Official statistics were checked against reporting scope, and figures with different geographic coverage were not treated as directly comparable trends. The 2023 national estimate reported in the 2025 ministerial circular and the 2024 SIPSAN submission-based figures, for example, are presented as complementary indicators rather than a time series because the reporting frames differ. Local emergency declarations are used as institutional evidence that waste-management failure reached formal emergency status, not as proof that all Indonesian municipalities face the same conditions. Likewise, causal claims about public behavior are avoided where the source literature provides only cross-sectional or descriptive evidence.

The study has three limitations. First, it is based on secondary evidence and does not substitute for interviews, household surveys, environmental exposure measurements, or institutional ethnography. Second, Indonesian waste statistics remain sensitive to reporting coverage, definitions, and data completeness. Third, the diversity of local governments means that national-level synthesis necessarily obscures variation in fiscal capacity, geography, service systems, political commitment, and market structure. These limitations are addressed by using cautious language, distinguishing national patterns from illustrative cases, and treating the proposed framework as a theoretically grounded model for subsequent empirical testing.

Table 1. Integrated Analytical Framework

Dimension	Core question	Indicative mechanisms / evidence	Primary theoretical lens
Risk production and distribution	Who is exposed to waste-related risks, and how are those risks produced?	Open dumping, open burning, leachate, odor, disease pathways, plastic leakage, occupational exposure, landfill proximity	Risk society; environmental health
Governance capacity	Can institutions prevent, coordinate, finance, implement, monitor, and enforce?	Collection reliability, institutional fragmentation, fiscal capacity, data quality, regulatory enforcement, adaptive response	Governance capacity; collaborative and polycentric governance
Environmental justice	Who receives burdens and benefits, whose status is recognized, and who can participate?	Facility siting, service inequality, waste-picker recognition, compensation, grievance channels, decision-making access	Distributive, recognition, and procedural justice

Dimension	Core question	Indicative mechanisms / evidence	Primary theoretical lens
Ecological citizenship	How are environmental rights and responsibilities balanced?	Information rights, source separation, complaint access, community co-production, producer responsibility, accountability	Ecological citizenship
Circular transition	Do technological and market solutions reduce waste while protecting people?	Prevention, reuse, recycling, composting, EPR, waste banks, WtE, just-transition safeguards	Circular economy; socio-technical transition

RESULT AND DISCUSSION

Results

A. From Chronic Waste Pressure to a Governance Emergency

The synthesis indicates that Indonesia's waste emergency is best understood as the acute expression of a chronic systems problem. National targets have long been ambitious: Presidential Regulation No. 97 of 2017 established a 2025 policy direction of 30% waste reduction and 70% handling for household and household-like waste (Republic of Indonesia, 2017). Yet official evidence shows that large volumes remained unmanaged as the target year approached. The Ministry of Environment's 2025 circular, using 2023 national figures, reported 56.63 million tonnes of waste generation and 60.99% unmanaged waste, while also identifying widespread open-dumping practice (Ministry of Environment, 2025a). The SIPSN 2024 reporting set, based on 317 districts/cities, recorded 34.21 million tonnes and 40.26% unmanaged waste (Ministry of Environment, 2025b). The discrepancy between these values does not itself indicate rapid improvement or deterioration; it reflects different reporting coverage and underscores a governance problem of data comparability.

International evidence helps explain why persistent service deficits can accumulate into crisis. Integrated waste systems depend on a functioning chain from prevention and storage to collection, transport, recovery, treatment, and safe final disposal. Weakness at any stage can transfer pressure downstream (Abarca Guerrero et al., 2013; Wilson et al., 2015). Where source separation is limited, mixed waste reduces recycling quality and increases the burden on final disposal. Where collection is irregular, households may resort to dumping or burning. Where landfill capacity or operating permits are disrupted, waste backs up in neighborhoods and temporary sites. What appears publicly as a sudden emergency is therefore often the visible endpoint of years of institutional, infrastructural, and behavioral accumulation.

The South Tangerang case illustrates this conversion from chronic stress to formal emergency. Mayor's Decision No. 600.1.17.3/Kep.21-Huk/2026 recognized the city as meeting emergency waste conditions and established an emergency period from 20 January to 20 July 2026. The decision also required communication, information, education, behavior change, and a strengthened management system as part of the emergency response (Mayor of South Tangerang, 2026). Sociologically, the importance of the document lies not only in administrative status but in what it reveals: a municipal waste problem can cross a threshold at which routine governance arrangements are judged insufficient and exceptional coordination becomes necessary. This supports the Sociology Day premise that a waste emergency is simultaneously a governance and citizenship issue.

Recent scholarship on Yogyakarta reaches a complementary conclusion. Mahaswa et al. (2026) interpret the garbage emergency around the Piyungan landfill as slow violence and socio-spatial externalization, in which urban centers displace the material and social consequences of consumption to peripheral 'sacrifice zones.' Their argument reinforces the

wider finding of this review: emergencies do not begin on the day a landfill closes or collection stops. They emerge through long-term normalization of unequal exposure, insufficient prevention, and the political invisibility of communities that absorb system costs.



Figure 3. Illustration of the public visibility of the emergency status and the logistical pressures of waste transport, based on SOD materials. Visual excerpts serve as illustrations; policy status was analyzed using official documents. Source: SOD materials, February 20, 2026.

B. Unequal Risk Distribution: The Exposure Burden

Risk is not distributed according to the amount of waste an individual or group generates. Instead, the physical geography of waste systems concentrates exposure in specific places and occupations. Communities near landfills and uncontrolled disposal sites may face odor, smoke, vectors, contaminated water, unstable slopes, and psychosocial stress, while informal waste workers experience direct contact with mixed and potentially hazardous materials. International reviews link poor solid waste management to respiratory, infectious, gastrointestinal, injury, and toxic-exposure pathways, although the magnitude of risk varies by context and exposure route (Giusti, 2009; Ziraba et al., 2016). Open burning adds an atmospheric pathway by emitting particulate matter and hazardous pollutants (Wiedinmyer et al., 2014).

