

Transitioning to a Circular Economy

An Evaluation of the World
Bank Group's Support for
Municipal Solid Waste
Management (2010–20)



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Abbreviations

ASA	advisory services and analytics
CPF	Country Partnership Framework
CPSD	Country Private Sector Diagnostic
DPL	development policy loan
FY	fiscal year
HIC	high-income country
IEG	Independent Evaluation Group
IFC	International Finance Corporation
LIC	low-income country
LMIC	lower-middle-income country
MIGA	Multilateral Investment Guarantee Agency
MSWM	municipal solid waste management
NIMBY	not in my backyard
PPP	public-private partnership
SCD	Systematic Country Diagnostic
SDG	Sustainable Development Goal
UMIC	upper-middle-income country

All dollar amounts are US dollars unless otherwise indicated.

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Overview

Municipal solid waste—waste generated mainly from residential and commercial sources—has emerged as one of the most pressing challenges across the world, with growing public health, environmental, social, and economic costs. By 2050, fast-growing large- and medium-size cities will nearly double the waste generation in lower-middle-income countries and upper-middle-income countries. Low-income countries (LICs), where most waste is disposed of in open dumps, are on a trajectory to triple their municipal solid waste generation by 2050. Historically, the causes and effects of municipal solid waste were considered local or regional. However, with increasing volumes and changing waste composition, municipal solid waste has become a global challenge.

Municipal solid waste management (MSWM) is at the core of Sustainable Development Goal (SDG) 11 for sustainable cities and SDG 12 for reducing waste (among other SDGs) and of efforts to achieve green, resilient, and inclusive development. SDG 11 for sustainable cities addresses it directly by targeting service delivery for waste management, and SDG 12 for reducing waste generation addresses it through prevention, reduction, recycling, and reuse. Other SDGs address waste to energy, informal workers' welfare and employment, climate action, and marine plastic pollution.

The waste hierarchy and the circular economy are sustainable alternatives to the traditional linear (take-make-dispose) economic model. The traditional economic model approaches the waste value chain as a linear sequence in which resources are extracted from the environment (take), manufactured into goods (make), and discarded when they are no longer needed or wanted (dispose). The waste hierarchy approach lays out a more nuanced but still linear set of disposal options and establishes a ranking among them from most to least preferable. Waste prevention and reuse are the most preferred options, followed by recycling, then recovery (for example, composting and waste to energy); waste disposal through landfills should be the very last resort. The circular economy approach closes the loop in relation to extraction, manufacturing, and disposal by advocating for designing products to reduce

waste, using products and materials for as long as possible, and recycling materials from end-of-life products back into the economy.

An integrated approach is required to help clients move in the direction of the waste hierarchy and a circular economy. An integrated approach avoids focusing only on disposal. Instead, it includes attention to all stages of the waste hierarchy and circular economy: designing for reusability, minimizing consumption, increasing reuse, repurposing end-of-life products, encouraging recycling, maximizing recovery, and practicing sanitary disposal. It also includes consideration of the interlinked areas of policies, institutions, capacity, and planning in central, provincial, and local governments; improved infrastructure, access, and service delivery; cost recovery for ensuring financial sustainability; awareness and behavior change; the integration of the private sector and informal actors, including waste pickers; and gender considerations.

The costs of inaction to improve solid waste management are unsustainable. At the local level, inadequate MSWM reduces quality of life through environmental, social, and health consequences that affect impoverished people disproportionately. Globally, it contributes to climate change and growing plastic pollution. Solid waste management generated an estimated 1.6 billion metric tons of carbon dioxide–equivalent greenhouse gas emissions in 2016, about 5 percent of global emissions (Kaza et al. 2018). Damages caused by plastics to the marine environment are estimated at \$13 billion per year, and more than \$75 billion when considering the total natural capital cost of plastics used in consumer goods. Local effects are harder to quantify, but one study estimated that the environmental costs of MSWM in a single city (Shanghai, China) amounted to \$171 million in 2018 alone (Liu et al. 2021).

Integrated and improved MSWM would lead to global and local environmental, health, social, and economic benefits. Globally, integrated and improved MSWM would reduce marine plastic pollution and greenhouse gas emissions. Locally, it would reduce soil and water contamination and improve air quality, improving public health. It would also enhance the welfare and livelihood security of informal waste pickers—the millions of people worldwide who make a living by collecting, recycling, and selling reusable waste. Furthermore, it would create jobs in the sector, improve land values, and have an enabling effect on other industries (such as tourism).

This evaluation assesses how well the World Bank Group has supported client countries to manage municipal solid waste using an integrated approach to advance development and sustainability goals. It covers all World Bank and International Finance Corporation (IFC) MSWM-related activities during fiscal years (FY)10–20. It answers three main evaluation questions:

- » How relevant is the Bank Group’s approach and engagement in meeting client country needs, considering the latest evidence and thinking on MSWM practices and country context and readiness?
- » How effective have Bank Group engagements been in delivering improved MSWM for clients?
- » How coherent has Bank Group engagement been in collaboration among the World Bank, IFC, and MIGA, and collaboration and partnerships with other actors to support better outcomes for client needs in MSWM?

Relevance and Coherence

The Bank Group has increasingly recognized and advocated for waste hierarchy and circular economy approaches for MSWM. The newly launched *World Bank Group Climate Change Action Plan 2021–2025*, for example, sets out a goal of pursuing integrated waste management and circular economy approaches to help countries and cities advance climate, development, and broader sustainability goals.

Although the Bank Group lends less for MSWM than for any other urban service, it is by far the leader among multilateral development banks in providing finance and knowledge on solid waste management. During FY10–20, the Bank Group provided about \$3 billion to client countries for MSWM, one-tenth the amount it provided for water supply and sanitation. The Inter-American Development Bank is the next leading multilateral development bank in this area, with \$708 million lent between 2005 and 2020. More recent data (from the Asian Development Bank, the African Development Bank, the European Bank for Reconstruction and Development, and the Inter-American Development Bank) show that other multilateral banks’ lending for MSWM during 2010–20 varied between 0.5 percent and 6.1 per-

cent of their overall lending for all urban services. Regarding knowledge, the Bank Group produced two flagship reports on MSWM (*What a Waste* and *What a Waste 2.0*) and conducts technical certification courses on solid waste management for policy makers and MSWM professionals.

Bank Group support for MSWM does not consistently cover several elements that are essential for moving toward integrated waste management. Elements that are essential to integrated waste management include revising policies, planning for cost recovery, involving the private sector, incorporating behavioral factors, and considering waste pickers. The Bank Group often supports the provision of infrastructure and services that are expected to increase MSWM coverage and improve service delivery. However, more is needed to achieve an integrated approach. Sixty-five percent of relevant Country Partnership Frameworks discussed the need to update MSWM policy and regulations, but World Bank projects included these elements in only 22 percent of the countries. Although insufficient attention to cost recovery often undermines the delivery of MSWM services, just over one-third of country strategies and lending addressed this issue. More than half of Country Partnership Frameworks referred to the need for private sector participation in MSWM, but only 27 percent of countries include operations to incentivize it. Efforts to raise awareness and effect behavior change are critical for achieving inclusive and sustainable solid waste management, but there is a lack of analytical work addressing these issues, and they are addressed in less than half of the relevant country programs. Finally, even though informal waste pickers are critical to the MSWM sector's functioning, very few Bank Group projects engaged with them beyond complying with do-no-harm safeguard provisions.

The Bank Group is doing little to address the growing waste management problem in LICs. Less than half of Systematic Country Diagnostics for LICs diagnose MSWM issues, despite the fast-growing municipal solid waste problem in these countries that the World Bank's analytical work has highlighted. With two exceptions (Haiti and Rwanda), there is no reference to MSWM in IFC strategies or diagnostics in LICs. Between FY10 and FY20, LICs received less than 2 percent of World Bank lending for MSWM and no investments from IFC. Of the 122 instances of relevant World Bank analytical work, only 6 covered LICs. The key challenges limiting support in LICs include

governments' lack of awareness of the major problems caused by solid waste; lack of a clear strategy for the sector; and lack of appropriate policies, regulations, and institutional capacity. These conditions lead to widespread open dumping and people's low willingness to pay for solid waste services, which further limits sustainable MSWM initiatives.

There has been limited Bank Group collaboration in support of MSWM. References to the complementary roles that the World Bank and IFC can play in a coherent approach for improved MSWM are absent from most Country Partnership Frameworks, IFC Country Private Sector Diagnostics, and IFC country strategies. MIGA has found it very difficult to enter the MSWM sector because of several constraints, mainly the lack of clear government counterparts, municipalities' low creditworthiness, and municipal borrowing generally restricted to local currency, which MIGA is not suited to support.

The Bank Group could convene other developmental institutions to raise MSWM's profile in client countries, given its leading global financial and knowledge role. Discussions with Asian Development Bank staff suggest that there is strong interest in observing the Bank Group's course toward MSWM. International MSWM experts advising the evaluation see scope for the World Bank to expand its convening role, given its reach, experience, and solid waste management portfolio, which is the most diversified among any of the multilateral lending institutions. Presently, the Bank Group is playing a convening role in addressing marine plastic pollution through the PROBLUE initiative—an umbrella trust-funded program that supports the sustainable and integrated development of marine and coastal resources in healthy oceans—and advocates for improved MSWM under the *World Bank Group Climate Change Action Plan 2021–2025*.

Effectiveness

World Bank support for basic municipal solid waste infrastructure and service delivery—the main Bank Group activity on municipal solid waste—has been generally effective. The leading activities in the World Bank's MSWM lending support focus on infrastructure and service delivery. Within infrastructure, the emphasis has been on closing uncontrolled dumpsites and building large sanitary landfills, with less consideration for transfer stations

and waste collection and separation. The Bank Group has carried out infrastructure activities as planned in most MSWM-related projects. In the evaluated portfolio, clients closed about 137 dumpsites, built 40 sanitary landfills, and constructed 112 transfer stations. Targets for access and service delivery have mostly been met. One example is Mozambique's municipal support program, which extended waste collection services to 43 suburban neighborhoods covering about 900,000 residents, exceeding the target.

However, financial unsustainability limits the effectiveness of infrastructure and services projects. The effectiveness of the World Bank's work on MSWM is undermined by relatively less attention to and low achievement of measures to recover costs and ensure the overall financial sustainability of MSWM operations. The World Bank addressed the issue of cost recovery and improved financial sustainability in 25 closed and evaluated projects, which yielded positive results in just 14 cases. Lessons can be learned from some LICs and lower-middle-income countries and economies (such as Mozambique, Vietnam, and West Bank and Gaza) that had positive experiences in which 70–90 percent or more of solid waste providers' costs were recovered from user fees. However, several other countries had less success in meeting cost recovery targets, even at project completion.

Very few projects tracked the environmental, health, social, or economic outcomes of MSWM activities. Only 6–15 percent of projects in the portfolio set out to capture environmental, health, social, or economic outcomes linked to MSWM activities. Of those projects, many either did not report on outcomes or reported that the intended outcomes were not achieved because of delays or implementation challenges with the MSWM activities. Local governments and regulatory agencies are ultimately responsible for measuring these impact areas, and this measurement may require more specialized and expensive interventions than are provided currently.

MSWM can make significant contributions to countries' environmental, social, and economic goals. Doing so depends on articulating and capturing higher-order impacts. Good practice examples in the MSWM portfolio show how investments in MSWM can contribute to reducing greenhouse gas emissions and pollution. For example, a project in Tunisia helped the client equip seven landfills with gas treatment systems, earning about \$3.5 mil-

lion from selling certified emission reduction. In China, one project provided new solid waste disposal capacity of about 2,000 tons per day, including the treatment of highly contaminating leachate at the landfill sites. Other examples show how focusing attention on job creation can enhance the economic security and working conditions for lower-income urban populations, including youth, and for those living in fragile and conflict-affected situations. In Côte d’Ivoire, for example, the Emergency Urban Infrastructure Emergency Recovery Loan (2008–14) provided 7,000 people with permanent jobs as waste collectors.

Factors of Effectiveness

Four factors have strong, often limiting, influences on the effectiveness of the Bank Group’s MSWM support. The four factors are (i) the nature of World Bank support in terms of continuity, coverage, and coherence; (ii) government commitment to ensuring the financial sustainability of municipal solid waste services; (iii) local governments’ accountability for providing adequate and sustainable services; and (iv) land availability and the phenomenon known as “not in my backyard,” or NIMBY (the generalized opposition of neighboring populations and local governments to siting landfills [or other infrastructure] within their jurisdictions).

Long-term, well-sequenced, and coherent engagement across the evaluation pillars improves MSWM. Extended, well-sequenced, and coherent country engagement that includes support for key policy reforms and investment has been effective in helping countries build an integrated approach to MSWM incrementally. Thus, improved MSWM is more likely to be achieved when MSWM is at the core of a project rather than included as a small project component. The evaluation found few examples of country engagements with MSWM at the core, mainly in upper-middle-income countries.

