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**Solid Waste Governance and Environmental Compliance in Liberia and Florida,
USA: A Cross-Jurisdictional Analysis**


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Solid Waste Governance and Environmental Compliance in Liberia and Florida, USA: A Cross-Jurisdictional Analysis

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Abstract

Purpose: This cross-jurisdictional review examines the divergence and convergence of municipal solid waste management (MSWM) governance in two jurisdictions, Liberia, West Africa, and the state of Florida, USA, with the aim of identifying governance design features that drive compliance gaps and transferable lessons for policy reform in lower-income country settings.

Methodology: The review employs a systematic comparative literature review organised around the integrated solid waste management (ISWM) framework and supplemented by the Governance Analytical Framework (GAF) and New Institutional Economics theory. Evidence was drawn from peer-reviewed journal articles, World Bank and United Nations assessments, national and state regulatory documents, and grey literature from non-governmental organisations. Literature was identified through systematic searches of Google Scholar, Scopus, and PubMed, covering the period 2000 to 2025. Analysis was structured across five governance dimensions: legislative coherence, institutional capacity, compliance monitoring, enforcement, and public participation.

Findings: Liberia's MSWM system is characterised by fragmented legislation, limited enforcement infrastructure, the absence of Polluter Pays and Extended Producer Responsibility mechanisms, and a persistent policy-to-practice gap between formal regulatory commitments and operational realities. Florida's system, anchored in the Resource Conservation and Recovery Act and administered through the Florida Department of Environmental Protection, demonstrates more coherent regulatory architecture and graduated compliance mechanisms. Florida's governance framework is significantly shaped by groundwater and aquifer protection imperatives, providing a sharp structural contrast to Liberia's documented pattern of disposal into swamplands, waterways, and vacant lots. Documented inequities in enforcement, Consent Order fatigue, and preemption laws limiting local environmental justice protections indicate that formal regulatory strength does not automatically produce equitable outcomes in mature systems either.

Unique Contribution to Theory, Practice and Policy: The review identifies five transferable governance principles for Liberia: legislative consolidation with implementing regulations, county-level institutional investment, graduated enforcement pathways, formal integration of community-based and informal sector actors into governance frameworks, and a leapfrog digital monitoring strategy suited to mobile infrastructure rather than replication of complex data systems. The review argues that the governance gap separating high- and lower-income country MSWM systems is, at its core, a governance design problem as much as a resource problem.

Keywords: *Municipal Solid Waste Management, Environmental Compliance, Regulatory Governance, West Africa, Solid Waste Policy, FDEP, RCRA, Cross-Jurisdictional Analysis*

JEL Classification: *Q53, Q56, H75, O18*

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INTRODUCTION

Global municipal solid waste (MSW) generation is on a steep upward trajectory. The United Nations Environment Programme projects that annual MSW production will increase from approximately 2.3 billion tonnes in 2023 to 3.8 billion tonnes by 2050, with the fastest growth concentrated in low- and middle-income countries undergoing rapid urbanisation (UNEP, 2024; Maalouf et al., 2025). Within sub-Saharan Africa, this trajectory is compounded by infrastructure deficits, constrained public financing, and institutional frameworks that have historically prioritised waste collection over the broader governance architecture needed to ensure environmental compliance (Kponor et al., 2020; Mmereki et al., 2016).

The academic literature on comparative MSWM governance has grown considerably over the past two decades, tracing the distance between high-income country regulatory systems, characterised by hierarchical legislation, professional enforcement agencies, and data-driven compliance monitoring, and lower-income country systems, where formal legislative frameworks often exist without the operational capacity to implement them (Marshall and Farahbakhsh, 2013; Wilson et al., 2015; Yadav and Samadder, 2018). What is less well-represented in this literature are fine-grained cross-jurisdictional analyses that situate a specific West African jurisdiction alongside a specific high-income jurisdiction, with attention to how the regulatory design features of the latter might, or might not, inform governance reform in the former.

This review addresses that gap by comparing Liberia and the state of Florida, USA. The selection of these two jurisdictions reflects both the geographic scope of the published evidence base and the thematic relevance of the comparison: Liberia is among the more comprehensively documented MSWM cases in anglophone West Africa, and Florida represents a well-documented sub-national jurisdiction with a multi-tiered, federally integrated waste governance system. A central structural contrast between the two jurisdictions is that Florida's governance architecture has been substantially shaped by the imperative to protect its shallow limestone aquifer system, which underlies the state's drinking water supply and is acutely vulnerable to leachate and chemical contamination from improperly managed waste. This aquifer protection imperative drives Florida's strict permitting standards, financial assurance requirements, and liner specifications for landfills and waste facilities. Liberia's documented pattern of waste disposal into swamplands, waterways, and vacant lots reflects the inverse condition: the absence of a regulatory logic anchored in groundwater protection, and the consequences of that absence for public health and ecological integrity. The comparison is not offered as a normative claim that Florida's model is desirable or replicable; it is offered as a structured analytical lens through which the structural drivers of governance divergence can be more precisely identified.

The review draws on peer-reviewed journal articles, World Bank and United Nations assessments, national and state regulatory documents, and grey literature from non-governmental organisations active in Liberia's solid waste sector. Literature was identified through systematic searches of Google Scholar, Scopus, and PubMed using the terms 'solid waste management Liberia', 'municipal solid waste governance West Africa', 'Florida environmental compliance', 'RCRA enforcement', and 'integrated solid waste management developing countries', supplemented by reference-chain searching from key review papers. The review period spans 2000 to 2025, with

emphasis on sources published after 2015 to capture the most current regulatory and institutional developments in both jurisdictions.