Indonesia-specific studies make this inequality visible. Research on the Bantargebang disposal economy has shown that waste pickers can derive significant livelihood value from recyclables while simultaneously facing dangerous living and working conditions (Sasaki et al., 2014, 2022). More recent research confirms that waste pickers' policy priorities include work safety, sanitation, food security, and children's education, demonstrating that the waste economy is inseparable from broader dimensions of well-being (Al Furqan et al., 2026). Amin et al. (2026) similarly find that livelihood vulnerability in Surakarta is shaped by dependence on waste picking, limited assets, weak social protection, and exposure to technological transition. These studies complicate a simple victim narrative: informal workers are active economic actors and environmental service providers, yet their contribution does not guarantee recognition, protection, or bargaining power.

Environmental justice is also relevant to communities that do not work in the waste sector but live near final disposal sites. Compensation schemes can acknowledge harm without necessarily eliminating it. Tamba et al. (2026), for example, show that environmental justice questions persist around Bantargebang despite long-standing compensation arrangements. Monetary compensation may address part of a distributive problem, but it cannot substitute for exposure reduction, public health safeguards, transparent monitoring,

recognition, and meaningful participation. This distinction matters because policy may otherwise normalize environmental sacrifice as long as compensation is provided.

Waste risks also extend beyond landfill boundaries. Plastic mismanagement contributes to riverine and marine leakage, creating ecological harms that are spatially disconnected from the point of consumption (Jambeck et al., 2015). Global modelling demonstrates that current mitigation efforts are insufficient to prevent continued growth in plastic pollution without systemic changes across production, consumption, collection, and treatment (Borrelle et al., 2020; Lau et al., 2020). From a risk-society perspective, these flows illustrate how everyday consumption generates diffuse, delayed, and transboundary hazards. From an environmental-justice perspective, they show why risk cannot be evaluated only at the household level; institutional and corporate production systems shape what materials enter the waste stream in the first place.

C. Unequal Service Access: The Service Burden

The second burden is unequal access to reliable waste services. A household may be asked to sort and reduce waste, but its capacity to do so depends on whether separated materials are collected separately, whether recyclables have stable downstream markets, whether organics can be composted or treated, and whether residual waste is transported to controlled facilities. The literature on developing-country cities consistently identifies service coverage, financing, technical capacity, land availability, institutional coordination, and public cooperation as interdependent determinants of performance (Abarca Guerrero et al., 2013; Fernando & Zutshi, 2023; Marshall & Farahbakhsh, 2013; Zhang et al., 2024). Thus, behavioral campaigns without service architecture can generate a gap between expected responsibility and feasible action.

Community-based programs demonstrate both possibility and limitation. In Surabaya, household participation has been associated with source reduction, recycling, and community-based initiatives (Dhokhikah et al., 2015; Trihadiningrum et al., 2017). Waste banks can increase the social and economic visibility of recyclables and create local incentives for sorting. A recent national review nevertheless concludes that waste banks account for only a limited share of recyclable waste management and depend heavily on local organizational conditions, market demand, and institutional support (Budiyarto et al., 2025). Community participation is therefore not a substitute for municipal responsibility; it is one component of a broader service system.

There is also an equity tension inside community-based recycling. van Leeuwen and Surya (2024) show that waste-bank networks in Klaten can improve plastic recovery while simultaneously excluding vulnerable waste pickers from access to valuable materials. This finding is central to a just circular-economy transition. A policy can be environmentally effective at the material-flow level and socially regressive at the livelihood level. Service redesign must therefore ask not only how much waste is diverted, but who gains access to the new value chain, who loses income, and whether informal workers are offered recognition, contracts, cooperatives, social protection, training, or alternative livelihood pathways.

The service burden also includes information as infrastructure. The Sociology Day material identifies limited access to waste-management information and weakly recognized complaint channels. These concerns are consistent with procedural-justice theory: citizens cannot effectively cooperate with a system they cannot understand, monitor, or challenge. Data dashboards such as SIPSN are important, but public accountability also requires local service standards, accessible information on collection schedules and facility performance, transparent reporting of incidents, and grievance mechanisms that produce traceable responses. Information should be designed not only for administrative reporting but for citizens' practical use.

D. Governance Capacity Gaps: Coordination, Enforcement, and Adaptive Learning

The review finds strong evidence for governance capacity gaps but insufficient basis for labeling the Indonesian state as uniformly failed. The distinction matters. Indonesia has a substantial legal architecture: Law No. 18 of 2008 provides the national waste-management framework; Law No. 23 of 2014 allocates waste responsibilities within decentralized government; Presidential Regulation No. 97 of 2017 establishes national targets; and planning documents increasingly link waste reform with low-carbon development and circular economy. The problem is the uneven translation of policy authority into local implementation capacity (Republic of Indonesia, 2008, 2014, 2017, 2025).

Fukuyama's (2013) definition of governance emphasizes the state's ability to make and enforce rules and deliver services. Applied to waste, capacity includes stable financing, professional staffing, infrastructure planning, procurement, contract management, environmental monitoring, enforcement, and coordination across agencies and jurisdictions. Local governments differ widely on each dimension. A landfill serving multiple jurisdictions may be technically located in one locality while receiving waste from another; recycling markets can span provinces; producer responsibility links national regulation to private supply chains; and rivers transport waste across administrative boundaries. These characteristics create coordination problems that no single agency can solve independently.