Governments’ inability to ensure sustainable financing is a constraint on providing adequate MSWM services. This inability can arise at any layer of government (national, provincial, or local), mainly because of lack of political commitment or competing demands for public financing. Several World Bank projects included components for ensuring the financial sustainability of MSWM services through arrangements for improved cost recovery via user

fees or tariffs, sometimes supplemented by earmarked municipal revenues or budget transfers from provincial or central governments. In some cases, the expected results were not achieved at project completion. Even where favorable results were achieved, the improvements were often not sustained. IFC's assistance depends on various elements, such as maturity of markets, sound legal and regulatory frameworks, and the creditworthiness of clients (such as municipalities and private companies). All those are generally lacking in LICs, especially for MSWM, and their absence makes financially sustainable private sector solutions particularly difficult to implement.

Local governments' lack of accountability for providing adequate and sustainable MSWM services is also a constraint on effectiveness. Accountability for adequate and affordable MSWM services can be undermined by lack of transparency and vested interests in existing arrangements for service provision of solid waste collection and transport. Improved monitoring of MSWM services, including through internet and cell phone-based systems (that are becoming more readily available and affordable), and the involvement of beneficiaries and civil society can help put greater pressure on service providers and policy makers to improve service delivery and tackle wider constraints.

Finally, the ability to acquire land for solid waste infrastructure is a systematic constraint across the portfolio. The constraint is partially attributable to the not-in-my-backyard phenomenon. A lack of reliable land administration, inadequate urban planning, and poorly functioning land markets in rapidly urbanizing countries greatly complicate the consolidation of land parcels at a reasonable cost to enable siting large-scale public infrastructure such as landfills and transfer stations.

Recommendations

This evaluation identifies three areas in which the World Bank can enhance its relevance and effectiveness when supporting countries with MSWM.

Recommendation 1. To achieve more sustainable and scalable outcomes in municipal waste management, Bank Group technical and financial support to clients should give clear priority to the adoption and implementation of waste hierarchy practices, in line with client needs and

capabilities for MSWM. To achieve this, the Bank Group’s support could build on proven good practice from its own experience in addressing the entire waste value chain (collection, transport, recycling, recovery, and disposal) in an integrated, phased, and incremental manner tailored to client needs and capabilities. This would require greater collaboration among the World Bank, IFC, and MIGA in supporting governments with promoting financial sustainability and accountability in service provision, updating policies and regulations, incentivizing private sector participation, increasing awareness and behavioral change, and integrating waste pickers into MSWM processes.

Recommendation 2. To support the LICs where municipal solid waste is growing most rapidly, the Bank Group should identify constraints on demand and investments and leverage external partnerships to implement context-specific MSWM solutions. To achieve this, the Bank Group could increase its advisory services and analytics in LICs and foster external partnerships to find context-specific solutions appropriate to the prevailing policy and service delivery gaps. This would entail, for example, systematically closing illegal dumps, ensuring that the regulatory framework is clear and predictable, and providing incentives to reduce the growth rate of waste generation and increase recycling, with a view to support LICs to “leapfrog” (move forward rapidly through the adoption of modern systems without going through intermediary steps) to the extent possible.

Recommendation 3. To bring prominence to and spur action on the global municipal solid waste agenda, the Bank Group should take up a clear leadership position, collaborating and convening with developmental partners. The Bank Group could leverage its leading role in financing and knowledge for MSWM by building on and scaling up current partnerships to improve municipal solid waste practices in the context of the climate change action plan and in specific areas, such as addressing riverine and marine plastic pollution through PROBLUE.

Management Response

Management of the World Bank Group welcomes the report by Independent Evaluation Group (IEG) entitled *Transitioning to a Circular Economy: An Evaluation of the World Bank Group’s Support for Municipal Solid Waste Management (2010–20)*. Lessons learned from this evaluation are relevant to current urban environmental challenges and will inform the Bank Group’s continuing support to client countries in the field of solid waste management and the circular economy.

World Bank Management Response

Overall

Management welcomes IEG’s finding that the Bank Group is recognized as having the “largest reach, greatest experience, and most diversified solid waste management portfolio among any of the multilateral lending or developmental institutions” (29). Management appreciates the conclusion that World Bank–supported Municipal Solid Waste Management (MSWM) infrastructure and service delivery were broadly effective. Management will strengthen ongoing efforts more consistently to cover elements essential for moving toward integrated waste management, keeping a line of sight to long-term development outcomes, recognizing the opportunities for improvement summarized in the recommendations in the report.

Bank Group Management is committed to pursuing integrated waste management and circular economy approaches to help countries and cities advance climate, development and broader sustainability goals, as stated in its Climate Change Action Plan for 2021 through 2025 and other Bank Group policy and technical reports. The MSWM sector has undergone dramatic transformation since FY00, with the emergence of the circular economy concept in the mid-2010s and the much stronger emphasis on resource utilization under the waste hierarchy principle. Yet, as much as 40 percent of the portfolio evaluated by IEG in its report was conceptualized in the early 2000s, with early MSWM projects designed with a strong emphasis on

the quality of basic services and improved environmental conditions at the waste disposal stage. Current policy work, publications, sector analytics, and projects supported by the Bank Group are developed within the framework of the waste hierarchy.

Outcome Orientation

Management concurs with the observation that the most pressing needs in the sector are in low-income countries (LICs) and lower-middle-income countries (LMICs), and stresses the importance of helping these countries build the necessary preconditions for long-term outcomes of effective waste management. LICs and LMICs face severe fiscal constraints, unlike upper-middle-income countries (UMICs). Given different socioeconomic conditions and budget envelopes, UMICs and LICs or LMICs have differing immediate priorities for the sector and have differing abilities to transition toward a circular economy. There are also important cost ramifications, given the limited budget envelope in LICs and LMICs. The immediate issue faced by many LICs is the incomplete waste collection service. There is a need to first establish a municipal waste collection system. This needs prioritization, along with longer-term efforts to advance upward in the waste hierarchy toward the circular economy.¹ Management will continue to address this comprehensive and sequential approach to long-term outcomes of MSWM in Systematic Country Diagnostics and Country Partnership Frameworks for both LICs and LMICs. Following the findings of the report, management will ensure that long-term and well-sequenced engagements that include support for key policy reforms continue to be the norm. Relevant experiences for further learning include World Bank engagements in Colombia, Liberia, Morocco, and West Bank and Gaza.²

Management agrees that the benefits of improved waste management need to be clearly flagged in project documents and analytics, whenever relevant, not only to demonstrate the high potential of the sector but also to strengthen outcome orientation. Benefits related to the global public good, notably reductions in greenhouse gas (GHG) emissions, are already captured and reported through corporate GHG accounting and climate co-benefits accounting. Management now intends to articulate more clearly in World Bank

documentation, as relevant, the benefits related to country-level high-level outcomes, such as local economic development, health, and social impact.

Financial Sustainability

Management notes that financial sustainability through user fees, where needed, in combination with subsidies and budget funding, has become an important area of focus for Bank Group-supported operations. Management will consider the findings regarding full-cost recovery in accordance with country circumstances. As part of efforts toward financial sustainability, World Bank operations also support the development of enabling conditions for public-private partnerships where relevant, whether it concerns management capacity, oversight mechanisms, or clarity of roles and procedures. Full-cost recovery remains the exception globally. The more common practice is to finance the sector through a combination of fees and the municipal budget. Full-cost recovery is, in fact, not fully achieved in many high-income countries. Although the World Bank aims for cost recovery and user fees, subsidies and budget funding are still widely used and remain very common in countries with well-performing MSWM systems. Although public-private partnerships could similarly lead to excellent benefits, the real challenge is to build management capacity among local governments, sustainable finances, and strong oversight mechanisms. These are key to both privately and publicly run operations. It is important to note that there are good examples of publicly run operations in high-income countries.

Recommendations

Management agrees with the first recommendation in the report to give clear priority to the adoption and implementation of waste hierarchy practices, in line with client needs and capabilities for MSWM. Management will ensure that prioritization of waste hierarchy continues to be integrated into project design, and advisory services and analytics supported by the Bank Group. Management emphasizes that since LICs, LMICs, and UMICs have different socioeconomic conditions, budgets, capacity constraints, and immediate and competing priorities, the transition and adoption of waste hierarchy practices will vary across countries, as recognized by the report. Tailored approach-

es will be required to ensure long-term consistency with the overall waste hierarchy framework and its principles. Management will work to ensure that this is acknowledged, as relevant, in individual country-level advisory services and analytics and project documents.

Management agrees with the second recommendation to identify constraints on demand and investments in LICs and leverage external partnerships for context-specific MSWM solutions. Analytical work will be carried out to this end, which will also outline opportunities to increase the support for solid waste management in LICs. Although LICs and LMICs have multiple competing development priorities, the Bank Group will endeavor, in collaboration with International Finance Corporation (IFC) and Multilateral Investment Guarantee Agency (MIGA) as well as external partners, to promote support that spans analytics, policy action and investment. For example, the Bank Group has been increasing its support for MSWM in several countries, including Cambodia, India, Indonesia, Lao People’s Democratic Republic, Senegal, and the Philippines in the areas of policy and regulatory environment, private sector participation, increasing awareness and behavior change, support to primary collection, and the integration of waste pickers.⁵

Management broadly agrees with the third recommendation as well, provided it is understood within current management efforts to strengthen the strategic selectivity of its convening efforts, in line with previous IEG recommendations. The World Bank already collaborates with development partners, international institutions, and research think tanks, including the International Solid Waste Association, the Covenant of Mayors and C40, bilateral aid agencies, the European Commission, and the Japan Institute for Global Environmental Strategies. Management will continue to engage at the global level and provide leadership in this important sector through, for example, global analytics and technical deep dives and engagement in international events and partnerships. It is important to recognize that the World Bank will need to balance the multiple mandates of climate, resilience, and marine pollution. This selectivity will be in line with previous IEG recommendations linked to the report by IEG *The World’s Bank: An Evaluation of the World Bank Group’s Global Convening*.

International Finance Corporation

Management Comments

IFC management appreciates the evaluation work delivered by IEG. The topic is timely as the Corporation is focusing on supporting clients in the sustainability agenda where transition to circular waste management solutions is a critical component. A circular economy deep dive is currently being undertaken to identify ways by which available resources can be used more efficiently and support progress in the municipal waste management sector. IFC will incorporate the knowledge and lessons provided in the report in the design and implementation of its advisory and investment plans in the sector.

Responses to Recommendations

Recommendation 1: IFC management agrees with the recommendation. IFC client countries need support from the developmental community, including the Bank Group, in transitioning from their current MSWM situation to better align with waste hierarchy principles. It is important to highlight that the transition paths will vary across geographies; support from the Bank Group, while ensuring long-term consistency with waste hierarchy principles, will need to improve waste management systems in the local context of (i) willingness and ability to pay; (ii) institutional capacity; and (iii) fit within multiple urgent priorities of client governments. As the report highlights, progress in the above agenda will be dependent on political economy challenges.

As noted in the report, IFC advisory engagement and support for private sector investment is more likely where the MSWM policy and regulatory environment is adequately developed. Appendix B of the report highlights the advisory engagements in the sector aimed at supporting the development of an enabling framework for private participation through advisory services—successfully in the case of Belgrade but with mixed results in other cases. In addition, IFC has used direct relationships with cities as part of its Cities Business Model to support decision makers with advice related to the waste sector in Izmir, Bogota, and Buenos Aires. These facts highlight IFC’s keen interest and commitment to engage in the sector to help develop sustainable private sector participation. However, this is extremely resource intensive,

and the probability of success is often uncertain because of changes in the political landscape.

Furthermore, while collaboration among Bank Group institutions has been active, there have been few joint projects so far due to the reasons outlined as well as differing focus areas and opportunities of the World Bank, IFC, and MIGA. However, where the opportunity has presented itself, for example with respect to the Belgrade sanitary landfill and waste to energy project, IFC and MIGA have worked together to deliver private sector solutions to client governments. In addition, the report does recognize multiple instances of ongoing collaboration between the World Bank and IFC in the MSWM sector, which are expected to show results going forward.

Recommendation 2: IFC management agrees with this recommendation. It is worth noting the observation made in the report regarding the need for elements like reasonable legal and regulatory frameworks, reasonable credit-worthiness of offtakers, and additional factors such as willingness and ability to pay for waste management services instead of other infrastructure services such as power, water and wastewater, and transport. Because these elements are less developed in LICs, IFC's ability to engage is diminished.

Although challenges in private participation in the solid waste sector remain high even in UMICs and LMICs, the enabling framework has improved gradually over the past decade, where the focus of IFC's efforts has been as a result. However, as past and ongoing efforts in Uganda, West Bank and Gaza, and Guinea demonstrate, IFC engages in LICs when strong political impetus provides an opportunity to do so. Under the IFC 3.0 strategy, mapping efforts to find opportunities for private sector engagement in the waste sector are underway in Sub-Saharan Africa and early engagement has been initiated in the Pacific Islands.

IFC management recognizes the potential for using hybrid financing models, such as the Clean Ganga Project of the World Bank, where public sector funds are being leveraged to introduce a private sector-led sewerage treatment program in low-income areas of India. Such programs represent a potential opportunity to be explored in LICs where political interest in attracting private sector investment to address waste sector is a challenge.