Problem Statement

Despite two decades of comparative MSWM scholarship, the existing literature has not produced a fine-grained cross-jurisdictional analysis pairing a specific West African jurisdiction with a specific high-income sub-national jurisdiction. Broader regional surveys document the structural deficits of lower-income country waste governance in aggregate terms, but they do not situate those deficits against a comparably detailed account of a functioning regulatory system in a way that allows the gap between the two to be analysed at the level of specific governance design features (Marshall and Farahbakhsh, 2013; Wilson et al., 2015; Mmereki et al., 2016). The result is that reform recommendations for sub-Saharan African MSWM systems tend to remain at a level of generality that limits their operational usefulness for policymakers in specific jurisdictions. A second gap concerns Liberia specifically: the peer-reviewed literature on Liberia's MSWM governance remains thin relative to comparable anglophone West African cases, and no existing study has examined its compliance architecture against a high-income country counterpart (Kponor et al., 2020). This review addresses both gaps. The primary beneficiaries are Liberian environmental policymakers and regulators engaged in implementing the 2024 National Solid Waste Management Policy, development partners supporting MSWM sector reform in West Africa, and researchers building comparative MSWM governance literature for the sub-Saharan African context.

The paper is structured as follows. Section 2 presents the conceptual framework and theoretical grounding informing the comparison. Section 3 describes the methodology. Sections 4 and 5 review the published literature on MSWM governance in Liberia and Florida, respectively. Section 6 presents a thematic comparative analysis across five governance dimensions. Section 7 discusses policy implications and transferable lessons. Section 8 concludes.

Conceptual Framework

This review employs the integrated solid waste management (ISWM) framework as its primary analytical structure. The ISWM framework recognises that effective waste governance depends on the alignment of three interdependent dimensions: (1) the technical and operational elements of waste management systems, including collection, treatment, resource recovery, and disposal; (2) governance factors, encompassing legislation, regulatory authority, financing, enforcement, and inter-institutional coordination; and (3) local contextual factors, including geography, economic capacity, public awareness, and the role of informal sector actors (Marshall and Farahbakhsh, 2013; Zurbrügg et al., 2014; Wilson et al., 2015). For the purposes of this review, the governance dimension is the primary focus, as it is within this dimension that the most significant divergences between Liberia and Florida are observed in the literature.

A second analytical concept employed here is the compliance gap, defined as the observable distance between what a regulatory framework formally requires and what regulated entities and individuals actually do (Dangi and Boland, 2017). Compliance gaps are not simply a product of non-compliance by regulated parties; they reflect the interaction between regulatory design, monitoring capacity, enforcement resources, and the incentive structures facing both regulators

and the regulated. The literature on MSWM governance in lower-income countries consistently identifies regulatory capacity constraints, rather than legislative ambition, as the primary driver of wide compliance gaps (Yadav and Samadder, 2018; Hoang and Fogarassy, 2020). This framework allows the comparison to move beyond a surface-level observation that Liberia and Florida have different waste outcomes, toward an analysis of why those differences exist and what governance mechanisms, if any, could narrow them.

The review does not adopt a purely technocratic view of compliance as a matter of regulatory design alone. The literature increasingly recognises that community engagement, informal sector integration, and public participation are structural components of MSWM governance, not peripheral additions (Wilson et al., 2015; Maalouf et al., 2025). Incorporating these dimensions is especially important in the Liberian context, where non-governmental and community-based actors carry operational responsibilities that formal institutions are unable to fulfil.

The theoretical grounding of this review draws on three complementary frameworks. First, New Institutional Economics, specifically North's (1990) framework distinguishing formal institutions (laws, regulations, enforcement mechanisms) from informal institutions (norms, customs, self-imposed behavioural codes) and from organisational capacity. North's framework holds that regulatory outcomes depend not solely on the formal rules in place but on the degree to which institutional capacity, including the organisations charged with implementing and enforcing those rules, aligns with the demands placed on it. Applied to MSWM governance, this means that the compliance gap between Liberia and Florida is understood not as a simple deficit of legislation but as a product of the institutional distance between the formal regulatory demands each jurisdiction has set for itself and the organisational capacity available to meet them.

Second, this review integrates the Governance Analytical Framework (GAF) as a complementary analytical lens. The GAF, developed within the tradition of institutional analysis, is particularly suited to contexts where formal rules and informal norms diverge. In Liberia, this divergence is central to understanding why compliance gaps persist: the 2024 National Solid Waste Management Policy establishes formal regulatory commitments, but informal norms, including community dumping practices, open burning, and the absence of household-level waste accountability, continue to govern daily behaviour. The GAF allows this review to categorise the compliance gap not simply as a resource deficit but as a conflict between formal institutional demands and the informal norms that structure behaviour at the household and community level. This reframing has practical significance for policy design: governance interventions that address only formal rules without accounting for informal behavioural norms are unlikely to produce durable compliance change.

Third, institutional path dependency theory is employed to explain why Liberia's waste governance trajectory has been difficult to alter even when formal policy commitments have been made. Path dependency analysis holds that governance outcomes are shaped by the accumulated institutional choices of preceding periods: infrastructure investments, organisational mandates, and bureaucratic cultures become self-reinforcing over time, making reform costly even when the need for change is acknowledged. Liberia's post-conflict governance context, in which multiple institutional rebuilding efforts have had to compete with immediate humanitarian priorities, illustrates the path dependency dynamic. These three theoretical lenses, New Institutional

Economics, GAF, and path dependency, complement the ISWM framework by providing explanatory accounts of why compliance gaps persist even where formal regulatory intent is present, and by identifying the conditions under which governance reforms are likely to generate sustainable change (North, 1990; Yadav and Samadder, 2018).