Collaborative and polycentric governance research suggests that multi-actor systems can be more adaptive when roles, information, accountability, and conflict-resolution mechanisms are clear (Ansell & Gash, 2008; Emerson et al., 2012; Ostrom, 2010). The opposite is also true: fragmentation without coordination can generate responsibility gaps. When citizens cannot identify which institution is responsible for a complaint, when enforcement is weak or inconsistent, or when emergency responsibilities are improvised only after service disruption, formal decentralization may result in institutional ambiguity. The source material's concern about unorganized complaint channels is therefore not a minor communication issue; it is an indicator of how responsibility is structured.

Adaptive capacity is equally important. Pahl-Wostl (2009) emphasizes learning across levels of governance. Waste systems must respond to changing consumption patterns, new packaging materials, extreme weather, landfill saturation, market volatility, and technological change. An emergency declaration can mobilize resources, but repeated reliance on emergency instruments may signal that learning has not been institutionalized into preventive planning. Emergency management should therefore generate after-action reviews, publicly reported lessons, revised contingency plans, and investment priorities rather than simply restoring the previous system.

Enforcement is another capacity dimension. Illegal dumping, open burning, non-compliant facilities, and inadequate producer responsibility cannot be corrected solely through moral appeals to citizens. Effective governance requires monitoring, credible sanctions, and enforcement that is proportional and procedurally fair. At the same time, punitive approaches directed at low-income households or informal workers can deepen injustice if formal services are inaccessible. Enforcement must therefore differentiate between actors with different levels of control and responsibility, placing greater obligations on institutions and producers capable of shaping the material system.

E. Participation, Behavior Change, and the Voice Burden

The third component of the proposed framework is voice burden: the unequal ability to influence waste decisions, obtain information, complain, and secure institutional response. Public participation is often invoked as a solution to waste problems, but 'participation' can range from receiving information to co-designing policy. Environmental justice requires the latter to be taken seriously. If communities are expected to accept facilities, alter household

practices, or bear transition costs without meaningful influence over service standards, siting, technology, or compensation, participation becomes instrumental rather than democratic.

The Sociology Day material notes that socialization and training do not necessarily produce behavior change. The wider literature supports a cautious interpretation. Household behavior is shaped not only by knowledge and attitudes but by convenience, norms, infrastructure, incentives, service reliability, and confidence that sorted waste will remain separated downstream. Agent-based modelling of urban Indonesia reinforces the importance of socioeconomic heterogeneity and community-level system conditions in household recycling behavior (Asih et al., 2026). Educational interventions may raise awareness, but durable behavior change requires enabling conditions and feedback.

Ecological citizenship helps clarify the normative balance. Citizens have responsibilities to reduce waste, separate materials where systems exist, avoid littering and open burning, and participate in collective solutions. Yet citizens also possess environmental rights: to a healthy environment, accessible services, credible information, safety, procedural fairness, and protection from disproportionate exposure. When institutions emphasize duties while underproviding rights, the result is responsabilization—the transfer of systemic burdens to individuals. A legitimate circular transition requires reciprocity: producers redesign materials and finance end-of-life systems, governments ensure service and enforcement, markets provide recovery pathways, and citizens participate in prevention and separation.

Voice burden is especially important for informal workers. Waste pickers often possess detailed practical knowledge of material values, routes, contamination, and recycling markets, yet may be excluded from planning. Simpson et al. (2025) argue that the informal sector has been persistently misunderstood despite its long-standing service role. Recent Indonesia-specific research further shows that circular and WtE transitions can create livelihood vulnerabilities when they change access to recyclable materials (Amin et al., 2026). Recognition therefore requires institutionalized representation, not merely consultation after decisions have been made.

F. Technology, Waste-to-Energy, and the Limits of the Techno-Fix

The source material identifies waste-to-energy (WtE), SIPSN, and the circular economy as examples of technology and policy instruments that have not yet necessarily translated into public benefit. The evidence supports a nuanced conclusion. WtE technologies can reduce residual waste volume and recover energy, but their environmental and economic performance depends on waste composition, scale, emissions control, feedstock consistency, capital cost, operations, and the counterfactual treatment pathway (Hoang et al., 2022; Makarichi et al., 2018; Malinauskaite et al., 2017). Life-cycle analysis shows that no treatment technology is automatically superior across all contexts; system boundaries and avoided burdens matter (Istrate et al., 2020).

For Indonesia, this means WtE should not be treated as a substitute for waste prevention, source separation, recycling, and organic treatment. Mixed municipal waste with high moisture content can constrain thermal efficiency, while contracts that require guaranteed waste volumes may create perverse incentives if poorly designed. More importantly, rapid technological transition can disrupt informal recycling livelihoods. A just approach therefore requires social-impact assessment, material-flow analysis, transparent procurement, emissions monitoring, residual-ash management, and safeguards for workers whose access to recyclables changes.

Circular economy offers a broader framework because it prioritizes avoidance, reuse, repair, recycling, and resource recovery before final disposal. Indonesia's national planning increasingly incorporates circular-economy reform, and the Circular Economy Roadmap and Action Plan 2025–2045 was launched in 2024 (Ministry of National Development

Planning/Bappenas, 2025). Yet circularity is not inherently just. If circular markets concentrate value among formal firms while displacing informal workers, or if recycling burdens are transferred to households without service support, material efficiency can coexist with social exclusion. A just circular economy therefore requires institutional design that connects environmental performance with labor inclusion, social protection, and procedural justice.

The results can be summarized in five mechanisms: waste risk accumulates through infrastructural and institutional deficits; exposure is socially and spatially concentrated; service access shapes the feasibility of citizen responsibility; governance gaps mediate whether rules become outcomes; and technological solutions create benefits only when embedded in prevention, justice, and accountable institutions. These mechanisms support the proposed triple-burden model.