Recommendation 3: IFC management is broadly supportive of this recommendation. IFC has regular engagements with other development partners to exchange ideas, share market knowledge, and enable co-financing opportunities to support clients. IFC management agrees with the observation that most development partners look to IFC to bring opportunities and ideas.

The report indicates that the Bank Group has yet to sufficiently integrate waste hierarchy and circular economy principles into its support to clients. It is critical to recognize that removing some key constraints to reaching a circular economy in developing countries often necessitates time and multiple interventions. Although sound policies tailored to the local context are important, the right mind-set and buy-in from constituents is also critical for developing a functioning circular economy. As evidenced in some developed countries, this takes time, even with significant resources deployed. IFC's investment portfolios may not explicitly focus on waste hierarchy and circular economy principles in initial interventions, because certain foundations, which require time, including behavioral change and adequate capacity development, need to be established to enable this transition.

Multilateral Investment Guarantee Agency Management Comments

MIGA welcomes IEG's report *Transitioning to a Circular Economy: An Evaluation of the World Bank Group's Support for Municipal Solid Waste Management (MSWM)*.

Recommendation 1: MIGA agrees with this recommendation for further collaboration across the Bank Group. MIGA notes IEG's assessment that MSWM is a very challenging sector for MIGA, even with proactive efforts to originate projects in partnership with international sponsors. We also appreciate IEG's recognition of the Belgrade sanitary landfill and waste-to-energy project as an example of a successful IFC and MIGA collaboration. MIGA understands that this project exemplifies the tenacity of IFC and MIGA in a very difficult sector for multilateral private sector operations. We are also keen to work closely with the World Bank and IFC to support the upstream work to help governments remove constraints for further MSWM operations.

Recommendation 2: MIGA also agrees with this recommendation, and we consider that additional support secured to help unlock the development of bankable projects for MSWM solutions in low-income countries is highly desirable, although the persistence of other barriers (for example, the regulatory context) could continue to make such engagements challenging.

Recommendation 3: MIGA broadly agrees with this recommendation. The evaluation report notes MIGA's engagement in MSWM is constrained by a lack of bankable projects seeking guarantees. The leadership of the World Bank and IFC could help ease some of the challenges over time, including the capacity limitations of municipalities as counterparts.

¹ “[The waste hierarchy]...by focusing on environmental benefit and not costs or social, economic and institutional requirements, represents a simplified framework...[and increases the financial cost of the sector]. The two most immediate and important issues faced by many low-income countries are incomplete waste collection service and the proliferation of uncontrolled dumping. Establishing waste collection services to protect public health and improving waste treatment and disposal services to protect the environment should therefore be the first objectives of the waste management strategy or plan. Policy aspirations supporting a transition to sustainable resource management should also be set out, but with the caveat that, in practical terms, climbing further up the ‘hierarchy’ can only happen once effective collection and disposal systems have been put in place” (World Bank 2021f, 40).

² Dedicated projects are preceded by large technical assistance, as is the case with the Indonesia National Solid Waste Project, which is aided by comprehensive analytic work funded by bilateral donors, Kerala Waste Management Project and facilitated by an in-depth review of the plastic market in India, or the China Plastic Waste Projects 1 and 2 that have been supported by comprehensive and multisectoral advisory services and analytics spanning plastics, waste, water and sanitation, and the agricultural sectors.

³ Examples include the Indonesia National Solid Waste Management Project (fiscal year [FY]20), the Senegal Municipal Solid Waste Management Project (FY20), Kerala Solid Waste Management Project (FY21), Cambodia Solid Waste and Plastic Project (FY22), Philippines Sustainable Inclusive and Resilient Tourism Project (FY22), and Lao Environmental and Waste Management Project (FY23).

Report to the Board from the Committee on Development Effectiveness

The Committee on Development Effectiveness met to consider the report by the Independent Evaluation Group (IEG) entitled *Transitioning to a Circular Economy: An Evaluation of the World Bank Group's Support for Municipal Solid Waste Management (2010–20)* and the World Bank Group management response.

The committee welcomed the evaluation, acknowledging that this first major assessment by IEG on the subject provides a rich and thorough analysis. They also noted the timeliness of the subject, which is critical to achieving the twin goals and the Sustainable Development Goals (SDGs) that are linked to the Climate Change Action Plan and Paris Alignment commitments. Members acknowledged municipal solid waste management's (MSWM) health, environmental, social, and economic implications and encouraged the World Bank Group to exercise its convening and leadership role to address this global challenge. Although the members were pleased to learn about IEG's finding that the Bank Group is by far the leader with the largest reach, greatest experience, and most diversified solid waste management portfolio among multilateral development institutions, members highlighted the evaluation's remarks that more could be done to address the growing waste management problem, particularly in low-income countries and lower-middle-income countries.

Members appreciated management's agreement with the report's recommendations. They agreed that a sequential approach, awareness-raising, and a focus on consumer behavior and enforceable rules and regulations were key, and they commended management's commitment to such an approach to long-term outcomes of MSWM in Systematic Country Diagnostics and Country Partnership Frameworks for low-income countries and lower-middle-income countries. Although acknowledging management's explanations on the constraints on MSWM demand, members asked management and IEG

to elaborate on the reasons behind limited lending to MSWM. They called for reinforced collaboration among the three Bank Group institutions, stressing the need to leverage private sector participation.

1 | Background and Context


Highlights

This evaluation assesses how well the World Bank Group has supported client countries with managing municipal solid waste to advance their development and sustainability goals. The evaluation covers World Bank, International Finance Corporation, and Multilateral Investment Guarantee Agency activities that supported municipal solid waste management (MSWM) in fiscal years 2010–20.

Municipal solid waste—waste generated from residential and commercial sources and managed mainly by local governments—is projected to triple in volume in low-income countries (and nearly double in lower-middle-income countries and upper-middle-income countries) by 2050. Most of the waste in low-income countries and lower-middle-income countries is managed improperly, untreated, and disposed of in open dumps.

The growing volume and changing composition of waste (including nonbiodegradable and plastic waste), if left unmanaged, will continue to contribute to greenhouse gas emissions and global and local land and water pollution that affect the health and welfare of impoverished people disproportionately.

It is widely accepted that municipal solid waste should be managed through a waste hierarchy approach that seeks to reduce consumption and increase reuse to complement efforts focused on waste collection, recovery, and disposal. The waste hierarchy is complemented by a wider circular economy approach that advocates for designing products to reduce waste, using products and materials for as long as possible, and recycling end-of-life products back into the economy.



The Bank Group delivers MSWM support to its clients across two pillars that are an organizing framework for this evaluation: policies and institutions, and infrastructure, access, and service delivery. This evaluation also considers how the Bank Group articulates and captures the environmental, social, health, and economic outcomes that are expected to come from improved MSWM.

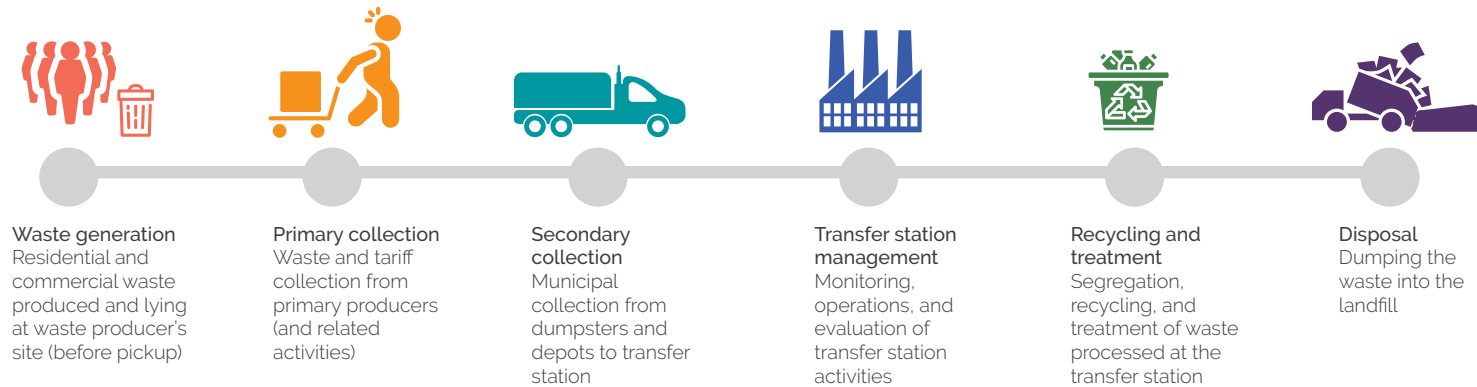
Municipal solid waste is one of the most pressing challenges worldwide. Global municipal solid waste is increasing rapidly; currently, the world's cities produce about 1.3 billion tons of waste annually, expected to rise to 2.2 billion tons annually by 2025 (Hoornweg and Bhada-Tata 2012). Historically, the causes and effects of municipal solid waste were considered local or regional; however, with increasing volumes and changing waste compositions, municipal solid waste has become a global challenge with growing public health, environmental, social, and economic costs.

Definition and Dimensions

Municipal solid waste is waste generated mainly from residential and commercial sources and managed mostly by local governments. Municipal solid waste is defined as waste collected and treated by or for municipalities. It covers waste from households, including bulky waste; similar waste from commerce and trade, office buildings, institutions, and small businesses; yard and garden waste; street sweepings; the contents of litter containers; and market waste if managed as household waste. The definition excludes waste from municipal sewerage networks and treatment, as well as waste from construction and demolition activities.¹

Municipal solid waste management (MSWM) consists of six stages: generation, primary collection, secondary collection, transfer station management, recycling and treatment, and disposal. Typically, waste generated by residential and commercial entities undergoes primary collection at the source. It is then conveyed through secondary collection to a transfer station, where it is segregated and composted, recycled, or treated before the remaining waste is disposed of in a controlled landfill. The treatment or recovery can be through converting waste to energy using biological or thermal treatment, including incinerators (figure 1.1).²

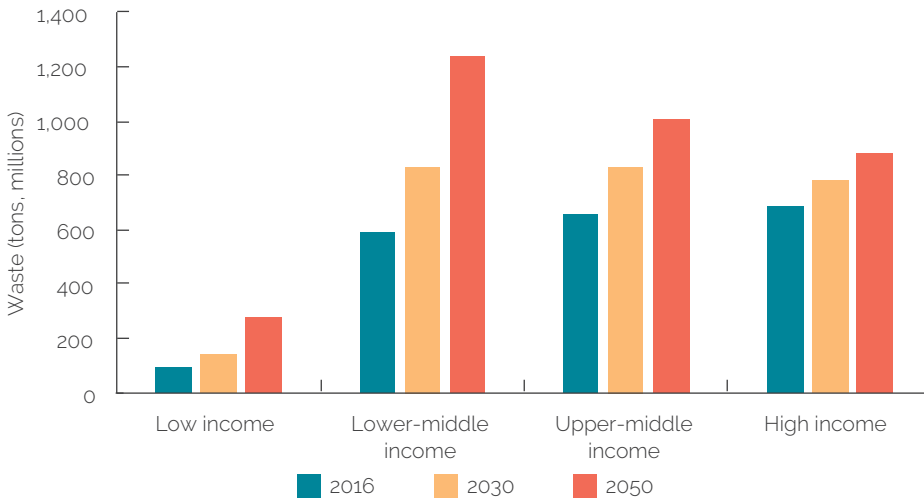
Figure 1.1. Municipal Solid Waste Management Process: Typical Stages



Source: Ahuja 2019.

The volume of municipal solid waste is growing fastest in low-income countries (LICs). As of 2020, high-income countries (HICs) and upper-middle-income countries (UMICs) together generate 71 percent of all municipal solid waste (Kaza, Shrikanth, and Chaudhary 2021). The average quantity of municipal solid waste generation per person per day is about 1.6 kilograms in HICs, 0.91 kilograms in UMICs, 0.47 kilograms in lower-middle-income countries (LMICs), and less than 0.41 kilograms in LICs. Fast-growing large- and medium-size cities will nearly double the waste generation in LMICs and UMICs by 2050 (figure 1.2). LICs will see even faster growth, with annual waste generation tripling from 93 million tons to 283 million tons over the same period. By contrast, the corresponding growth will be less than 30 percent in HICs.

Figure 1.2. Estimated Waste Generation by Country Income Classification



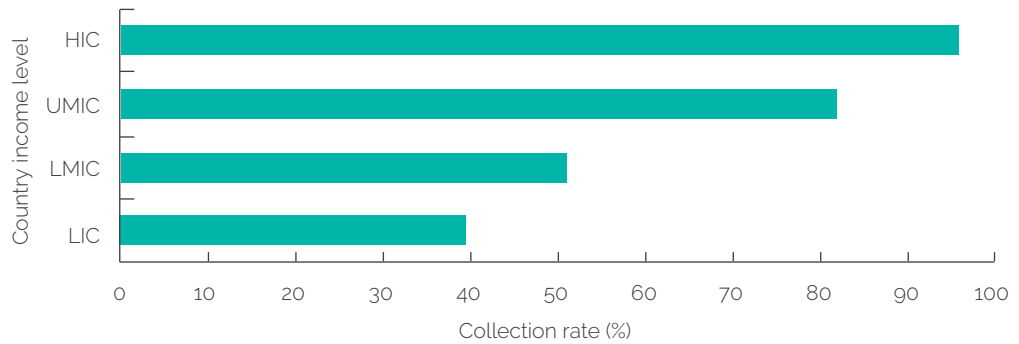
Source: Adapted from Kaza et al. 2018.