METHODOLOGY

This study employs a systematic comparative literature review as its research design. A systematic comparative literature review is appropriate for questions that require synthesising the state of knowledge across multiple documentary sources, including peer-reviewed literature, policy documents, and institutional assessments, in order to draw structured comparisons across jurisdictions (Marshall and Farahbakhsh, 2013; Zurbrügg et al., 2014). This design was selected over primary data collection because the governance dimensions under examination, specifically legislative coherence, institutional capacity, compliance monitoring, enforcement, and public participation, are documented with sufficient depth in the existing published literature to support comparative analysis at the level of specificity this review pursues. The research does not generate new field observations or empirical measurements; it synthesises, organises, and analyses existing documentary evidence within the ISWM, GAF, and New Institutional Economics frameworks described in Section 2.

The target population for this review comprised all published and grey literature bearing on solid waste governance, environmental compliance, regulatory capacity, and enforcement practice in Liberia and the state of Florida, USA, from 2000 to 2025. The review placed emphasis on sources published after 2015 to capture the most current regulatory and institutional developments in both jurisdictions, while retaining earlier foundational studies where they provide the most comprehensive available treatment of a topic.

Sources were identified through systematic keyword searches of three academic databases: Google Scholar, Scopus, and PubMed. Search terms applied included 'solid waste management Liberia', 'municipal solid waste governance West Africa', 'Florida environmental compliance', 'RCRA enforcement', and 'integrated solid waste management developing countries'. These database searches were supplemented by reference-chain searching from key review papers identified in the initial rounds to capture relevant studies not indexed in the primary databases. Primary regulatory documents from the EPA-L, FDEP, U.S. EPA, World Bank, Cities Alliance, and UNEP were retrieved directly from institutional repositories and official government websites. Grey literature from non-governmental organisations active in Liberia's solid waste sector was included where it provided the only available documentation of operational conditions not covered in the peer-reviewed record.

Data analysis followed a thematic synthesis approach. Retrieved documents were reviewed for relevance to the five ISWM governance dimensions identified in the conceptual framework. Content was coded and organised under each dimension for both jurisdictions, enabling systematic side-by-side comparison. The analytical process moved from descriptive synthesis within each jurisdiction to comparative analysis across jurisdictions, with findings presented in tabular and narrative form. No statistical analysis was conducted, consistent with the qualitative nature of the

review methodology. The review did not include primary data collection from human subjects and therefore did not require institutional ethical review.

MSWM Governance in Liberia: A Review of the Literature

Legislative and Institutional Framework

The legislative architecture governing solid waste in Liberia has been a subject of scholarly and policy concern for over two decades. Kponor et al. (2020), in the most comprehensive peer-reviewed review of Liberia's MSWM system to date, characterise the legislative environment as 'inconsistent and fragmented', with multiple laws making reference to waste management without establishing an integrated operational framework. The Environmental Protection and Management Law grants the Environmental Protection Agency of Liberia (EPA-L) principal regulatory authority over environmental matters, including solid waste. The Public Health Law of 1975, though outdated in scope, continues to provide the basis for environmental sanitation provisions in the absence of more current operational guidance. The National Environmental Policy and the National Environmental Action Plan supplement these instruments at the strategic level.

The most significant recent legislative development is the 2024 National Solid Waste Management Policy, published by the EPA-L, which represents Liberia's first dedicated national-level policy instrument for the solid waste sector and addresses waste minimisation, recycling, resource recovery, institutional roles, and financing mechanisms (EPA Liberia, 2024). A critical question for the trajectory of Liberia's governance reform concerns whether the 2024 Policy formally introduces key regulatory principles that anchor more mature systems. The policy does not explicitly enshrine the Polluter Pays Principle as an enforceable regulatory standard, nor does it establish a formalised Extended Producer Responsibility (EPR) framework. In Florida, EPR for electronics and certain product categories serves as a major governance pillar, shifting end-of-life management costs and logistics to producers and reducing the burden on public waste systems. The absence of both Polluter Pays and EPR provisions in the 2024 Policy means that what is commonly described in the literature as a 'compliance gap' is, more precisely, a 'policy gap' at the foundational level: regulated entities cannot be held to standards that the legal framework has not yet established. Whether this policy gap is addressed through implementing regulations will be a defining determinant of whether the 2024 Policy produces operational change or remains a strategic statement without enforcement consequence (Kponor et al., 2020; World Bank, 2019; Cities Alliance, 2021).

Institutional responsibility for waste management in Liberia is distributed across the EPA-L, the Monrovia City Corporation (MCC), the Ministry of Internal Affairs, and county governments, without clearly defined mandates or coordination mechanisms (Kponor et al., 2020; Cities Alliance, 2021). The MCC carries primary operational responsibility for Greater Monrovia's waste collection, but functions without the legal infrastructure or technical staffing to enforce environmental compliance standards at facility or household levels. County environmental offices, where they exist, are characterised in the literature as severely under-resourced in personnel, transportation, and data systems (World Bank, 2019).

Operational Conditions and the Compliance Gap

The literature is consistent on the operational conditions of MSWM in Liberia. A World Bank assessment from 2019 estimated that more than 85 percent of household, commercial, and biohazardous waste ends up in unsanitary dumps, swamplands, vacant lots, or near waterways (World Bank, 2019). Waste collection coverage in Greater Monrovia is estimated at below 50 percent of total waste generated, with rural counties receiving effectively no formal collection services (Cities Alliance, 2021). Kponor et al. (2020) estimate a daily MSW generation burden exceeding 750 tonnes for Monrovia alone, based on a per-capita generation rate of approximately 0.7 kg per day, a figure consistent with World Bank benchmarks for low-income urban settings.