Table 2. Evidence Synthesis

Synthesis theme	Evidence pattern	Sociological interpretation	Policy implication
Waste pressure becomes emergency	High unmanaged volumes, open dumping, landfill/service disruptions, formal emergency declarations	Acute crises are visible endpoints of cumulative socio-technical failure	Institutionalize prevention, contingency planning, data continuity, and after-action learning
Exposure burden	Landfill-adjacent communities and waste workers face disproportionate environmental and occupational risk	Manufactured risks are spatially externalized and unequally distributed	Exposure reduction, health safeguards, recognition, fair compensation, worker protection
Service burden	Uneven collection, separation, recovery, market access, and information constrain household action	Citizens cannot exercise responsibility without enabling infrastructure	Universal service standards, source-separation logistics, accessible information and markets
Voice burden	Complaint channels, participation, and representation are often weaker than behavioral obligations	Procedural injustice shifts responsibility without equal decision-making power	Traceable grievance systems, participatory planning, waste-worker representation, public reporting
Governance capacity gaps	Rules and targets coexist with uneven local capacity, coordination and enforcement	Problem is implementation capability rather than absence of formal policy alone	Professional institutions, stable finance, intergovernmental coordination, monitoring and enforcement
Technology/circular transition	WtE and circular initiatives can reduce waste but may create lock-in or livelihood displacement	Techno-fixes can redistribute risks and value rather than eliminate them	Waste hierarchy, lifecycle assessment, social safeguards, EPR, inclusive circular value chains

Discussion

A. Risk Society: Waste as Manufactured and Unequally Externalized Risk

The findings support Beck's central insight that late-modern institutions generate risks that are inseparable from systems of production and consumption. Municipal waste is not an accidental residue outside modernization; it is one of modernization's routine outputs. Packaging, disposable products, e-commerce logistics, changing food systems, urban density,

and rising consumption continuously produce materials whose downstream impacts depend on institutional capacity. Waste becomes a risk-society problem when the benefits of consumption are widely distributed but the harms of disposal are concentrated and politically obscured.

However, a purely universalized risk-society interpretation is insufficient because exposure is not socially equal. The concept becomes more analytically powerful when combined with environmental justice. Residents of affluent neighborhoods may experience waste primarily as a collection service, while landfill communities experience it as odor, traffic, environmental exposure, stigma, and land-use conflict. Informal waste workers experience waste simultaneously as hazardous material and economic resource. These differences show that the same waste stream carries different meanings and risks depending on social position.

The concept of slow violence is useful here. Environmental harms often accumulate gradually and therefore lack the dramatic temporality associated with disaster. Mahaswa et al. (2026) show how a 'garbage emergency' can paradoxically obscure the long duration of the conditions that produced it. Declaring an emergency may mobilize attention, but it can also frame the problem as exceptional when it is structurally persistent. The policy challenge is to use emergency status as a gateway to structural reform rather than as a temporary suspension before returning to business as usual.

B. Why 'State Failure' Should Be Reframed as Governance Capacity Gaps

The Sociology Day framing of 'state failure' is normatively forceful because it highlights the state's obligation to protect citizens' environmental rights. Yet as a social-scientific diagnosis, the term risks collapsing distinct failures into a single category. Indonesia has laws, national targets, information systems, local regulations, emergency instruments, and expanding circular-economy policy. The empirical problem is not an absence of state action; it is uneven capability, fragmented implementation, weak coordination, and persistent gaps between rules and outcomes.

Governance-capacity language offers four analytical advantages. First, it is measurable: fiscal capacity, staffing, collection coverage, enforcement actions, response times, data completeness, and facility compliance can be assessed. Second, it recognizes local heterogeneity rather than treating all governments as equivalent. Third, it identifies institutional mechanisms that can be improved. Fourth, it permits accountability without assuming that failure in one service sector equals collapse of the state as a whole. This reframing therefore strengthens rather than weakens the critical argument.

The governance literature also cautions against assuming that centralization is the only solution to fragmented local performance. Polycentric systems can mobilize local knowledge and distributed capacity when there are clear rules, monitoring, coordination, and conflict-resolution arrangements (Ostrom, 2010). Collaborative governance can similarly integrate municipalities, producers, community organizations, recyclers, researchers, and informal workers if power asymmetries are explicitly managed (Ansell & Gash, 2008; Emerson et al., 2012). The central issue is not whether governance is centralized or decentralized in the abstract, but whether responsibilities, resources, authority, and accountability are aligned.

C. Environmental Justice and the Crisis of Ecological Citizenship

The waste emergency becomes a citizenship crisis when basic environmental rights depend on where people live, how much institutional attention they can command, and whether they possess access to complaint and decision-making mechanisms. Environmental justice clarifies three distinct claims. Distribution asks whether some communities bear more pollution and fewer services. Recognition asks whether informal workers and affected

communities are treated as legitimate stakeholders rather than as nuisances or passive beneficiaries. Procedure asks whether they can access information, challenge decisions, participate early, and receive reasoned responses.

Ecological citizenship adds a second layer: environmental systems require citizens to exercise responsibility, but rights and duties must be reciprocal. A household cannot be meaningfully blamed for failing to recycle if collection mixes materials again downstream or if no market or facility exists for separated waste. Likewise, communities should not be asked to tolerate pollution in the name of urban service without adequate health protection, monitoring, participation, and compensation. The normative objective is co-responsibility: households reduce and separate; producers design for circularity and finance recovery; governments guarantee service, regulation and enforcement; and waste-sector workers receive safe conditions and social protection.

This balance is especially important in policy communication. Awareness campaigns often assume an information deficit: if citizens know more, behavior will improve. Yet behavior is embedded in structures. Convenience, trust, social norms, incentives, available space, collection frequency, fee structures, and perceived fairness all affect household decisions. Effective communication should therefore be paired with material redesign of the system. Public education is necessary but cannot replace institutional performance.