LICs and LMICs have greater challenges than UMICs and HICs in managing municipal solid waste. Collection rates correlate with country income. LICs collect only 39 percent (by weight) of the municipal waste they generate; LMICs collect 51 percent, UMICs collect 82 percent, and HICs collect 96 percent (figure 1.3, panel a). The use of proper disposal methods also varies by country income. The collected waste ends up predominantly in open dumps in LICs (93 percent) and LMICs (66 percent); this share is progressively less in UMICs (30 percent) and HICs (2 percent). LICs and LMICs have few sani-

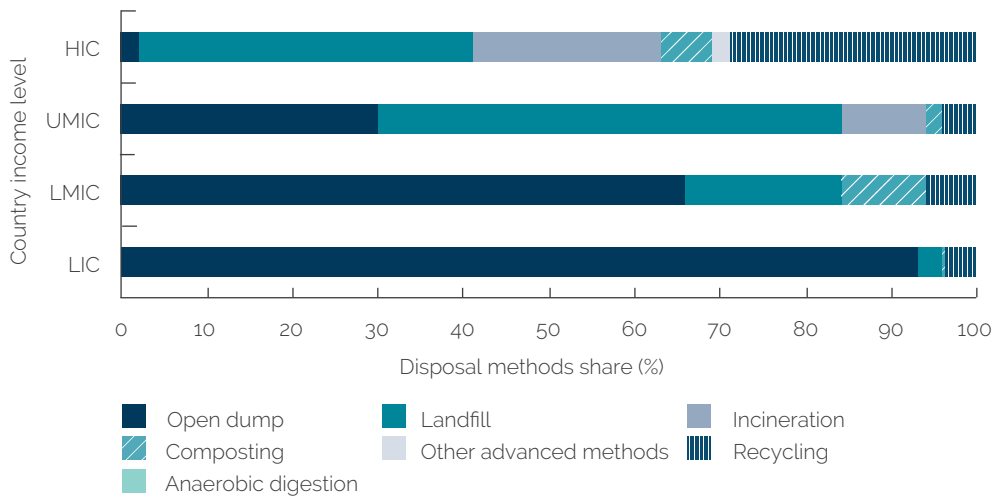
tary landfills or recycling facilities and no incineration facilities (Kaza et al. 2018; figure 1.3, panel b).

Figure 1.3. Select Municipal Solid Waste Parameters by Country Income Category

a. Collection rates



b. Disposal methods share



Source: Adapted from Kaza et al. 2018.

Note: HIC = high-income country; LIC = low-income country; LMIC = lower-middle-income country; UMIC = upper-middle-income country.

Several actors have roles to play in MSWM. Residential and commercial entities are the sources of municipal solid waste and the beneficiaries of municipal solid waste services. Local governments are the principal sources of municipal solid waste financing and service provision, but central and regional governments perform policy setting and regulatory functions and

provide supplementary financial support. Civil society and nongovernmental organizations raise awareness for MSWM, hold service providers accountable, and support the informal waste picker community, which plays an important role in collecting and reclaiming recyclable and reusable material. The private sector is a potential source of investment, higher efficiency in service delivery, and improved practices, including extended producer responsibility, whereby manufacturers are physically and financially responsible for the disposal of their products. The informal sector (informal waste pickers) operates where formal services are inadequate.

Inadequate MSWM causes harmful local and global impacts through air, land, and water contamination. At the local level, inadequate MSWM has a significant bearing on overall quality of life through environmental, social, and economic impacts that affect impoverished people disproportionately. Globally, it contributes to climate change and growing plastic pollution.

- » **Weak MSWM at the local level affects health and quality of life adversely.** Improper waste management and open dumping and burning of municipal solid waste—which are more common in LICs and LMICs—pollute soil, air, and water and attract disease vectors. Mismanaged waste can clog stormwater drains, resulting in flooding that creates unsanitary and toxic conditions, disproportionately affecting impoverished people, who are likely to live near or work at waste disposal locations (Giusti 2009). When waste is burned, the resulting toxins and particulate matter in the air can cause respiratory and neurological diseases, among other health issues (Thompson 2014).
- » **Weak MSWM also contributes to climate change.** Landfills and open dumps contribute about 4 percent of global greenhouse gas emissions, though waste can potentially be a resource and a net sink of greenhouse gases through recycling and reuse (Barrera and Hooda 2016).
- » **Marine and riverine plastic pollution have particularly serious consequences for ecosystems and the health and livelihoods of people living near the water.** Damage caused by plastics to the marine environment is estimated at \$13 billion per year and upward of \$75 billion when considering the total natural capital cost of plastics used in consumer goods (World Bank Group 2021). In a business-as-usual scenario, the global flow of plastics to the oceans will nearly double between 2015 and 2025. About 80 percent of

ocean plastic originates from land, and 75 percent of that comes from poorly operating MSWM systems (Fletcher 2021).

- » **The millions of informal waste pickers worldwide who make a living by collecting, recycling, and selling reusable waste face low social status, work and live in deplorable conditions, and get little support from local governments.** An estimated 24 million waste pickers are in the informal sector worldwide, mostly in developing countries but also in richer countries (ILO 2013). Informal waste pickers provide widespread public benefits by recovering a greater proportion of recyclables than the formal sector in most LICs and LMICs, but they work under difficult conditions and with low returns. Women and children are significant participants in the informal sector and are especially vulnerable regarding their safety and welfare (Dias 2021).

Multilateral development institutions and private investment pay substantially less attention to MSWM than to other urban services. An assessment by the International Solid Waste Association found that, between 2003 and 2012, the share of solid waste management in all official development finance was only 0.32 percent (Lerpiniere et al. 2014). Recent donor assistance for MSWM (from the Asian Development Bank, the African Development Bank, the European Bank for Reconstruction and Development, and the Inter-American Development Bank) varied between 0.5 and 6.1 percent of all urban sector commitments during 2010–20. The Public-Private Infrastructure Advisory Facility database shows that in 2020, MSWM received \$1 billion in private investments, compared with \$4 billion for water supply and sanitation. All the private investment in MSWM was directed toward UMICs.

The municipal solid waste sector lacks an international mechanism to promote a coordinated approach. There is no global coordination mechanism devoted to solid waste management, unlike in other urban sectors (such as water supply, sanitation, transport, and energy). The only such mechanism focusing on waste management, the Global Partnership on Waste Management, was launched in 2010 but stopped functioning in 2019 without conducting any significant activities.³

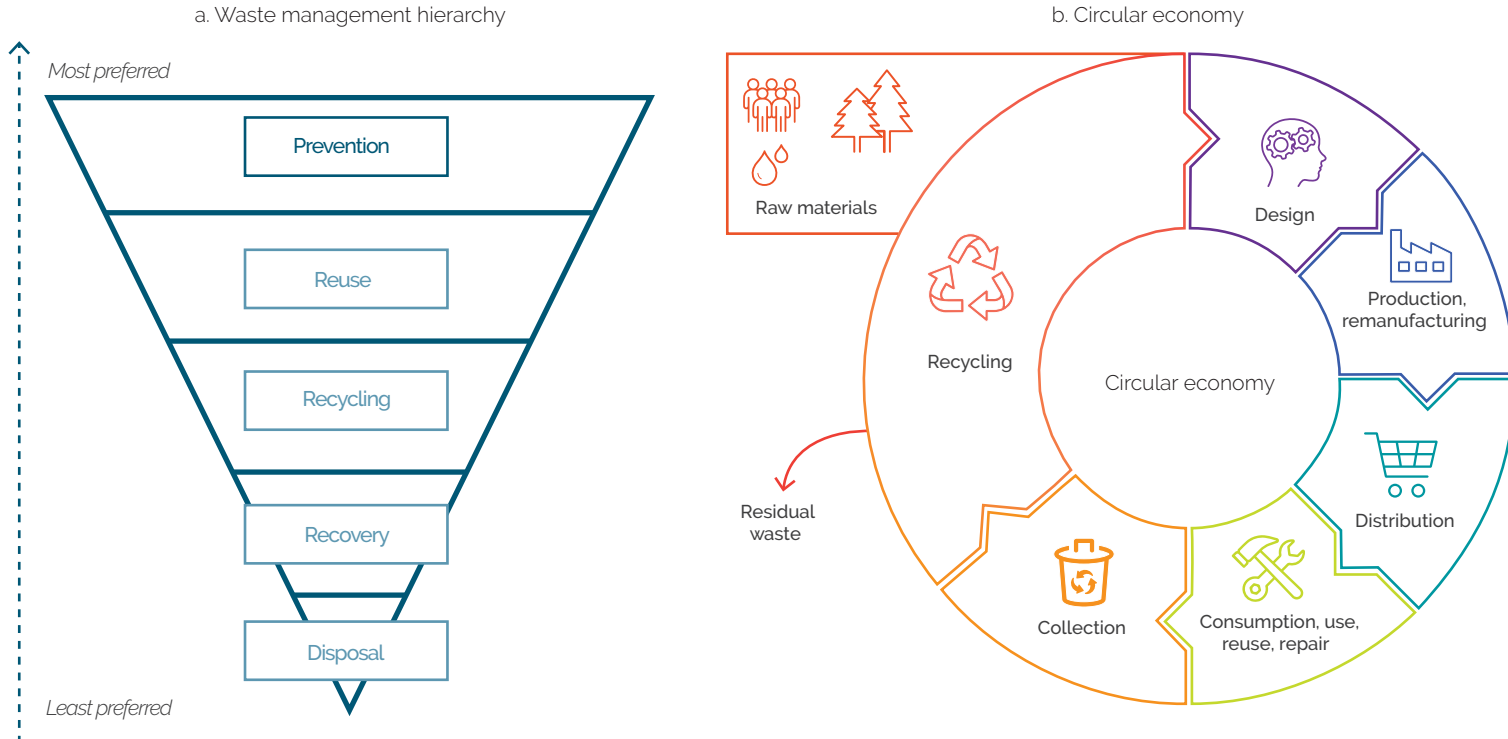
Current and Emerging Approaches

MSWM is at the core of (i) Sustainable Development Goal (SDG) 11 for sustainable cities and SDG 12 for reducing waste (and is relevant to issues addressed by other SDGs) and (ii) efforts to achieve green, resilient, and inclusive development. SDG 11 for sustainable cities addresses it directly by targeting service delivery for waste management, and SDG 12 for reducing waste generation addresses it through prevention, reduction, recycling, and reuse, which are essentially the elements of the waste hierarchy approach to MSWM described in the next paragraph. Other SDGs address means of converting selected waste to energy, the welfare of informal waste pickers, the role of MSWM in climate action, and marine plastic pollution (appendix A).

The waste hierarchy is a widely accepted principle for managing waste efficiently and sustainably. The waste hierarchy is typically presented as an inverted pyramid that shows approaches to MSWM from most to least preferred (figure 1.4, panel a). In this formulation, minimizing consumption and improving source reduction, along with increasing reuse, are preferable to recycling, which is preferred to recovery (for example, waste to energy, composting, and incineration) before disposing the remaining waste in an environmentally responsible manner, typically in sanitary landfills. Countries vary widely in how much they have transitioned from less to more desirable approaches in the waste hierarchy.

The broader circular economy approach is a sustainable alternative to the traditional linear (take-make-dispose) economic model. The circular economy approach advocates for designing products to reduce waste, using products and materials for as long as possible, and recycling end-of-life products back into the economy (figure 1.4, panel b). In the transition to a circular economy, it is important for consumers to demand extended producer responsibility, whereby manufacturers are physically and financially responsible for the disposal of their products.⁴ According to the independent *Circularity Gap Report 2021*, the global economy is only 8.6 percent circular, wasting 91.4 percent of everything that is used (Circle Economy 2021). Application of the circular economy principle to MSWM is gaining traction in HICs, and awareness and interest is increasing in LICs, LMICs, and UMICs.

Figure 1.4. The Waste Hierarchy and the Circular Economy



Sources: Panel a: UNEP 2011; panel b: European Parliament 2021.