Open burning of waste is widespread in peri-urban settlements and has been documented as a major source of air quality degradation and toxic chemical exposure in communities adjacent to informal dumpsites (Kponor et al., 2020). The public health consequences of inadequate MSWM in Liberia are well-documented: UNICEF data has linked poor waste and sanitation conditions to elevated rates of diarrhoeal disease, with an estimated 20 percent of deaths among children under five attributable in part to these conditions (UNICEF-DFID, 2004). These figures, while dated, are consistent with more recent assessments that describe Liberia's sanitation infrastructure as among the most constrained in the West African sub-region.

The governance of medical and biohazardous waste merits specific attention as a high-stakes sub-sector of Liberia's broader compliance failure. The World Bank's estimate that 85 percent of biohazardous waste enters unsanitary disposal pathways is not merely an environmental statistic; in a post-Ebola and post-COVID context, it represents an active public health emergency risk. The EPA-L has documented a persistent bottleneck in the licensing of private medical waste incinerators in Monrovia. The absence of licensed, operational incineration capacity means that healthcare facilities, including hospitals, clinics, and laboratories, default to improper disposal practices not because they choose non-compliance but because compliant pathways do not exist at sufficient scale. This dynamic is precisely what the Governance Analytical Framework characterises as a structural governance failure: the formal regulatory requirement for safe medical waste disposal exists, but the state has not created the licensed infrastructure through which compliance could be achieved. Addressing this bottleneck requires not only regulatory enforcement but active state facilitation of compliant private sector alternatives.

Recycling infrastructure in Liberia is effectively absent at the formal level. No operational material recovery facilities have been documented in the peer-reviewed literature. Informal waste picking occurs in Monrovia's primary dumpsites but without regulatory recognition, occupational safety protections, or integration into formal resource recovery planning (Kponor et al., 2020). The 2024 National Solid Waste Management Policy acknowledges the need for recycling guidelines and informal sector recognition, but the literature does not yet document implemented programmes.

Informal Sector Integration and De Facto Governance

A structural theme running through the MSWM literature on Liberia, and on sub-Saharan Africa more broadly, is the mismatch between regulatory ambition and financial capacity. Kponor et al. (2020) and the World Bank (2019) both identify sustainable financing as the most critical systemic gap in Liberia's waste sector: municipal revenues are limited, cost recovery from waste services is

negligible, and donor-funded programmes have generated localised improvements without catalysing sector-wide reform.

The enforcement literature on Liberia is thin, which is itself informative. The absence of documented enforcement actions, penalty records, or compliance monitoring reports in the peer-reviewed literature reflects a system where enforcement is largely aspirational. Corrective action orders exist in statute but are inconsistently issued and rarely followed through to conclusion (Kponor et al., 2020). The comparative MSWM literature characterises this pattern as common across lower-income country contexts: the efficiency of MSW collection in developing countries is estimated at approximately 40 percent, less than half that in developed countries, and enforcement infrastructure lags even further behind (Yadav and Samadder, 2018).

What the enforcement deficit obscures is a more significant governance reality: Liberia's waste management system is, in functional terms, operated primarily by informal sector actors. The 'waste pickers' active at Monrovia's dumpsites, and the community-based organisations running neighbourhood collection and plastic recycling initiatives, are not peripheral to Liberia's MSWM governance. They are the de facto governance system. Informal sector integration must therefore be treated not as a supplementary community engagement strategy but as a core governance design imperative. The GAF framework is instructive here: informal norms around waste picking, material exchange, and community dumping represent a parallel institutional order that formal regulation has not yet engaged. Governance reform that ignores this parallel order, by focusing exclusively on formal regulatory instruments, will continue to produce policy-to-practice gaps. The literature on comparable settings in East Africa and South Asia documents how formal integration of informal sector actors, through licensing, occupational safety recognition, and defined reporting roles, produces measurable improvements in waste management outcomes while also delivering equity and livelihood benefits to some of the most economically marginalised urban workers (Wilson et al., 2015; Maalouf et al., 2025).

Several gaps in the existing literature on Liberia's MSWM governance are relevant to note. First, the peer-reviewed record contains no empirical studies documenting enforcement practice at the county level outside Monrovia; the compliance and enforcement picture for Liberia's 14 other counties is effectively invisible in the published evidence base. Second, no published study has quantified the cost of the compliance gap in economic or public health terms, a gap that limits the evidentiary base available to policymakers making the case for investment in regulatory capacity. Third, the informal waste sector in Liberia, which performs a de facto resource recovery function at major dumpsite locations, has not been studied with the methodological rigour applied to informal sector actors in comparable settings in East Africa and South Asia (Wilson et al., 2015). These gaps point to a priority agenda for field-based research in the post-2024 policy reform period.

MSWM Governance in Florida, USA: A Review of the Literature

Federal and State Regulatory Architecture

Florida's solid waste governance framework is situated within the broader United States federal regulatory structure, anchored by the Resource Conservation and Recovery Act (RCRA) of 1976. RCRA establishes the foundational statutory basis for solid and hazardous waste regulation

nationally, distinguishing between non-hazardous municipal solid waste, regulated primarily at the state level under Subtitle D, and hazardous waste, subject to federal Subtitle C requirements administered jointly by the U.S. EPA and state-authorized agencies (EPA, 2024). Florida operates an EPA-authorized state hazardous waste programme under Chapter 403, Florida Statutes, administered through the Florida Department of Environmental Protection (FDEP).