D. The Triple Burden of Waste Emergency: Exposure, Service, and Voice

The principal theoretical contribution of this article is the triple-burden framework. The first dimension, exposure burden, concerns unequal contact with environmental and occupational hazards. It is experienced most directly by communities around disposal and processing facilities, informal waste workers, and populations affected by uncontrolled dumping or burning. The second dimension, service burden, concerns unequal access to the infrastructure and institutional support necessary to manage waste safely. Households with irregular collection, no sorting pathway, limited information, or distant facilities carry more of the practical labor and risk of disposal. The third dimension, voice burden, concerns unequal capacity to shape decisions, obtain information, complain, and secure institutional remedy.

These burdens can overlap but should not be conflated. A community may receive regular collection and still face exposure because it is located near a landfill. Another community may have low direct exposure yet face poor service and resort to burning. Waste pickers may have detailed system knowledge but little formal voice. The framework therefore provides a diagnostic tool for policy evaluation: an intervention is not fully just if it improves one burden while worsening another.

For example, a new WtE facility may reduce landfill pressure and thus lower some exposure burdens. Yet if procurement consumes a disproportionate share of municipal budgets, service burdens elsewhere may increase. If the facility reduces access to recyclable materials without livelihood protections, waste pickers may face economic harm. If affected communities are excluded from siting and emissions-monitoring decisions, voice burdens remain. Conversely, inclusive source-separation programs can reduce exposure, improve service, and strengthen voice when they combine reliable collection, community participation, market access, and recognition of informal workers.

The framework also helps clarify accountability. Exposure burden points toward environmental standards and occupational safety. Service burden points toward fiscal, infrastructural, and managerial capacity. Voice burden points toward transparency, grievance, recognition, and democratic procedure. A single indicator such as tonnes collected or landfill diversion cannot capture all three. High-quality waste governance requires a multidimensional performance system.

E. From Emergency Management to Just Circular Governance

The results suggest that Indonesia should move from a predominantly reactive logic toward a preventive and just circular-governance model. Prevention begins upstream. The waste hierarchy places avoidance and reduction before recycling, energy recovery, and disposal. Extended producer responsibility can help shift financial and material responsibility toward producers, but it must be designed with transparency and social inclusion. Packaging redesign, reuse systems, organics prevention, food-loss reduction, repair, and recycled-content markets reduce the volume that municipalities must handle.

Second, universal basic waste service should be treated as environmental infrastructure. The global waste literature emphasizes that collection and controlled disposal are foundational public-health services (Wilson et al., 2012; Cook et al., 2026). Circular ambitions cannot substitute for this foundation. Municipalities require stable financing, professional management, measurable service standards, and access to regional solutions where local scale is insufficient. Intergovernmental fiscal design should recognize that weaker municipalities cannot achieve national targets with mandates alone.

Third, source separation should be designed as a complete chain rather than a household campaign. Separate containers, schedules, collection vehicles or compartments, transfer points, organics treatment, materials-recovery markets, and public feedback must align. Where downstream systems remix separated materials, trust erodes and participation declines. Digital information systems should therefore connect administrative monitoring with practical public information: service schedules, facility status, incident alerts, grievance tracking, and performance dashboards.

Fourth, waste workers formal and informal must be integrated into transition planning. Informal recyclers already contribute to material recovery, and their exclusion can reduce both social justice and system efficiency (Sembiring & Nitivattananon, 2010; Simpson et al., 2025). Integration can take different forms: identification cards, occupational safety equipment, designated sorting access, cooperatives, procurement preferences, contracts, social insurance, training, or livelihood transition packages. The correct model will vary locally, but non-recognition should no longer be the default.

Fifth, technology procurement should be conditional on transparent lifecycle and social assessment. WtE may be appropriate for certain residual streams and urban contexts, but it should not lock municipalities into waste generation or undermine higher-value prevention and recycling. Public disclosure of feedstock assumptions, emissions controls, financial commitments, residual-ash plans, monitoring data, and social impacts is essential. Circular economy is a governance strategy, not a synonym for incineration or digitalization.

Sixth, emergency governance should become a learning institution. Emergency status should trigger standardized risk communication, temporary service arrangements, public complaint channels, interagency command, protection for workers and affected communities, and daily or weekly performance monitoring. After the emergency, a public review should identify causes, institutional failures, costs, and corrective investments. Without this learning loop, emergencies become recurrent rather than transformative.

Finally, waste reform should be connected to Indonesia's broader development and climate commitments. National planning already links circular economy, sustainable consumption and production, waste reform, and low-carbon development. The 2025 Voluntary National Review notes the launch of the Circular Economy Roadmap and Action Plan 2025–2045 and reports progress in recycling while identifying continued challenges in awareness, technology, infrastructure, and finance (Ministry of National Development Planning/Bappenas, 2025). Waste-sector methane reduction, avoided open burning, material efficiency, and organics management can support climate objectives, but the Paris Agreement

does not itself prescribe a specific waste technology. Climate alignment should therefore be assessed through actual emissions performance, not technological labels.