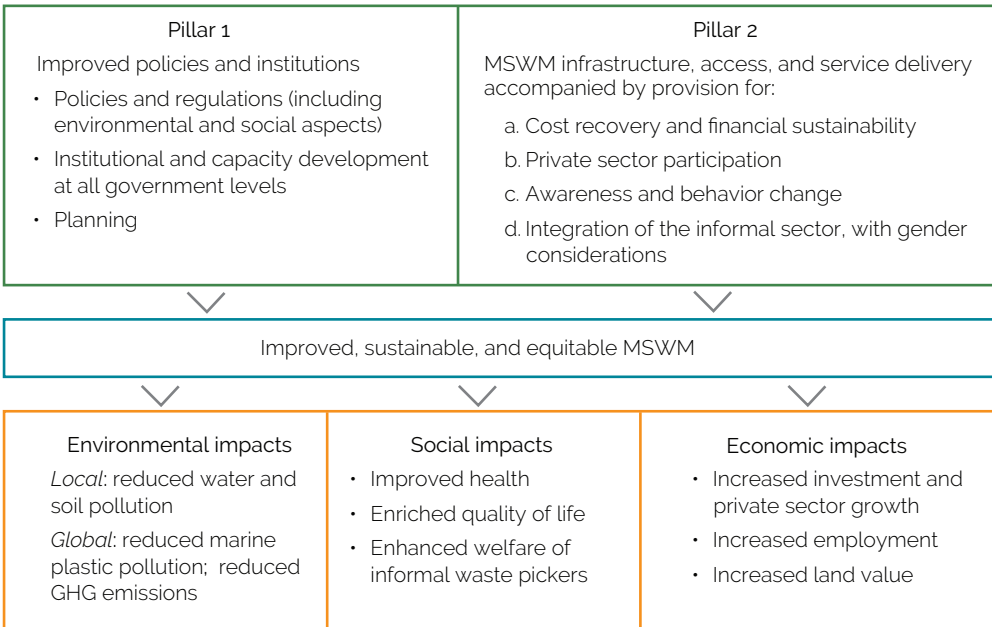
Evaluation Scope and Organizing Framework

The evaluation covers World Bank, International Finance Corporation (IFC), and Multilateral Investment Guarantee Agency (MIGA) activities that supported MSWM during fiscal years (FY)10–20. It covers World Bank projects and advisory services and analytics (ASA), IFC investments and advisory services, and MIGA guarantees.

The World Bank Group delivers MSWM support to its clients across two pillars that are an organizing framework for this evaluation: policies and institutions, and infrastructure, access, and service delivery. The first pillar covers the interlinked areas of policies, institutions, capacity, and planning at the central, provincial, and local government levels. The second pillar covers improved and sustainable access and service delivery through enhanced infrastructure and processes that promote accountability for service delivery, financial sustainability, and awareness and behavior change.

Integrated support for the two pillars is expected to lead to improved, sustainable, and equitable MSWM that will result in positive local and global environmental, social, and economic impacts. Global environmental impacts include reduced greenhouse gas emissions and marine plastic pollution. Local environmental impacts include reduced soil and water contamination and improved air quality, which would also enhance health. Social impacts include improving the welfare and livelihood security of informal waste pickers. Economic impacts come from job creation in the sector and the secondary effects that improved MSWM can have on land value and the expansion of economic activity in general (for example, in tourism) (figure 1.5).

Figure 1.5. Evaluation Framework for Improved Municipal Solid Waste Management



Source: Independent Evaluation Group.

Note: GHG = greenhouse gas; MSWM = municipal solid waste management.

Evaluation Aim, Questions, and Methods

This evaluation is the first major Independent Evaluation Group (IEG) study of the Bank Group’s support for MSWM. The evaluation builds on and contributes to IEG’s work stream on climate change and environmental sustainability.

This evaluation aims to assess how well the Bank Group has supported client countries to manage solid waste to advance goals related to development and sustainability, including climate-related goals. The three main evaluation questions are as follows:

- » How relevant is the Bank Group’s approach and engagement in meeting client country needs, considering the latest evidence and thinking on MSWM practices and country context and readiness?
- » How effective have Bank Group engagements been in delivering improved MSWM for clients?

- » How coherent has Bank Group engagement been in collaboration among the World Bank, IFC, and MIGA, and collaboration and partnerships with other actors to support better outcomes for client needs in MSWM?

The evaluation uses a mixed methods approach based on consultative theory- and case-based principles. The evaluation team consulted with staff across World Bank Global Practices and IFC industry departments and conducted a targeted literature review, a review of Bank Group country strategies, a Bank Group portfolio review, two project performance assessments, and seven country case studies. IEG conducted the case studies through virtual discussions with World Bank staff and stakeholders for six economies (Azerbaijan, Colombia, Kenya, Morocco, Nigeria, and West Bank and Gaza) and through desk-based research for Liberia. Coronavirus pandemic–related travel restrictions made virtual discussions necessary (appendix C).

¹ As defined in https://www.oecd-ilibrary.org/environment/municipal-waste/indicator/english_89d5679a-en

² Waste to energy is a very broad term that encompasses several technology options, from low-temperature landfill gas recovery through medium-temperature anaerobic (bio) digestion, to high-temperature thermal treatment (incineration, gasification, pyrolysis). The application of high-temperature thermal treatment facilities in most client countries should be considered carefully in terms of costs of technology and operation, potential for environmental risks if not operated correctly, maintenance and repair, capability to operate, and public perception.

³ The Global Partnership on Waste Management was launched in 2010 to enhance international cooperation, outreach, advocacy, and knowledge management and sharing and to raise awareness and political will for waste management. It was a partnership of four international agencies, but multilateral development banks and international agencies covering urban issues were not represented. It was closed in December 2019, and there have been no activities since then. The partnership's website has no mention of activities between 2010 and 2019.

⁴ For more information on extended producer responsibility, see <https://www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm>.

2 | Relevance and Coherence

Highlights

The World Bank Group has increasingly recognized and advocated for waste hierarchy and circular economy approaches for municipal solid waste management (MSWM). The *World Bank Group Climate Change Action Plan 2021–2025*, for example, sets out a goal of pursuing integrated waste management and circular economy approaches to help countries and cities advance climate, development, and sustainability goals.

Bank Group support does not consistently provide for some elements essential to integrated waste management, including revising policies, planning for cost recovery, involving the private sector, incorporating behavioral factors, and considering waste pickers.

The Bank Group addresses the growing waste management problem in low-income countries (LICs) infrequently. Less than half of Systematic Country Diagnostics in LICs diagnose MSWM issues, and there is no reference to MSWM in International Finance Corporation (IFC) strategies or diagnostics in LICs, except for two cases. LICs received less than 2 percent of World Bank lending and no investments from IFC.

The Bank Group has had limited collaboration in support of MSWM. References to the complementary roles that the World Bank and IFC can play in a coherent approach to improving MSWM are absent from most Country Partnership Frameworks, Country Private Sector Diagnostics, and IFC country strategies. MSWM has been a very difficult sector for the Multilateral Investment Guarantee Agency to enter because of several constraints related mainly to a lack of bankable projects seeking guarantees and the capacity limitations of municipalities as counterparts.

This chapter assesses the relevance and coherence of the Bank Group's approach to MSWM. Relevance was assessed by examining the Bank Group's approach to supporting clients with MSWM in line with waste hierarchy and circular economy approaches, as appropriate to client needs and stage of sector development. Coherence was assessed by examining collaboration among the World Bank, IFC, and MIGA. Specific methods to assess the relevance of the Bank Group's approach to MSWM included a targeted literature review; interviews with Bank Group staff and key country-based stakeholders; a review of data and analysis from the World Bank's flagship analytical products, including *What a Waste 2.0*; and reviews and analysis of Systematic Country Diagnostics (SCDs), Country Private Sector Diagnostics (CPSDs), Country Partnership Frameworks (CPFs), IFC country strategies, ASA, and lending.

Portfolio

This evaluation covers all World Bank, IFC, and MIGA support for MSWM during the period FY10–20. There were 117 World Bank investment and policy lending operations approved or ongoing during FY10–20, implemented in 55 countries (table 2.1). Of those operations, 82 were closed, and IEG evaluated 68. These operations individually supported some or all activities along the waste chain, which covers collection, transport, treatment, and disposal of municipal solid waste, in addition to policy and institutional development. IEG identified 122 World Bank analytical products covering 40 countries. There were 13 IFC investments in 7 countries, of which IEG evaluated 1. There were 26 IFC advisory services in 19 countries, of which 14 were closed, and IEG evaluated 9. IFC investments were mainly for waste-to-energy conversion from landfill gas recovery, except for one landfill investment and three investments for e-waste recycling and composting. Most IFC advisory services were for public-private partnership (PPP) transactions that supported waste-to-energy facilities and sanitary landfills. The rest were a mix of concessions, acquisitions, and lines of credit for MSWM services as part of urban services. MIGA has one recent active guarantee for a new sanitary landfill that was issued along with advisory services (table 2.1).

Table 2.1. World Bank Group Municipal Solid Waste Management Activities (Approved and Ongoing, FY10–20)

Activity Category	Countries (no.)	Projects (no.)	Commitments (US\$, millions)	Projects Closed and Evaluated (no.)
World Bank projects	55	117	2,676	68
World Bank ASA	40	122	44	n.a. ^a
IFC investments	7	13	398	1
IFC advisory services	19	26	23	9
MIGA guarantees	1	1	106	0

Source: Independent Evaluation Group.

Note: ASA = advisory services and analytics; FY = fiscal year; IFC = International Finance Corporation; MIGA = Multilateral Investment Guarantee Agency; n.a. = not applicable.

^aWorld Bank ASA are not rated.

Relevance

The Bank Group has recently focused on the waste hierarchy and circular economy approaches. World Bank knowledge products before 2020, though important, did not explicitly adopt waste hierarchy and circular economy approaches.¹ However, the Bank Group (2021) sets out a goal of pursuing integrated waste management and circular economy approaches to help countries and cities advance climate, development, and broader sustainability goals. According to the plan, the World Bank will support cities to promote these approaches, and IFC will help strengthen MSWM capacity for service delivery in areas where infrastructure is limited or relies heavily on the informal sector and will promote sustainable resource recovery solutions. The growing problem of marine plastic pollution—and the need to use waste hierarchy and circular economy approaches to address it—was discussed during the World Bank–IMF Spring Meetings (2018, 2019) and was the subject of other events focused on the East Asia and Pacific Region involving environment ministers (of Cambodia, Indonesia, and Vietnam), a private sector leader in plastic production, and a leading plastic recycling entrepreneur.² The coronavirus pandemic has also highlighted the need to ensure

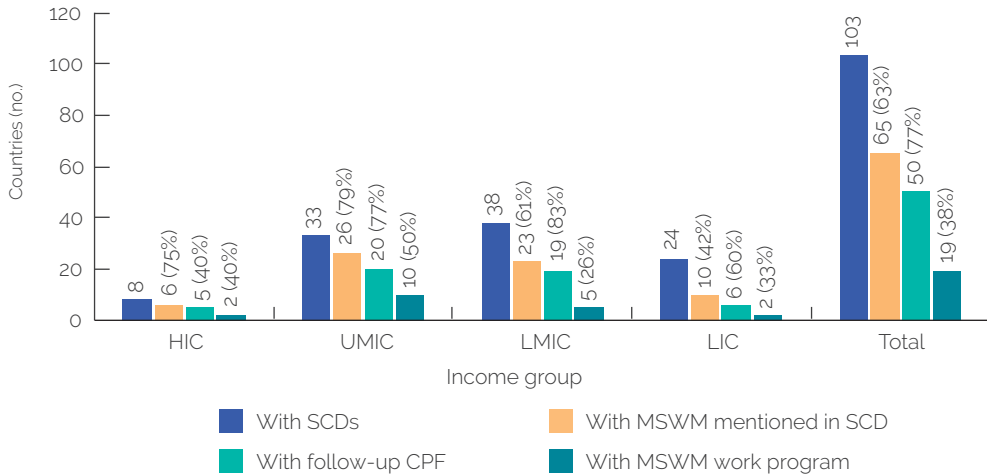
the sound management and proper disposal of medical-related plastics and waste, including hospital waste, masks, and single-use containers.

The Bank Group is playing a convening role in addressing marine plastic pollution through the PROBLUE initiative. PROBLUE is an umbrella trust-funded program that supports the sustainable and integrated development of marine and coastal resources in healthy oceans.³ It is currently supporting the Regional Marine Plastics Framework and Action Plan for East Asia and Pacific, the region with the largest incidence of marine plastic pollution. Linked to this initiative, the World Bank in June 2021 approved a \$430 million China Plastic Waste Reduction Project that has learning potential for other countries. PROBLUE is pursuing analytical work, pilot activities, and public-private platforms in Cambodia, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam.

Bank Group Diagnostics and Strategies across Country Income Groups

The Bank Group's country diagnostics, partnership frameworks, and strategies cover MSWM issues less in LICs than in other country income groups. Although SCDs often refer to MSWM as a development challenge for UMICs and HICs, such diagnoses occur far less for LICs. Less than half (42 percent) of SCDs in LICs diagnose MSWM issues (figure 2.1), even though most LICs face fast-growing municipal solid waste issues, as documented in the World Bank's analytical products (for example, Kaza et al. 2018). By contrast, 75 percent and 79 percent of SCDs diagnose MSWM challenges in HICs and UMICs, respectively. More than half (54 percent, 20 of 37) of IFC's country strategies and one-third (7 of 21) of its CPSDs (all of which had been developed since 2018) refer to MSWM issues. Encouragingly, 80 percent of those relate to LMICs. Only 2 country strategies for LICs, Haiti and Rwanda, mention MSWM issues. However, the overall number of these IFC documents is low for LICs: 5 country strategies and 4 CPSDs.