The Florida Solid Waste Management Act provides the primary state legislative basis for regulating solid waste facilities, establishing permitting requirements, and defining enforcement authority. Administrative rules under Florida Administrative Code Chapter 62-701 govern solid waste management facilities. These include operational standards for landfills, transfer stations, and processing facilities. Chapter 62-730 governs hazardous waste generators, transporters, and treatment, storage, and disposal facilities (FDEP, 2024). The regulatory framework is regularly updated through a documented public rulemaking process: the FDEP's Solid Waste Section held rulemaking workshops in both 2023 and 2024 on grease waste disposal provisions, illustrating the system's capacity for iterative regulatory development (FDEP, 2023).

The FDEP's Division of Waste Management organises its activities across four programme areas: Permitting and Compliance Assistance, District Support, Waste Cleanup, and Petroleum Restoration (FDEP, 2024). District offices across the state carry operational responsibility for facility permitting, compliance monitoring, and enforcement. County-level environmental protection agencies, such as Broward County's Environmental and Consumer Protection Division, complement state enforcement through field inspection, citizen complaint response, and operator education, functioning under delegated or concurrent county authority.

Compliance Monitoring and Enforcement

Florida's compliance monitoring architecture is built on scheduled inspections, data transparency, and financial assurance mechanisms. Hazardous waste facilities regulated under RCRA are tracked through the U.S. EPA's RCRAInfo database, a publicly searchable system that records compliance histories, permit status, and enforcement action records. This data infrastructure allows both regulatory agencies and the public to identify patterns of non-compliance and monitor enforcement responses over time (EPA, 2024). Solid waste facilities are subject to scheduled compliance evaluation inspections by FDEP district staff, supplemented by complaint-driven unannounced inspections.

The enforcement framework follows a graduated response structure. Notices of non-compliance are issued for initial or minor violations, requiring corrective action within defined timeframes. More significant or repeat violations may result in consent orders with stipulated penalties and compliance schedules. Administrative penalties, civil litigation, and criminal referrals are available for the most serious cases. Financial assurance requirements, covering closure, post-closure, and corrective action costs for solid and hazardous waste facilities, ensure that environmental liability is pre-funded and does not depend on the continued financial viability of the facility operator (FDEP, 2024).

The 2024 RCRA Third Rule amendment, signed by the U.S. EPA in June 2024, updated hazardous waste generator requirements and introduced mandatory electronic manifest tracking for large and small quantity generators, with new registration requirements in the RCRAInfo system effective

January 2025 (EPA, 2024; FDEP, 2024). This development reflects the ongoing regulatory development characteristic of a mature compliance system, in which rule-making responds to identified gaps and emerging waste streams rather than waiting for crisis conditions to prompt reform.

The enforcement discretion problem in Florida's system deserves candid treatment. Even within a mature regulatory framework, the gap between formal enforcement authority and operational enforcement practice is observable. Notices of violation are routinely subject to protracted administrative proceedings, and Consent Orders, which are intended to function as enforceable compliance schedules, frequently encounter 'Consent Order fatigue' whereby stipulated corrective action timelines extend through successive amendments without achieving full compliance. FDEP audit records and state inspector general reviews have documented backlogs in enforcement file closure and instances where regulated facilities operated with unresolved violations across multiple inspection cycles. This enforcement discretion dynamic is not a failure unique to Florida; it is a structural characteristic of enforcement systems that depend on administrative negotiation rather than automatic penalty triggers. Its relevance to the comparative analysis is significant: it cautions against a reading of Florida's system as uniformly functional merely because its formal rules are coherent and graduated. The distance between formal regulatory architecture and consistent operational enforcement is present in both jurisdictions, though the mechanisms generating that distance differ substantially between a high-capacity and a low-capacity governance environment.

Limitations and Environmental Justice Considerations

The literature on Florida's MSWM system is not uniformly positive. Environmental justice scholars have documented persistent disparities in the distribution of solid and hazardous waste facility siting, with lower-income and minority communities disproportionately bearing proximity burdens relative to wealthier and predominantly white communities. Legacy contamination at Superfund sites and petroleum storage tank remediation sites, managed through the FDEP's Waste Cleanup and Petroleum Restoration programmes, reflects decades of prior regulatory gaps whose consequences are still being addressed.

The environmental justice dimensions of Florida's waste governance have become more precisely quantifiable through EPA's EJScreen tool, a publicly available environmental justice mapping and screening tool that overlays demographic and environmental burden data at the census tract level. EJScreen analysis of Florida's waste facility distribution reveals systematic patterns of facility clustering in lower-income and minority census tracts, consistent with the broader national environmental justice literature. The tool's availability also creates an accountability mechanism: community organisations and researchers can now document siting disparities with empirical precision rather than relying solely on qualitative observation.

A significant and underexamined frontier in Florida's waste governance is the emergence of state-level preemption legislation during the 2023 and 2024 Florida Legislative sessions. Preemption laws enacted during this period constrain the authority of county and municipal governments to adopt environmental standards more stringent than state minimums, including restrictions on the siting of waste processing facilities in vulnerable communities. For environmental justice

advocates, these preemption provisions represent a structural barrier to the kind of locally responsive governance that the environmental justice literature identifies as essential for addressing distributional inequities. County governments that previously exercised discretionary authority to condition or deny facility permits on environmental justice grounds have had that authority limited. This legislative development reflects a tension at the frontier of Florida's waste governance: a formally mature regulatory system in which the state simultaneously expands environmental data infrastructure through tools like EJScreen while legislatively constraining the local authority needed to act on what that data reveals.