Table 3. Policy Architecture for a Just Waste Transition

Current failure mode	Structural mechanism	Priority reform	Suggested accountability indicator
Waste accumulation / emergency collection	Downstream overload and weak contingency capacity	Waste prevention, contingency protocols, regional backup capacity, emergency logistics	Frequency/duration of service disruption; emergency waste backlog; recovery time
Open dumping / uncontrolled burning	Insufficient controlled disposal, enforcement, or collection access	Close/rehabilitate open dumps; universal collection; monitoring and proportionate enforcement	Share of waste to controlled facilities; open-burning complaints; compliance status
Low source separation	Behavioral demands not matched by infrastructure and markets	End-to-end separated collection, organics treatment, MRFs, feedback and incentives	Households served by separate collection; contamination rate; material recovery rate
Invisible or excluded waste workers	Low recognition and weak bargaining power	Registration, occupational safety, cooperatives/contracts, social protection, just-transition safeguards	Worker coverage by PPE/social insurance/contracts; worker representation in planning
Weak complaint and information systems	Procedural fragmentation and low transparency	One-stop grievance channel with case tracking; local service dashboards; incident disclosure	Response/resolution time; % complaints closed; data completeness and timeliness
Technology-first policy	Procurement incentives and pressure for rapid disposal solutions	Waste-hierarchy tests, lifecycle assessment, transparent contracts, social-impact assessment	Cost/tonne, emissions compliance, residual management, diversion from prevention/recycling
Repeated emergencies	Limited institutional learning	Mandatory post-emergency review, corrective action plan, budgeted prevention measures	Implementation rate of corrective actions; recurrence within 12–24 months

CONCLUSIONS

Indonesia's waste emergency is not adequately explained as a technical shortage of trucks, landfills, or treatment plants. It is a sociological crisis because the burdens generated by urban consumption are distributed through unequal social positions, territories, institutions, and labor arrangements. The evidence reviewed in this article shows that unmanaged waste and open dumping create cumulative environmental and health risks; landfill communities and informal workers frequently absorb disproportionate exposure; service inequality constrains citizens' ability to act responsibly; and weak complaint, information, and participation systems can turn environmental management into a crisis of citizenship.

The article refines the original 'state failure' framing by distinguishing wholesale state failure from sector-specific governance capacity gaps. Indonesia has a substantial legal and policy architecture, but implementation remains uneven because authority, finance, expertise, data, enforcement, and coordination do not always align across governance levels. This distinction matters because it converts a broad diagnosis into a reform agenda that can be measured and improved.

The proposed triple burden of waste emergency exposure burden, service burden, and voice burden provides a compact framework for future research and policy evaluation. A waste policy should not be considered successful solely because more tonnes are collected or

diverted from landfill. It should also reduce unequal exposure, provide reliable and accessible services, protect workers and vulnerable communities, and expand citizens' effective voice. This framework can be tested empirically through community surveys, spatial exposure studies, grievance-system analysis, service audits, and institutional interviews across municipalities with different capacities.

A high-quality transition therefore requires more than emergency cleanup or a single technology. It requires upstream prevention, universal basic waste services, source separation linked to real downstream infrastructure, accountable producer responsibility, transparent and context-appropriate technology, recognition of informal workers, robust enforcement, and participatory governance. Citizens must be treated not only as waste generators who need behavioral correction, but as rights-holders, knowledge holders, service users, and co-governors. The fundamental policy question is thus not simply how Indonesia can dispose of more waste, but how it can prevent waste and govern unavoidable residuals without concentrating ecological costs on those with the least power to refuse them.

REFERENCES

- Abarca Guerrero, L., Maas, G., & Hogland, W. (2013). Solid waste management challenges for cities in developing countries. *Waste Management*, 33(1), 220–232. <https://doi.org/10.1016/j.wasman.2012.09.008>
- Agyeman, J., Schlosberg, D., Craven, L., & Matthews, C. (2016). Trends and directions in environmental justice: From inequity to everyday life, community, and just sustainabilities. *Annual Review of Environment and Resources*, 41, 321–340. <https://doi.org/10.1146/annurev-environ-110615-090052>
- Al Furqan, R., Agustina, E., Uttajug, A., & Abe, N. (2026). Towards an inclusive society and solid waste management system: Revealing waste pickers' life preference and satisfaction in Indonesia. *Journal of Material Cycles and Waste Management*, 28, 3543–3557. <https://doi.org/10.1007/s10163-026-02635-y>
- Amin, C., Umrotun, Fikriyah, V. N., & Samson, M. G. M. (2026). Livelihood vulnerability of urban waste pickers in Indonesia: Insights for inclusive circular economy transitions. *World Development Sustainability*, 8, 100268. <https://doi.org/10.1016/j.wds.2026.100268>
- Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. *Journal of Public Administration Research and Theory*, 18(4), 543–571. <https://doi.org/10.1093/jopart/mum032>
- Asih, A. M. S., Prasetyo, D. H., & Sopha, B. M. (2026). Household recycling behavior and community-based waste management: An agent-based modeling of socioeconomic heterogeneity in urban Indonesia. *Journal of Environmental Management*, 399, 128658. <https://doi.org/10.1016/j.jenvman.2026.128658>
- Beck, U. (1992). *Risk society: Towards a new modernity*. Sage.
- Borrelle, S. B., Ringma, J., Law, K. L., Monnahan, C. C., Lebreton, L., McGivern, A., Murphy, E., Jambeck, J., Leonard, G. H., Hilleary, M. A., Eriksen, M., Possingham, H. P., De Frond, H., Gerber, L. R., Polidoro, B., Tahir, A., Bernard, M., Mallos, N., Barnes, M., & Rochman, C. M. (2020). Predicted growth in plastic waste exceeds efforts to mitigate plastic pollution. *Science*, 369(6510), 1515–1518. <https://doi.org/10.1126/science.aba3656>
- Budiarto, A., Clarke, B., & Ross, K. (2025). Overview of waste bank application in Indonesian regencies. *Waste Management & Research*, 43(3), 306–321. <https://doi.org/10.1177/0734242X241242697>