Figure 2.1. Municipal Solid Waste Management in SCDs and CPFs by Country Income Group (Approved and Ongoing, FY10–20)



Source: Independent Evaluation Group.

Note: The percentages shown in the figure refer to the share of countries in one category that are also in the next. For example, of the 6 LICs with follow-up CPFs, 2 (33 percent) have MSWM work programs. CPF = Country Partnership Framework; FY = fiscal year; HIC = high-income country; LIC = low-income country; LMIC = lower-middle-income country; MSWM = municipal solid waste management; SCD = Systematic Country Diagnostic; UMIC = upper-middle-income country.

IFC CPSDs do not cover the constraints that inadequate MSWM may be posing for wider private sector activity. High levels of mismanaged solid waste may pose sector-specific and economy-wide constraints that hold back private sector development (including for such sectors as retail, tourism, housing development, and manufacturing). However, CPSDs rarely discuss these links between MSWM and private sector development.

LICs receive a very small share of World Bank and IFC investments and ASA. Only 1.5 percent of World Bank lending for MSWM during 2010–20 was directed to LICs (to only two countries). IFC had no investments in the sector for LICs. Of the 122 World Bank analytical products, only 6 were directed exclusively toward LICs (table 2.2).

Table 2.2. World Bank Group Municipal Solid Waste Management Operations by Country Income Group (Approved and Ongoing, FY10–20)

Income Group	World Bank Lending			IFC Investment			IFC Advisory		
	Countries	Commitments		Countries	Commitments		Countries	Commitments	
	(no.)	(US\$, millions)	(%)	(no.)	(US\$, millions)	(%)	(no.)	(US\$, millions)	(%)
HIC	1	22	1	0	0	0	0	0	0
UMIC	11	616	34	4	382	96	11	11.3	50
LMIC	21	1,145	63	3	16	4	5	9.2	40
LIC	4	28	1.5	0	0	0	2	2.4	10
Total	37	1,811	100	7	398	100	18	22.9	100

Source: Independent Evaluation Group.

Note: FY = fiscal year; HIC = high-income country; IFC = International Finance Corporation; LIC = low-income country; LMIC = lower-middle-income country; UMIC = upper-middle-income country.

The low World Bank lending to LICs can be attributed mainly to their limited borrowing ability and competing priorities in these countries. Discussions with World Bank staff and country counterparts indicate that there is a limited political constituency in LICs for raising MSWM as an issue, despite their fast-growing municipal solid waste problem. Client governments lack awareness of waste issues, strategies for managing the sector, appropriate policies, relevant regulations, and institutional capacity (Guerrero, Maas, and Hogland 2013). Higher-income households make private provision for municipal solid waste services, whereas the majority of impoverished people are left to fend for themselves. Although these conditions foster an environment for open dumping and low willingness to pay for services that limits the feasibility of financial support for MSWM initiatives, there may be unexplored opportunities (box 2.1). In any case, there is no clear reason for the low coverage of LICs in World Bank ASA.

Box 2.1. Supporting Solid Waste Management in Sub-Saharan Africa

Municipal solid waste management in Sub-Saharan Africa, which is home to the largest share of low-income countries, has received little attention, with minimal domestic and international investment. The result is that waste is managed poorly in most countries in Sub-Saharan Africa. Uncontrolled dumping and open burning of waste are the dominant means of waste management.

Given the limited resources available to most municipalities for managing municipal services, waste management is often given lower priority and budgets. However, there is scope for both the public and private sectors to bring waste under control and unlock the opportunities for using waste as a resource. Doing so requires investments in the waste management system, from basic city cleansing and improved waste collection to improved waste management at end of life.

Immediate opportunities exist in the beneficiation (that is, the treatment of waste to improve its physical or chemical properties to use it as a raw material input into production processes and extract economic value) of organic waste to compost or biogas, paper and packaging, tires, and waste electrical and electronic equipment recycling. These activities could divert 70–80 percent of municipal solid waste away from disposal and help reduce waste leakage into the environment, including the marine environment.

(continued)

Box 2.1. Supporting Solid Waste Management in Sub-Saharan Africa (cont.)

Estimated investment needs for transforming the waste sector in Africa ranged from a cumulated \$6 billion to \$42 billion in 2015 (UNEP 2018). However, diverting waste away from dumpsites and landfills toward reuse, recycling, and recovery could inject an additional \$8 billion every year into the African economy and create significant socio-economic opportunities for the continent.

Sources: Independent Evaluation Group interviews and case studies in Kenya, Liberia, and Nigeria; UNEP 2018.

IFC's investments in MSWM are subject to the same constraints as in most other sectors. IFC's assistance depends on various elements, such as maturity of markets, sound legal and regulatory frameworks, and the creditworthiness of clients (such as municipalities and private companies). All those are generally lacking in LICs, especially for MSWM, and their absence makes private sector solutions particularly difficult to implement (box 2.2).

Box 2.2. Outstanding Issues to Enable Private Sector Participation in Municipal Solid Waste Management

A study covering 20 private service providers in the Dar es Salaam municipalities of Kinondoni, Temeke, and Ilala, Tanzania, revealed that the private sector operates in difficult conditions because of low cost recovery, the use of inferior waste collection and transportation equipment, limited scheduling, short contract durations, inefficient systems of refuse fee collection, an absence of planned waste recycling systems, inaccessible roads, and weak implementation of relevant municipal policies and bylaws. It was also noted that the system's success would depend on increasing municipal authorities' accountability, raising communities' awareness, improving willingness to pay for refuse fees, discouraging illegal dumping, enforcing municipal bylaws, and planning and promoting environmentally friendly waste management practices.

Source: Kirama and Mayo 2016.

Integration of Waste Hierarchy and Circular Economy Principles in Country Strategies and Operations

The Bank Group has yet to sufficiently integrate waste hierarchy and circular economy principles into its support to client countries. Thirty-eight percent of countries in the World Bank MSWM portfolio (21 of 55) articulated waste hierarchy or circular economy aims in their SCDs or CPFs. However, only 20 percent of the countries (11 of 55) focused explicitly on waste hierarchy elements (reduction, reuse, recycling, and recovery) in their lending portfolios. The China Ningbo Municipal Solid Waste Minimization and Recycling Project (box 2.3) is a best practice example of operationalizing waste hierarchy principles.

Box 2.3. A Best Practice Example of Operationalizing Waste Hierarchy Principles

The China Ningbo Municipal Solid Waste Minimization and Recycling Project is an example of best practice in project design and implementation for operationalizing waste hierarchy principles. Key to this effort was supporting the city of Ningbo to achieve systematic separation of recyclables from organic wastes and ensure their sustainable disposal. The project was based on the premise that more efficient waste separation would make more recycling material readily available, with reduced quantities ending up in the final disposal sites.

The project activities included constructing a kitchen waste treatment facility; providing residential municipal solid waste separation and collection equipment, transferring and sorting stations, and collection vehicles; implementing an incentive-based municipal solid waste program for neighborhood resident committees to roll out increased public awareness programs regarding separation and recycling; conducting training programs on waste minimization for municipal solid waste management staff; developing a solid waste management information system; and formulating municipal solid waste pricing and separation rules and policies.

(continued)

Box 2.3. A Best Practice Example of Operationalizing Waste Hierarchy Principles (cont.)

Project outcomes exceeded targets. The proportion of solid waste separated (paper, cardboard, plastic, metal, glass, textiles, and so on) at project closure was 17.5 percent, compared with a target of 15 percent. The total amount of separated kitchen waste collected and transferred to the kitchen waste treatment facility was 193,200 tons per year, compared with the target of 150,000 tons per year. The biogas produced is transported to the Yinzhou Landfill Gas Power Plant for use, yielding greenhouse gas emission reductions of about 50,000 tons per year. Before the project, municipal waste in Ningbo municipality either ended up in the landfill or was incinerated. Under the project, 71,600 tons per year of materials for recycling were separated at sorting centers. For monitoring and ensuring accountability, the project established an internet-based smart technology sanitation information system that collects data related to waste collection, transfer vehicles, and transfer stations. The project also established an output-based incentive program targeted to neighborhoods, and it is operational. A client satisfaction survey in 2019 showed an increase in awareness of waste separation from 35 percent in 2015 to 94 percent.

Source: World Bank 2020.

Relevance of the Bank Group's Support for Pillar 1 (Policies and Institutions)

A majority of Bank Group CPFs highlight needs for support with policies, regulations, and institutions, but fewer countries received such support. To improve MSWM, it is often important to formulate policy, update regulations, and develop institutions along the entire waste value chain, from collection to disposal. Such activities may be necessary for addressing waste hierarchy elements; incentivizing behavior change among waste generators, policy makers, and local government officials; and integrating informal waste pickers. These needs were highlighted in about 65 percent of the countries with CPFs, but only 22–36 percent of those countries received relevant lending assistance. This gap may arise partially because client countries are at different stages of readiness to absorb and implement new or enhanced

policies and institutional development. Policies and institutional mechanisms from some countries may not be readily transferable to others without being substantially adapted to local contexts. There was a better balance between the extent to which planning issues were raised in countries with CPFs (42 percent), and the share of those countries with follow-up on planning issues in their lending programs was larger (table 2.3).

Table 2.3. Municipal Solid Waste Management Support Needs versus Relevant Support Provided, Policies and Institutions (percent)

Determinants of Effective MSWM	Share of Borrowing Countries (n = 55) with Issues Raised in CPF	Share of Borrowing Countries (n = 55) with Issues Covered in Lending Portfolio
Policy and regulations	65	22
Institutional development	64	24
Capacity building	64	36
Planning	42	40

Source: Independent Evaluation Group.

Note: CPF = Country Partnership Framework; MSWM = municipal solid waste management.

Relevance of the Bank Group's Support for Pillar 2 (Infrastructure, Access, and Service Delivery)

Among MSWM issues, CPFs and lending support paid the most attention to infrastructure for access and service delivery. Improved MSWM infrastructure needs were cited for two-thirds of countries with CPFs, and a similar proportion received lending support. Likewise, the need for enhanced access and service delivery was also cited for almost two-thirds of countries with CPFs and addressed in more than half of them. The most common infrastructure activities were closing informal dumpsites and rehabilitating sanitary landfills or building new ones. There was relatively less emphasis on infrastructure related to collection, separation, recycling, and recovery. Service delivery involved improved waste collection systems and expanding the reach of existing formal waste management systems to additional households and commercial enterprises.

However, support for infrastructure and service delivery was not sufficiently accompanied by provisions for financial sustainability. The issue of cost recovery was raised in only about one-third of countries with CPFs. Although more than half of the CPFs refer to the need for private sector participation, only 27 percent of World Bank projects included any efforts to incentivize private sector participation. Moreover, these were generally on a limited scale, relating mainly to earlier stages of the waste chain, especially waste collection and transport (table 2.4).

Table 2.4. Municipal Solid Waste Management Support Needs versus Relevant Support Provided, Infrastructure, Access, and Service Delivery

Determinants of Effective MSWM	Share of Countries (n = 55) with Issues Raised in CPF	Share of Countries (n = 55) with MSWM Lending
Infrastructure development	64	65
Enhanced access and service delivery	62	53
Cost recovery and financial sustainability	38	40
Private sector participation	58	27
Mechanisms for awareness and behavior change at firm and household level	15	44
Integration of informal actors into MSWM	16	24
Integration of gender	2	18

Source: Independent Evaluation Group.

Note: CPF = Country Partnership Framework; MSWM = municipal solid waste management.

The World Bank's ASA and CPFs addressed awareness and behavior change infrequently, but they received greater attention in its projects. Awareness and behavior change issues were raised for only 15 percent of countries with CPFs and in only 6 of 122 ASA products. However, these issues were addressed in 44 percent of the countries in the World Bank's lending portfolio. The efforts in the lending portfolio focused mainly on households and had widely varying coverage.

There have been relatively few efforts to address the informal sector's role and gender considerations. These considerations do not feature prominently in the World Bank's ASA, CPFs, or country lending programs or as part of the design and implementation of relevant operations. In many developing countries, especially LICs, informal waste pickers may provide a large share of solid waste collection, contributing to public benefits and recycling rates. However, very few projects engage with informal waste pickers beyond complying with do-no-harm safeguard provisions. Gender-related issues specific to MSWM were addressed infrequently in MSWM operations. The inattention to gender is particularly concerning because participation by women and children is high in the informal sector and requires focused attention to address specific challenges. Women's participation in processing and in recycling factories is also often unregulated, posing health and safety issues. In addition to these occupational challenges, women in the waste sector must deal with competing demands from domestic and child rearing responsibilities, as in several other sectors.

Coherence

There has been limited Bank Group collaboration in support of MSWM, despite the need for it expressed in several IFC CPSDs and country strategies. IFC's CPSDs and country strategies indicate that World Bank involvement is crucial to enhancing the enabling environment for MSWM development. One role the World Bank can play is to support enhancing regulatory and legal aspects of the MSWM sector in client countries (and their enforcement). Another is to develop revenue models for private sector participation during implementation of MSWM projects. Sovereign-guaranteed resources also need to be leveraged to promote private sector participation. In a couple of cases where this has occurred or is under way (the Arab Republic of Egypt and West Bank and Gaza), project teams' initiative played a large role (see chapter 3).