These limitations are relevant to the comparative analysis not because they diminish the structural advantages of Florida's regulatory system, but because they caution against a reading of high-income country MSWM governance as uniformly effective. The distance between formal regulatory capacity and equitable outcomes is present in both jurisdictions, though the mechanisms generating that distance differ substantially.

The Florida literature also leaves several gaps relevant to this comparative review. The environmental justice literature on facility siting disparities draws predominantly on data from the 1990s and 2000s, and more recent empirical work documenting the distributional effects of Florida's RCRA compliance system under the updated 2024 Third Rule requirements is not yet available. Additionally, the literature does not yet document how the shift to mandatory electronic manifest tracking affects compliance outcomes in practice, a question with potential relevance for lower-income country contexts considering digital monitoring tools. Comparative assessments of enforcement efficacy across FDEP district offices are not available in the peer-reviewed record, meaning that internal variation in Florida's compliance performance remains largely uncharacterised. These gaps limit the granularity with which Florida's system can serve as a reference point, but they do not undermine the structural comparisons drawn in Section 6.

Comparative Analysis: Five Governance Dimensions

Table 1 presents a structured comparison of the two jurisdictions across the five governance dimensions identified in the ISWM framework. The sections that follow elaborate on the literature supporting each dimension.

Table 1: Comparative Summary of Solid Waste Governance, Liberia and Florida, USA

Governance Dimension	Liberia	Florida, USA
Legislative Coherence	Multiple overlapping statutes; 2024 National SWM Policy lacks Polluter Pays and EPR provisions; implementing regulations absent; enforcement guidance underdeveloped; policy gap precedes compliance gap	Integrated multi-level framework (RCRA, Ch. 403 F.S., FAC Ch. 62-701/730); regular public rulemaking; clear regulatory hierarchy between federal, state, and county authority; EPR framework for electronics
Institutional Capacity	EPA-L, MCC, county governments: limited staffing, technical resources, and training; responsibilities not clearly demarcated; EPA-L failure to license medical waste incinerators creates compliant pathway gap	FDEP Division of Waste Management; district offices; county environmental divisions; specialised programmes for hazardous and solid waste; District Support Programme provides technical assistance to county agencies
Compliance Monitoring	Predominantly complaint-driven; systematic facility inspection absent in most counties; no digital compliance tracking infrastructure; informal sector monitoring absent	Scheduled and unannounced inspections; publicly searchable RCRAInfo database; mandatory electronic manifest tracking (2024 RCRA Third Rule); financial assurance requirements; EJScreen for environmental justice monitoring
Enforcement Mechanisms	Corrective action orders exist but follow-through inconsistent; penalties rarely applied; policy gap means non-compliance is structurally enabled in absence of implementing regulations	Graduated enforcement: notices of non-compliance, consent orders, administrative penalties, civil or criminal action; pre-funded financial assurance covers closure liability; Consent Order fatigue documented in mature system
Public Participation	Community awareness programmes delivered primarily by NGOs and civil society; informal sector is de facto governance system; no formal consultation mechanisms in regulatory processes; Informal Sector Integration not formalised	Public comment processes for permits and rulemaking; citizen complaint systems; EJScreen accountability tool; 2023-24 preemption laws constrain local environmental justice authority; federal and state environmental justice provisions

Legislative Coherence

The literature consistently identifies legislative coherence, defined as the degree to which statutory instruments form an operationally integrated and clearly hierarchical framework, as a foundational prerequisite for functional compliance systems. In Florida, the relationship between federal RCRA requirements, state statute, and administrative rules is explicit and procedurally managed: regulated entities can access current requirements through publicly available documents, and FDEP publishes compliance guidance to assist generators, facility operators, and transporters in understanding their obligations (FDEP, 2024). Regulatory updates follow a documented public process, with workshops, comment periods, and administrative review before new provisions take effect.

In Liberia, the coexistence of the Public Health Law of 1975, the Environmental Protection and Management Law, the National Environmental Policy, and the 2024 National Solid Waste Management Policy, without a defined regulatory hierarchy or implementing regulations that translate policy provisions into enforceable operational standards, creates ambiguity that undermines enforcement. The absence of Polluter Pays and EPR provisions means the 2024 Policy is better characterised as a policy gap than a compliance gap: it is not that regulated actors are failing to comply with established standards, but that the standards themselves are not yet operational. Kponor et al. (2020) identify this as the central legislative problem: not the absence of laws, but the absence of operational coherence among them. The comparative MSWM literature documents this pattern as common across lower-income country settings (Mmereki et al., 2016; Marshall and Farahbakhsh, 2013).

Institutional Capacity

Published assessments of Liberia's institutional capacity for MSWM are consistent in their diagnosis. The EPA-L is under-staffed relative to its mandate; county environmental offices lack the technical personnel, vehicles, and communication infrastructure necessary for field monitoring; and the division of operational responsibility between the EPA-L and MCC for Greater Monrovia has historically generated overlapping mandates without corresponding accountability (World Bank, 2019; Cities Alliance, 2021; Kponor et al., 2020). The literature on sub-Saharan African MSWM more broadly confirms that this institutional fragmentation is a widespread structural constraint, not a condition unique to Liberia (Yadav and Samadder, 2018).

Florida's institutional architecture assigns clearer operational mandates through defined programme areas within FDEP, with district offices providing the interface between state regulatory authority and local operational realities. County environmental agencies carry delegated or concurrent authority for specific compliance functions, including field inspection and complaint response. The FDEP's District Support Programme provides technical assistance to county-level agencies, on the basis that compliance capacity at the county level is a necessary condition for effective statewide governance (FDEP, 2024). This intermediate institutional tier, situated between national policy and community practice, is precisely what the literature identifies as absent or inadequately resourced in Liberia.