- Cook, E., Ionkova, K., Bhada-Tata, P., Yadav, S., & Van Woerden, F. (2026). *What a Waste 3.0: Global snapshot of solid waste management toward circularity until 2050*. World Bank. <https://doi.org/10.1596/978-1-4648-2309-1>
- Dhokhikah, Y., Trihadiningrum, Y., & Sunaryo, S. (2015). Community participation in household solid waste reduction in Surabaya, Indonesia. *Resources, Conservation and Recycling*, 102, 153–162. <https://doi.org/10.1016/j.resconrec.2015.06.013>
- Dobson, A. (2007). Environmental citizenship: Towards sustainable development. *Sustainable Development*, 15(5), 276–285. <https://doi.org/10.1002/sd.344>
- Emerson, K., Nabatchi, T., & Balogh, S. (2012). An integrative framework for collaborative governance. *Journal of Public Administration Research and Theory*, 22(1), 1–29. <https://doi.org/10.1093/jopart/mur011>
- Fernando, S. J., & Zutshi, A. (2023). Municipal solid waste management in developing economies: A way forward. *Cleaner Waste Systems*, 5, 100103. <https://doi.org/10.1016/j.clwas.2023.100103>
- Ferronato, N., & Torretta, V. (2019). Waste mismanagement in developing countries: A review of global issues. *International Journal of Environmental Research and Public Health*, 16(6), 1060. <https://doi.org/10.3390/ijerph16061060>
- Fukuyama, F. (2013). What is governance? *Governance*, 26(3), 347–368. <https://doi.org/10.1111/gove.12035>
- Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances*, 3(7), e1700782. <https://doi.org/10.1126/sciadv.1700782>
- Giddens, A. (2009). *The politics of climate change*. Polity.
- Giusti, L. (2009). A review of waste management practices and their impact on human health. *Waste Management*, 29(8), 2227–2239. <https://doi.org/10.1016/j.wasman.2009.03.028>
- Hoang, A. T., Varbanov, P. S., Nižetić, S., Sirohi, R., Pandey, A., Luque, R., Ng, K. H., & Pham, V. V. (2022). Perspective review on municipal solid waste-to-energy route: Characteristics, management strategy, and role in circular economy. *Journal of Cleaner Production*, 359, 131897. <https://doi.org/10.1016/j.jclepro.2022.131897>
- Istrate, I.-R., Iribarren, D., Gálvez-Martos, J.-L., & Dufour, J. (2020). Review of life-cycle environmental consequences of waste-to-energy solutions on the municipal solid waste management system. *Resources, Conservation and Recycling*, 157, 104778. <https://doi.org/10.1016/j.resconrec.2020.104778>
- Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, 347(6223), 768–771. <https://doi.org/10.1126/science.1260352>
- Lau, W. W. Y., Shiran, Y., Bailey, R. M., Cook, E., Stuchtey, M. R., Koskella, J., Velis, C. A., Godfrey, L., Boucher, J., Murphy, M. B., Thompson, R. C., Jankowska, E., Castillo Castillo, A., Pilditch, T. D., Dixon, B., Koerselman, L., Kosior, E., Favoino, E., Gutberlet, J., ... Palardy, J. E. (2020). Evaluating scenarios toward zero plastic pollution. *Science*, 369(6510), 1455–1461. <https://doi.org/10.1126/science.aba9475>
- Mahaswa, R. K., Kim, M. S., & Nurriky, A. M. (2026). The emergency will last a long time: Hyperabjection, slow violence, and the enduring politics of waste in Indonesia. *Environmental Sociology*. Advance online publication. <https://doi.org/10.1080/23251042.2026.2637620>
- Makarichi, L., Jutidamrongphan, W., & Techato, K.-A. (2018). The evolution of waste-to-energy incineration: A review. *Renewable and Sustainable Energy Reviews*, 91, 812–821. <https://doi.org/10.1016/j.rser.2018.04.088>
- Malinauskaite, J., Jouhara, H., Czajczyńska, D., Stanchev, P., Katsou, E., Rostkowski, P., Thorne, R. J., Colón, J., Ponsá, S., Al-Mansour, F., Anguilano, L., Krzyżyńska, R., López, I. C., Vlasopoulos, A., & Spencer, N. (2017). Municipal solid waste