IFC investments are more likely where the MSWM policy and regulatory environment is mature and core infrastructure is in place. IFC looks to the World Bank to take the lead in supporting client countries to create an enabling environment for private sector investment in MSWM. The issue of landfills is an example. Constructing new landfills usually involves closing

old dumpsites that can carry legacy contamination issues. Local governments' lack of commitment to dealing with these legacy issues can stall new landfill development, with little leverage for IFC in these matters.

IFC's engagement in MSWM is mostly in waste to energy. IFC's investments and advisory services focus mostly on recovery, especially activities that seek to convert waste to energy. IFC has faced challenges in expanding its range of activities because of insufficient scale, unfavorable legal and regulatory frameworks for private participation in MSWM, uncertain contractual arrangements, and uncertainties in land acquisition. China is the only country where IFC has financed activities in addition to waste to energy, such as treatment of restaurant and commercial waste, anaerobic digestion, and recycling. Even these have been on a modest scale.

A lack of bankable projects seeking guarantees constrains MIGA's participation. MIGA can participate in the MSWM sector through two avenues. One is to participate in PPP transactions and provide political risk insurance. The other is to provide guarantees protecting commercial lenders from nonhonoring of financial obligations by central governments and municipalities regarding their solid waste management projects. MIGA has been proactively trying to originate projects in the MSWM sector in partnership with international sponsors. However, MSWM has been a very difficult sector for MIGA to enter. One constraint is that municipalities typically borrow in local currency, whereas MIGA can support transactions in local currency only when they meet certain criteria. Another is that many municipalities lack capacity to design and implement MSWM projects, which often have complex revenue and fee structures, with multiple contracts and payment sources and without uniform tariff structures. Finally, less than 20 percent of the 500 largest municipalities in developing countries are deemed creditworthy in their local context, limiting MIGA's potential to find suitable counterparts.⁴ The Belgrade Waste-to-Energy Project in Serbia, which was the result of long-term IFC upstream engagement with the city government, is an exception. It is groundbreaking because it addressed many of the typical constraints of MSWM projects, including the tariff and revenue structures, and the project's bankability was enhanced to such a level that development finance institutions besides IFC and MIGA felt comfortable to provide financing.

The World Bank Group's Role among Multilateral Development Banks and Private Investment

The World Bank is by far the leading source of lending and knowledge on solid waste management. The Bank Group's lending of about \$3 billion for MSWM during FY10–20 far exceeds that of most other multilateral development banks, after accounting for geographical coverage. The Inter-American Development Bank is next with \$708 million for 2005–20. An assessment of recent donor assistance (from the Asian Development Bank, the African Development Bank, the European Bank for Reconstruction and Development, and the Inter-American Development Bank) shows that their financing for MSWM activities varied between 0.5 and 6.1 percent of all urban sector commitments during 2010–20, compared with about 10 percent for the Bank Group (appendix F). Regarding knowledge, the Bank Group produced two flagship reports on the state of and approaches to MSWM worldwide—*What a Waste* and *What a Waste 2.0*—and has been conducting technical certification courses on MSWM for professionals and policy makers worldwide.

Multilateral development banks are seeking to expand their support for MSWM, and sector experts see a convening role for the Bank Group. Discussions with staff of the Asian Development Bank suggest that they are looking for ways to raise the priority for MSWM within client countries and their own organizations. Both institutions are interested in observing the Bank Group's course toward MSWM. International MSWM experts see a convening role for the Bank Group, which has the largest reach, greatest experience, and most diversified solid waste management portfolio among any of the multilateral lending or development institutions. Experts also point to the lack of an international coordination and advocacy mechanism for MSWM (unlike for energy, transport, and water supply and sanitation). An assessment of marine plastic pollution—an important component of municipal solid waste—by a leading international expert finds that the absence of a unifying voice and leadership in this area is blocking coordinated action (Fletcher 2021).

¹ The World Bank’s urban and local government strategy, *Systems of Cities* (World Bank 2009), covered municipal solid waste management issues widely under the theme of promoting a safe and sustainable urban environment. Its environmental strategy, *Toward a Green, Clean, and Resilient World for All* (World Bank Group 2012), and the strategic action plan of the Water Global Practice (World Bank Group 2019) together highlight the challenges of managing waste in fast-growing cities and specific environmental issues relating to soil and water pollution, urban flooding, and greenhouse gas emissions.

² The event, *Marine Plastics in East Asia and the Pacific: Crisis and Opportunity*, was held on November 2, 2020. Another event on the subject was *Measuring Plastic Pollution*, held during the Asia-Pacific Workshop (March 30–31, 2021).

³ For more information about the PROBLUE initiative, see <https://www.worldbank.org/en/programs/problue>.

⁴ For more information, see “City Creditworthiness Initiative: A Partnership to Deliver Municipal Finance” at <https://www.worldbank.org/en/topic/urbandevelopment/brief/city-creditworthiness-initiative>.

3 | Effectiveness

Highlights

There are few World Bank Group efforts to articulate specific links between policies and regulations enacted and overall improvements in municipal solid waste management (MSWM) systems. However, successful efforts to enact policy and regulations occur in countries that have undertaken activities geared toward integrated approaches.

The International Finance Corporation does not play a strong role in MSWM policy and institutional development, but when it does, it can be effective in supporting improvements to the enabling frameworks for private investment in MSWM.

World Bank support for basic municipal solid waste infrastructure and service delivery has been generally effective but is often undermined by insufficient attention to financial sustainability.

Very few projects tracked the environmental, social, or economic outcomes of improving MSWM. Many that did either did not report on outcomes or reported that the intended outcomes were not achieved because of delays or implementation challenges. Local governments and regulatory agencies are ultimately responsible for measuring these impact areas, and this measurement may require more specialized and expensive interventions than are provided currently.

Articulating and capturing higher-order impacts shows that MSWM can make substantial contributions toward achieving country-level environmental, social, and economic goals. Good practice examples show how MSWM can contribute to reducing global greenhouse gas emission (Bosnia and Herzegovina), abating local pollution (especially in China), and creating jobs for low-income urban residents (the Central African Republic, Côte d'Ivoire, and Liberia).

This chapter assesses the effectiveness of Bank Group support for MSWM in client countries. Effectiveness is assessed based on IEG's evaluations of projects that were closed during 2010–20, which include World Bank projects, IFC investments, and completed advisory services. The World Bank has 82 closed projects covering 55 countries, and project-level IEG Implementation Completion and Results Report Reviews covered 68 of those projects.¹ Only one of IFC's 13 investments in 7 countries was matured and evaluated through an Expanded Project Supervision Report review. Nine of 26 IFC advisory services in 19 countries were closed and evaluated through Project Completion Reports. For the World Bank's evaluated projects, the evaluation rated the performance of each determinant of pillars 1 and 2 that the project addressed and each environment, social, and health determinant. Thus, if a completed World Bank project addressed infrastructure and planning, its performance against each of these elements was assessed on whether it was effective or not, based on key performance indicators and other information available from the project evaluations. The following discussion for World Bank projects is based on this analysis.

Pillar 1: Policies, Institutions, Capacity Building, and Planning

A small proportion of World Bank projects addressed pillar 1, and although most of them achieved the expected outputs, attribution of wider MSWM outcomes is less clear. Between 15 and 30 percent of the World Bank lending portfolio addressed policy, institutions, capacity building, and planning (table 3.1). The planned outputs were achieved in the majority of projects that were evaluated—between 69 and 81 percent. But attributing larger MSWM outcomes to these projects was not possible in some cases, especially for institutional development and capacity-building activities.

Table 3.1. Effectiveness of Pillar 1 Determinants: Policies, Institutions, Capacity Building, and Planning

Determinants	Projects Addressing Determinant ^a		Projects Closed and Evaluated	Projects with Effective Performance ^b	
	(no.)	(%)	(no.)	(no.)	(%)
Policies and regulations	17	15	10	7	70
Institutional development	19	16	13	9	69
Capacity building	35	30	21	17	81
Planning	28	24	14	10	71

Source: Independent Evaluation Group.

Note: a. Total portfolio is 117 projects.

b. Performance is assessed based on an analysis of key performance indicators for a given determinant.

World Bank projects that addressed policy and regulatory issues effectively were generally linked to positive overall MSWM outcomes. Most client countries have at least basic policy and regulatory elements in place, but these policies often need clarification, especially at local levels. There is a positive association between cases where the World Bank supported policy and regulatory reform effectively and those where the World Bank also achieved effective results across both evaluation pillars. In West Bank and Gaza, the Southern West Bank Solid Waste Management Project helped update guidelines for PPPs, including specifications for solid waste equipment and facilities. This upstream assistance helped implement a PPP contract for managing a landfill and generated momentum for wider solid waste management sector reform. In Bosnia and Herzegovina, the World Bank’s solid waste management projects helped develop a legal framework for facilitating the development of intermunicipal boards that is underpinning improved performance in the MSWM sector. Policy actions in the Morocco development policy loan (DPL) series encompassed issues belonging to several determinants of the evaluation framework’s two pillars—institutional coordination, budgeting, sector industry standards, transparency, and cost-effectiveness—as part of the country’s National Solid Waste Program. These efforts helped increase waste collection in Morocco to near-universal coverage. Similarly, the Colombia DPL for Sustainable Development updated

standards and regulations for sanitary landfills in line with Organisation for Economic Co-operation and Development recommendations and applied waste hierarchy principles in promoting recycling and reuse. World Bank regulatory assistance helped improve the welfare of waste pickers and was instrumental in increasing adequate disposal rates. However, policy dialogue for MSWM was stalled under Nigeria's Lagos Metropolitan Development and Governance Project, partly because it was given less priority than other urban services the project covered, and no progress was made in improving the state of MSWM in the city.

Institutional development and capacity-building activities were generally carried out as planned, but they often did not track their contributions to overall MSWM outcomes. Institutional development was mainly through developing dedicated municipal solid waste cells or units at the local government or other levels, implementing mechanisms for intermunicipal district coordination, and equipping training centers. Capacity building was carried out through training officials from local government and other levels using classroom training and study tours. Most of the outputs from these activities (for example, the number of training sessions and the number of persons trained) were reported but can be reasonably linked to overall MSWM outcomes in only a few cases. A positive experience from Mozambique's Maputo Municipal Development Program I and II involved support for reorganization in the City Council of Maputo to focus on the core functions of policy development and planning of solid waste services while contracting out to private firms and microenterprises the job of collecting and disposing of garbage. These actions can be linked to significant improvements in access and service delivery. Azerbaijan's ARP II Integrated Solid Waste Management Project was instrumental in setting up Tamiz Shahr, a solid waste management company, with positive results for MSWM in the Baku area. Bosnia and Herzegovina's solid waste management projects helped establish 13 intermunicipal districts using a regional landfill and sharing operational and capital costs. By contrast, Brazil's Ceara Regional Development, a regional consortium established for a landfill, did not materialize because of disagreement among members. In the Central African Republic's Emergency Urban Infrastructure Emergency Recovery Loan, there is no clear evidence for strengthened capacity of stakeholders in MSWM after management training in this regard. The Maldives' Ari Atoll Solid Waste Management Project provided training to at least one community member in

each participating island in solid waste management practices, but there is no clear evidence linking it to results. Tanzania’s Strategic Cities Project resulted in more efficient collection and disposal methods at project completion, but it is not clear whether this can be attributed to increased local government capacity that can sustain these results in the long term or whether the results were mainly attributable to external consulting services and additional specialists employed during project implementation.

World Bank project activities for MSWM planning were mostly completed as envisioned, but there is little evidence of follow-up. Support for planning was directed mainly toward preparing MSWM strategies and master plans (for capital cities or major cities), and these were completed with a few exceptions. But there appears to have been little follow-up through investments, either through the borrower’s own funds or through projects funded by external sources. This also makes it likely that any capacity addition for local government or other bodies during the planning exercise may have dissipated after project completion. For example, MSWM plans were developed for six provinces and six municipalities and regions in Argentina, in the Central African Republic for the cities of Bangui and Bimbo, and in Côte d’Ivoire for Abidjan without any indication of follow-up. In Nepal, on a smaller scale, four medium-size municipalities improved their solid waste management services, first by developing a solid waste management strategy and service implementation plan and then by following the plans with grant subsidy support.

IFC investments and advisory services improved the enabling framework for private investments in some cases. IFC advisory services helped improve PPP regulatory frameworks in Serbia that contributed to finalizing the Belgrade Waste-to-Energy Project. They also helped clarify the legal enabling environment for private investment in MSWM in Maldives, setting the stage for private participation. In Albania, IFC’s support for formulating legal provisions for packaging and e-waste was not followed through because of political changes. Several advisory engagements captured in table B.3 reflect similar efforts with mixed results in Brazil, Egypt, Guinea, India, Kosovo, Lesotho, Montenegro, and West Bank and Gaza. Efforts are currently under way in Indonesia and Uganda. In addition, IFC has provided advisory services related to the waste sector in Buenos Aires, Argentina; Bogota, Colombia; and Izmir, Turkey (as part of the Cities Business Model).