Compliance Monitoring

The literature on compliance monitoring in lower-income country MSWM settings documents a near-universal pattern: monitoring is reactive, data systems are absent or fragmented, and the information necessary to prioritise enforcement resources is unavailable (Mmereki et al., 2016; Dangi and Boland, 2017). In Liberia, this pattern is well-documented: systematic facility inspection outside the complaint-driven reactive mode is not described in the published literature for any county beyond Monrovia, and even in the capital, routine monitoring of waste generators and disposal sites is not consistently practised.

Florida's compliance monitoring system combines proactive, scheduled inspections with a publicly accessible data infrastructure. The RCRAInfo system enables transparency that serves both regulatory and civil society oversight functions. The introduction of mandatory electronic manifest tracking for hazardous waste generators under the 2024 RCRA Third Rule amendment extends

this data infrastructure further, creating an audit trail that enables real-time compliance monitoring without requiring proportionally larger inspection workforces (EPA, 2024).

The question of how digital monitoring tools might be adapted to Liberia's context requires precise framing. It is insufficient to observe that Liberia lacks digital infrastructure and leave the analysis there. The relevant question is what type of digital infrastructure is appropriate to Liberia's operational environment. Liberia does not need, and cannot sustain in the near term, a RCRAInfo-equivalent system requiring stable broadband connectivity, complex database administration, and sophisticated IT procurement processes. What Liberia's context does support is a leapfrog digital strategy: mobile-based compliance reporting designed for the infrastructure realities of a country where smartphone penetration and mobile money adoption are expanding faster than fixed-line data infrastructure. Evidence from comparable West African contexts is instructive. Ghana and Rwanda have deployed GPS-tracking systems for waste haulers and mobile-reporting platforms that allow field inspectors to log compliance observations using basic smartphones without internet connectivity, syncing data when connectivity is available. Mobile-based reporting systems can capture facility inspection records, transport manifests, and community complaint logs at a fraction of the cost and complexity of a centralised web-based database. A leapfrog digital strategy for Liberia would prioritise these fit-for-purpose tools over aspirational replication of data systems designed for high-capacity regulatory environments.

Enforcement

Enforcement design is, in the ISWM literature, the dimension most directly linked to compliance outcomes. Systems that rely primarily on prohibitory legislation without graduated enforcement pathways tend to produce binary outcomes: either violations are ignored, or they escalate to actions that are disproportionate to the violation and practically difficult to pursue. The literature on lower-income country MSWM enforcement documents this dynamic extensively (Mmereki et al., 2016; Yadav and Samadder, 2018). In Liberia, the practical enforcement default is inaction, not because inspectors are unaware of violations, but because the intermediate enforcement options, including notices, corrective action timelines, and modest administrative penalties, are not operationally available in a consistent and procedurally supported way.

Florida's graduated enforcement architecture, which moves from notice of non-compliance through consent order to formal administrative penalty and potential criminal referral, provides the intermediate options that lower-income country systems lack. The financial assurance requirement is a particularly instructive design feature: by requiring that funds for closure and corrective action be pre-designated, the state creates a compliance mechanism that operates independently of the agency's capacity to pursue enforcement after the fact. This preventive financial structure is not contingent on having large inspection workforces and is therefore more transferable to resource-constrained settings than enforcement mechanisms that depend on prosecutorial capacity. The caveat noted in Section 5.2 regarding Consent Order fatigue applies here: the structural existence of graduated enforcement tools does not guarantee their effective use, and the gap between enforcement authority and enforcement practice deserves the same analytical attention in mature systems as in developing ones.

Public Participation and Community-Based Governance

Both the Florida and Liberian MSWM systems exhibit gaps between formal participation structures and substantive community influence over waste governance decisions. In Florida, formal public comment processes for rulemaking and permitting exist and are documented, but the environmental justice literature identifies persistent disparities in the degree to which lower-income and minority communities are able to exercise meaningful influence within these processes. In Liberia, formal public consultation mechanisms in regulatory processes are not described in the published literature; community engagement in waste management occurs primarily through civil society organisations operating outside the regulatory framework.

The literature on community-based MSWM in sub-Saharan Africa documents a range of non-governmental and community-led initiatives that have achieved meaningful waste management outcomes in low-regulatory-capacity settings (Maalouf et al., 2025; Mmereki et al., 2016). In Liberia specifically, community-level solid waste initiatives led by organisations such as the Environmental Rescue Initiative have demonstrated that participatory programmes can drive behavioural change and material recovery in settings where formal regulatory systems cannot reach the household level. The literature increasingly argues that integrating such initiatives formally into national waste governance strategies, with defined reporting roles and linkages to county oversight, strengthens both the reach and the legitimacy of MSWM governance in comparable settings (Wilson et al., 2015; Zurbrügg et al., 2014).

The GAF framework is particularly useful in this dimension. The informal norms that govern community disposal behaviour in Liberia, including the social acceptability of open dumping, the absence of household-level waste accountability, and the economic incentives that structure waste picker activity, constitute an informal institutional order that formal regulatory instruments have not engaged. Governance reform that treats community participation as a communication exercise, informing communities of what formal rules require, rather than as an institutional design challenge, designing governance arrangements that work with informal norms rather than against them, is unlikely to produce the behaviour change at the household level on which any functional waste system ultimately depends.

Policy Implications and Transferable Lessons

The cross-jurisdictional review yields several policy-relevant findings that bear on MSWM governance reform in Liberia and on broader scholarship addressing MSWM in sub-Saharan Africa.