- management and waste-to-energy in the context of a circular economy and energy recycling in Europe. *Energy*, 141, 2013–2044. <https://doi.org/10.1016/j.energy.2017.11.128>
- Marshall, R. E., & Farahbakhsh, K. (2013). Systems approaches to integrated solid waste management in developing countries. *Waste Management*, 33(4), 988–1003. <https://doi.org/10.1016/j.wasman.2012.12.023>
- Mayor of South Tangerang. (2026). *Keputusan Wali Kota Tangerang Selatan Nomor 600.1.17.3/Kep.21-Huk/2026 tentang Status Darurat Pengelolaan Sampah*. JDIH Kota Tangerang Selatan.
- Ministry of Environment. (2025a). *Surat Edaran Menteri Lingkungan Hidup/Kepala Badan Pengendalian Lingkungan Hidup Nomor 01 Tahun 2025 tentang Hari Peduli Sampah Nasional 2025*. Government of Indonesia.
- Ministry of Environment. (2025b). *Sistem Informasi Pengelolaan Sampah Nasional (SIPSN): Capaian kinerja pengelolaan sampah tahun 2024*. Government of Indonesia.
- Ministry of National Development Planning/Bappenas. (2025). *Voluntary National Review 2025: Indonesia's progress toward the Sustainable Development Goals*. Government of Indonesia.
- Ostrom, E. (2010). Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change*, 20(4), 550–557. <https://doi.org/10.1016/j.gloenvcha.2010.07.004>
- Pahl-Wostl, C. (2009). A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 19(3), 354–365. <https://doi.org/10.1016/j.gloenvcha.2009.06.001>
- Pramanti, A., & Chotim, E. E. (2019). Critical review of growth population, plastic waste and the digital society in Indonesia. *Jurnal Partisipatoris*, 1(2), 79–86. <https://doi.org/10.22219/jp.v1i2.8569>
- Republic of Indonesia. (2008). *Law No. 18 of 2008 on Waste Management*.
- Republic of Indonesia. (2014). *Law No. 23 of 2014 on Local Government*.
- Republic of Indonesia. (2017). *Presidential Regulation No. 97 of 2017 on National Policy and Strategy for Household Waste and Household-like Waste Management*.
- Republic of Indonesia. (2025). *Presidential Regulation No. 12 of 2025 on the National Medium-Term Development Plan (RPJMN) 2025–2029*.
- Sasaki, S., Araki, T., Tambunan, A. H., & Prasadja, H. (2014). Household income, living and working conditions of dumpsite waste pickers in Bantar Gebang: Toward integrated waste management in Indonesia. *Resources, Conservation and Recycling*, 89, 11–21. <https://doi.org/10.1016/j.resconrec.2014.05.006>
- Sasaki, S., Choi, Y., & Watanabe, K. (2022). Economic status of waste pickers in Bantar Gebang compared to other workers in Indonesia. *Habitat International*, 119, 102501. <https://doi.org/10.1016/j.habitatint.2021.102501>
- Schlosberg, D. (2004). Reconceiving environmental justice: Global movements and political theories. *Environmental Politics*, 13(3), 517–540. <https://doi.org/10.1080/0964401042000229025>
- Sembiring, E., & Nitivattananon, V. (2010). Sustainable solid waste management toward an inclusive society: Integration of the informal sector. *Resources, Conservation and Recycling*, 54(11), 802–809. <https://doi.org/10.1016/j.resconrec.2009.12.010>
- Simpson, M., Oduro-Appiah, K., Günsilius, E., Dias, S. M., & Scheinberg, A. (2025). Shifting perceptions of informal operators in the service and value chains: A retrospective of 40 years of observation and advocacy for informal recyclers and waste service providers, through the eyes of five global participant-researchers. *Waste*

- Management & Research*, 43(6), 850–896. <https://doi.org/10.1177/0734242X241280076>
- Tamba, W. P., Laksmono, B. S., Machdum, S. V., & Tamba, D. (2026). Transforming landfill compensation policy in Bantargebang, Indonesia: An environmental justice perspective. *Sustainability*, 18(9), 4204. <https://doi.org/10.3390/su18094204>
- Temper, L., Demaria, F., Scheidel, A., Del Bene, D., & Martinez-Alier, J. (2018). The Global Environmental Justice Atlas (EJAtlas): Ecological distribution conflicts as forces for sustainability. *Sustainability Science*, 13(3), 573–584. <https://doi.org/10.1007/s11625-018-0563-4>
- Trihadiningrum, Y., Laksono, I. J., Dhokhikah, Y., Moesriati, A., Radita, D. R., & Sunaryo, S. (2017). Community activities in residential solid waste reduction in Tenggilis Mejoyo District, Surabaya City, Indonesia. *Journal of Material Cycles and Waste Management*, 19(1), 526–535. <https://doi.org/10.1007/s10163-015-0440-5>
- United Nations Environment Programme & International Solid Waste Association. (2024). *Global waste management outlook 2024: Beyond an age of waste—Turning rubbish into a resource*. United Nations Environment Programme.
- van Leeuwen, J., & Surya, I. R. F. (2024). Network power and exclusion of informal waste pickers when plastic flows change: A case study of community waste banks in Klaten Municipality in Indonesia. *Marine Policy*, 167, 106285. <https://doi.org/10.1016/j.marpol.2024.106285>
- Varjani, S., Shahbeig, H., Popat, K., Patel, Z., Vyas, S., Shah, A. V., Barceló, D., Ngo, H. H., Sonne, C., Lam, S. S., Aghbashlo, M., & Tabatabaei, M. (2022). Sustainable management of municipal solid waste through waste-to-energy technologies. *Bioresource Technology*, 355, 127247. <https://doi.org/10.1016/j.biortech.2022.127247>
- Wiedinmyer, C., Yokelson, R. J., & Gullett, B. K. (2014). Global emissions of trace gases, particulate matter, and hazardous air pollutants from open burning of domestic waste. *Environmental Science & Technology*, 48(16), 9523–9530. <https://doi.org/10.1021/es502250z>
- Wilson, D. C., Rodic, L., Cowing, M. J., Velis, C. A., Whiteman, A. D., Scheinberg, A., Vilches, R., Masterson, D., Stretz, J., & Oelz, B. (2015). ‘Wasteaware’ benchmark indicators for integrated sustainable waste management in cities. *Waste Management*, 35, 329–342. <https://doi.org/10.1016/j.wasman.2014.10.006>
- Wilson, D. C., Rodic, L., Scheinberg, A., Velis, C. A., & Alabaster, G. (2012). Comparative analysis of solid waste management in 20 cities. *Waste Management & Research*, 30(3), 237–254. <https://doi.org/10.1177/0734242X12437569>
- Zhang, Z., Chen, Z., Zhang, J., Liu, Y., Chen, L., Yang, M., Osman, A. I., Farghali, M., Liu, E., Hassan, D., Ihara, I., Lu, K., Rooney, D. W., & Yap, P.-S. (2024). Municipal solid waste management challenges in developing regions: A comprehensive review and future perspectives for Asia and Africa. *Science of the Total Environment*, 930, 172794. <https://doi.org/10.1016/j.scitotenv.2024.172794>
- Ziraba, A. K., Haregu, T. N., & Mberu, B. (2016). A review and framework for understanding the potential impact of poor solid waste management on health in developing countries. *Archives of Public Health*, 74, 55. <https://doi.org/10.1186/s13690-016-0166-4>