First, legislative consolidation is a governance prerequisite, not a secondary reform. The published literature on Liberia uniformly identifies the absence of an operationally coherent regulatory hierarchy as the foundational impediment to enforcement (Kponor et al., 2020; World Bank, 2019). The 2024 National Solid Waste Management Policy represents meaningful progress at the strategic level, but the analysis in this review suggests that the policy gap, specifically the absence of Polluter Pays and EPR provisions, must be addressed before the compliance gap can be meaningfully closed. The development of implementing regulations that specify operational standards, assign enforcement responsibilities, define compliance timelines, and introduce cost-internalisation mechanisms is the logical next step in Liberia's legislative reform process.

Second, the intermediate institutional tier, meaning county-level environmental offices with dedicated compliance functions, is the most underdeveloped element of Liberia's MSWM governance architecture. The Florida model is instructive in demonstrating that effective compliance monitoring occurs only when the agencies responsible for monitoring possess the personnel, transportation, data systems, and technical resources adequate to their mandate. The literature on sub-Saharan African MSWM consistently identifies investment in this intermediate tier as more likely to generate systemic change than equivalent investment concentrated at either the national policy level or the community programme level (Yadav and Samadder, 2018; Mmereki et al., 2016).

Third, graduated enforcement pathways reduce the barriers to initiating compliance action. The literature on enforcement in lower-income country settings documents a recurring problem: the binary choice between inaction and formal prosecution creates a practical disincentive for under-resourced inspectors to initiate compliance proceedings they cannot sustain (Dangi and Boland, 2017; Mmereki et al., 2016). A simplified notice-and-corrective-action system, providing intermediate enforcement options between these two extremes, is both more consistent with available institutional capacity and more likely to achieve compliance outcomes than a framework that relies on prosecutorial action as the primary enforcement mechanism.

Fourth, the financial assurance model deserves attention as a compliance mechanism relevant to emerging private sector waste operations in Liberia. As the country's extractive sector expands and private waste haulers operate without formal regulatory integration, pre-designated financial assurance requirements for waste facility closure and remediation costs could provide a compliance mechanism that does not depend on reactive enforcement. The principle is not contingent on sophisticated financial markets. Basic bond or escrow arrangements could operationalise it in Liberia's context.

Fifth, the formal integration of informal sector actors into national governance frameworks is not optional in contexts where the informal sector functions as the de facto governance system. In Liberia, waste pickers and community-based organisations are not supplementary actors; they are the primary delivery mechanism for what waste management function exists. Governance frameworks that fail to integrate them formally, through licensing, occupational safety recognition, material recovery agreements, and defined reporting roles, lose the institutional asset that is already operating in the field and forego the opportunity to strengthen it through official recognition and technical support (Wilson et al., 2015; Zurbrugg et al., 2014).

Sixth, Liberia's digital monitoring strategy should be designed as a leapfrog solution rather than as a scaled-down version of a high-capacity system. The goal is not to replicate RCRAInfo. The goal is to create a fit-for-purpose digital infrastructure that enables field inspectors to log compliance observations, track waste transport, and aggregate data for management review using tools that work within Liberia's mobile connectivity environment. West African precedents in Ghana and Rwanda demonstrate that GPS-tracked waste hauler systems and mobile-reporting platforms can generate actionable compliance data without requiring the institutional and technical infrastructure that underpins more complex data systems. Liberia's digital governance strategy for waste management should be designed with these precedents in mind.

Conclusion

This cross-jurisdictional review has examined the peer-reviewed and policy literature on solid waste governance in Liberia and Florida, USA, structured around five ISWM governance dimensions: legislative coherence, institutional capacity, compliance monitoring, enforcement, and public participation. The review finds that the compliance gap separating the two jurisdictions is not principally a product of awareness or intent. It is a product of regulatory design, institutional resourcing, and the degree to which formal governance authority is matched by operational capacity to exercise it.

The literature on Liberia's MSWM system is consistent in identifying fragmented legislation, the absence of Polluter Pays and EPR provisions, under-resourced institutions, EPA-L's failure to create licensed medical waste incineration pathways, and a governance gap that manifests as a persistent public health burden. The literature on Florida's system reveals a more coherent regulatory architecture, capable of graduated enforcement and systematic monitoring, but subject to enforcement discretion problems, Consent Order fatigue, and legislative preemption that constrains local environmental justice authority. Neither system is presented in the literature as a model to be transplanted; both offer evidence about what governance design features matter and what operational conditions make them functional.

The review contributes to the MSWM governance literature by providing a cross-jurisdictional analysis at a level of specificity, pairing one West African jurisdiction with one U.S. sub-national jurisdiction, that the broader comparative literature has not yet addressed in this combination. The application of the Governance Analytical Framework alongside the ISWM framework provides a more nuanced account of the compliance-to-policy-gap distinction and the role of informal norms in perpetuating governance failures. The findings carry direct relevance for policy reform discussions in Liberia, particularly in the implementation phase following the 2024 National Solid Waste Management Policy. They also contribute to the theoretical literature on compliance gaps in lower-income country MSWM governance by identifying the intermediate institutional tier, the informal sector integration imperative, and the leapfrog digital strategy as three under-studied determinants of regulatory effectiveness.

Future research should examine empirically the relationship between county-level enforcement capacity and compliance outcomes in Liberia and comparable West African settings, using primary data collection methods that can capture operational realities not visible in documentary review. Original field research documenting enforcement practices, institutional coordination, informal sector integration models, and community-based governance structures would substantially advance the scholarly and policy conversation.

Conflict of Interest

The authors declare no conflict of interest.

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