Pillar 2: Infrastructure, Access, and Service Delivery

World Bank support for infrastructure development in the MSWM portfolio achieved its intended results in most projects where it was attempted. World Bank support for infrastructure and operations to collect, transfer, and dispose of solid waste covered 56 percent of the project portfolio and generally realized the intended outputs in 83 percent of the evaluated projects (table 3.2). In decreasing order of occurrences, the following are the types of infrastructure that were supported: (i) *disposal*: closure of open dumps, rehabilitation of dumps and landfills, and opening of new sanitary landfills; (ii) *collection, separation, sorting, transfer, transport*: bins, trucks, and transfer stations; and (iii) *sorting, recycling*: material recovery facilities and recycling facilities. Under the evaluated portfolio, about 137 dumpsites closed, 40 sanitary landfills were built, and 112 transfer stations were built, with varying sizes and capacity.

Table 3.2. Effectiveness of Pillar 2 Determinants: Infrastructure, Access, and Service Delivery

Determinants	Projects Addressing Determinant		Projects Closed and Evaluated (no.)	Projects with Effective Performance ^a	
	(no.)	(%)		(no.)	(%)
Infrastructure development	65	56	40	33	83
Access and service delivery	44	38	26	24	92
Solid waste management operations	44	38	31	23	74
Cost recovery and financial sustainability	37	32	25	14	56
Private sector participation	22	19	15	11	73
Awareness and behavior change	35	30	23	20	87
Integration of informal waste pickers	21	18	11	9	82
Gender considerations	12	10	5	5	100

Source: Independent Evaluation Group.

Note: a. Performance is assessed based on an analysis of key performance indicators for a given parameter.

Efforts to improve access and service delivery—whether carried out by themselves or in conjunction with new infrastructure—had favorable results in nearly all cases. World Bank projects addressed access to MSWM collection and service delivery in 38 percent of the project portfolio, and favorable results were achieved in 92 percent of the evaluated cases. Access is measured by the number of waste generators (households and commercial enterprises) covered by MSWM services, mainly waste collection and transport. Service delivery is measured by the frequency and quality of MSWM services. In Côte d’Ivoire’s Emergency Urban Infrastructure Emergency Recovery Loan, the number of people in urban areas with access to regular solid waste collection increased from about 3 million to 4.5 million, surpassing the target of 4 million. In the surveyed municipalities, the majority of respondents agreed that household waste collection and frequency had improved. Under Bosnia and Herzegovina’s solid waste management projects, the percentage of households in the project area that were serviced by a formal waste management system increased from 25 to 64 percent, marginally exceeding the target. Under the Central African Republic’s Emergency Urban Infrastructure Emergency Recovery Loan, the number of people in urban areas provided with access to regular solid waste collection was only 183,600 against a target of 390,000. However, 72 percent of households that were provided access were satisfied with the regularity of collection.

Infrastructure improvements covering landfills and equipment for collection and transport increased the scale of solid waste management operations in most cases. Solid waste management operations are assessed on scale and frequency of transfer, transport, and disposal. These were addressed in 38 percent of the project portfolio, with favorable results in 74 percent of the evaluated cases. In Benin’s Decentralized City Management II Project, the share of municipal waste collected and transported out of the capital city of Porto-Novo (as a percentage of the total quantity) rose to 71 percent against a baseline of 25 percent and a target of 65 percent. In West Bank and Gaza’s Southern West Bank Solid Waste Management Project, there was a transformational shift in solid waste management services in two governorates, from a widely criticized, primitive, local open dump to a modern, internationally comparable landfill and waste disposal operation with sound environmental processes and social acceptability. In Argentina’s National Urban Solid Waste

Management Project, the targeted percentage of solid waste disposed of in the new sanitary landfills (as a proportion of the total estimated solid waste generated by the municipalities) was exceeded—98 percent achieved, compared with the goal of 85 percent. However, in Turkey’s Municipal Services Project, only 52 percent of the targeted waste disposal (in tons per year) was achieved at project completion.

Cost Recovery and Private Sector Participation

Attention to cost recovery and financial sustainability in World Bank projects lags significantly behind infrastructure provision, and results were favorable in only about half of the evaluated cases. The World Bank addressed the issue of cost recovery and improved financial sustainability in 32 percent of the portfolio, and only 56 percent of the evaluated projects showed favorable results. Mozambique, Vietnam, and West Bank and Gaza had positive experiences in which 70–90 percent or more of solid waste providers’ costs (including loan repayments in Vietnam) were recovered from user fees. In Morocco, the government allocated supplementary financial support to local governments on a regressive basis over three to four years for collection and cleaning and contributing to landfill construction. Several other countries had less success in meeting cost recovery targets, even at project completion. In Albania’s Coastal Zone Management Adaptable Program Loan 1 Project, there was a risk that the larger environmental infrastructure investments, such as the solid waste landfill site and the transfer station, would not be operated fully or maintained properly because of inadequate allocations in local utility companies’ maintenance budgets. In the Kyrgyz Republic’s Bishkek and Osh Urban Infrastructure Project, despite improvements to the cities’ revenue collection, most utilities and towns do not have adequate financial resources, and sector financing remains low.

A small proportion of World Bank projects addressed private participation in MSWM activities with generally limited scope and scale. Only 19 percent of World Bank projects had activities involving private sector involvement, and 73 percent of the evaluated cases had positive results. Under West Bank and Gaza’s Global Partnership on Results-Based Aid Solid Waste Management Project, a concession agreement with a private landfill operator was implemented, although the contractor chose not to continue after the initial

contract period because of unfavorable financial terms and difficult working conditions. Under Mozambique’s Maputo Municipal Development Program I and II, primary waste collection was initiated in 25 suburban neighborhoods, using microenterprises to provide collection services. In Bosnia and Herzegovina, recycling facilities were installed and made operational in four regions through contracts between utilities and private companies.

Awareness Raising and Behavioral Change

Activities for raising awareness and behavior change were limited, but positive results were achieved in most evaluated cases. Awareness and behavior change activities were attempted in 30 percent of the project portfolio, and favorable results were obtained in 87 percent of the evaluated cases. The programs generally targeted waste generators (households and commercial enterprises). The activities included citizen engagement programs, public awareness campaigns, and complaint systems. Positive results were achieved in projects in Argentina, Benin, Egypt, and West Bank and Gaza, raising public awareness and demand for solid waste collection, encouraging residents to pay for collection, reducing the discharge of solid waste into open drains, and decreasing illegal dumping. In India, IFC advisory services work supported a pan-India awareness campaign delivered through social media and radio, creating broader awareness across both consumers and local waste management companies about the hazards of e-waste.

Integration of the Informal Sector

Relatively few MSWM projects addressed the issue of waste pickers (beyond compliance with social safeguards), though several show positive results. The World Bank addressed the issue of informal waste pickers in only 18 percent of its portfolio, with 82 percent of the evaluated cases showing favorable results. In Argentina’s National Urban Solid Waste Management Project, the targeted number of informal recyclers that were integrated into formal activities of the municipalities’ sanitary landfills and separation plants was only partially achieved—275 were integrated compared with the target of 360. The Morocco DPL series supported pilots for inclusion of informal waste pickers by organizing cooperatives through partnerships with municipalities and private operators. IEG’s discussion with one well-functioning cooperative in

Meknes municipality found that its success was due to the municipality and the private company's willingness to support the informal waste pickers in organizing themselves as a cooperative to operate the sorting center. However, these efforts need to be scaled up to have wider impact. In Colombia, the World Bank's DPL series supported the government's regulatory efforts by developing and implementing frameworks to formalize waste pickers and secure their livelihoods. Other efforts were less successful because subnational entities did not follow through on implementation of World Bank proposals on integrating waste pickers, even though national governments may have agreed with them. This was the case in Brazil's Integrated Solid Waste Management and Carbon Finance Project, in which waste pickers' issues were incorporated in the design phase, but limited progress was made because of implementation and coordination challenges at the local government level, including disagreement over the amount of monetary compensation.

Social safeguard requirements can be leveraged to create substantial social and economic benefits for waste pickers and other informal actors. This was demonstrated by the World Bank-supported MSWM projects in West Bank and Gaza relating to waste pickers who were at risk of losing their livelihoods when dumpsites closed. Through the Sustainable MSWM Project, a livelihood assessment was conducted instead of only offering compensation for monetary loss, and a program was designed for waste pickers and implemented by specialized nongovernmental organizations. Underage pickers were allowed to attend vocational schools, and at least 80 percent of households whose livelihood depended on waste picking were integrated into improved and commercially viable waste management plans or other income-generating plans that the project promoted.

Only a few closed projects addressed gender considerations, but the active portfolio is promoting good practices. Only 10 percent of the project portfolio included gender considerations for informal waste pickers. They were mostly about counting female beneficiaries of MSWM access and services, and all five evaluated projects met their generally modest expectations. Mozambique's Municipal Development Program solid waste microenterprises generated 590 jobs for local residents, many of whom are women. More recently, some active projects are taking a more nuanced approach. In Ghana, the Greater Accra Resilient and Integrated Development Project is

conducting a gender-sensitive trash value-chain analysis (which includes recycling and processing handpicked trash) and is mapping the results to support women operating as trash pickers. This will include elements of cost analysis, access (both monetary and nonmonetary), and usage needed to make gender-informed decisions. In Pakistan’s Competitive and Livable City of Karachi Project, the World Bank is tracking the number of jobs and the working conditions of women employed in the solid waste management sector, both formally and informally and across the value chain.

Environmental, Health, Social, and Economic Impacts

Very few projects tracked the environmental, health, social, or economic impacts of improved MSWM activities. Only 9–21 percent of projects in the World Bank portfolio reported on some type of environmental, social, or economic impacts linked to MSWM activities (table 3.3). Of those projects, many either did not report any data on outcomes or reported that the intended impacts were not achieved because of delays or other challenges in implementing MSWM activities. Local governments and regulatory agencies are ultimately responsible for measuring these impact areas, yet this measurement may require more specialized and expensive interventions than are provided currently. Measuring these impacts is essential because they provide the basis to make the case for greater attention to and resource allocation for MSWM.

Table 3.3. Environmental, Social, and Economic Impacts of Improved Municipal Solid Waste Management Activities

Determinant	Projects Addressing Determinant		Projects Closed and Evaluated (no.)	Projects with Effective Performance	
	(no.)	(%)		(no.)	(%)
Environment	25	21	20	13	65
Climate change	12	10	7	5	71
Social (focus on health)	11	9	8	2	25
Job creation	17	15	12	7	58

Source: Independent Evaluation Group.

Environment and Climate Change

World Bank support for landfill gas collection and the conversion of gas to energy has not yielded the expected returns in a majority of cases. Landfill gas is a natural by-product of the decomposition of organic material in landfills and is composed of about equal proportions of methane and carbon dioxide, together with a small quantity of nonmethane organic compounds. The World Bank supported landfill gas collection through six projects in six countries (Argentina, Azerbaijan, Bosnia and Herzegovina, Brazil, Jordan, and Tunisia) during FY10–20, as detailed in box 3.1. The evaluation also took stock of the results of several carbon finance projects for landfill gas collection that were attached to parent projects that closed before 2010 (appendix E).

Box 3.1. World Bank Support for Landfill Gas Collection to Address Climate Change

The World Bank supported 25 carbon offset projects dealing with recovery of gas from landfills. These projects were developed within the Kyoto framework, which has since been assessed as regulatorily complex, with stringent lengthy procedures and with high transaction costs. Of those projects, 21 were closed and 4 were active during 2010–20. The projects fell under the following categories: composting, landfill gas recovery, landfill gas with electricity generation, and landfill gas with electricity generation and composting. Only 5 of the 21 closed projects met or exceeded targets for reductions in greenhouse gas emissions. Some examples are as follows:

- » In Bosnia and Herzegovina, the Solid Waste Management Project (2002–11) helped install gas control and prevention systems for three regional landfills, resulting in 100 percent prevented costs of air pollution and prevented costs of greenhouse gas (methane) emissions.
- » In Jordan, the Amman Solid Waste Management and Carbon Finance Project (2007–14) achieved good preliminary results of the pilot landfill gas flaring phase, but the target carbon dioxide reduction was not met because of delays in construction.

(continued)

Box 3.1. World Bank Support for Landfill Gas Collection to Address Climate Change (cont.)

- » In Tunisia, the Sustainable Municipal Solid Waste Management Project helped the client equip seven landfills with landfill gas treatment systems, per the Clean Development Mechanism requirements. The project reports earning about \$3.5 million from selling certified emission reductions at project closure, although the earnings were less than anticipated.

Sources: United Nations Environment Programme–Denmark Technical University Partnership database (2017), <http://www.cdmpipeline.org>; World Bank 2014a, 2014c, 2018.

Support for pollution monitoring was an essential mechanism for identifying and acting on MSWM-related pollution risks. MSWM activities in China show how the World Bank can help countries monitor and measurably achieve reduction in surface water, groundwater, and soil pollution from municipal solid waste sources. Within the MSWM portfolio, China was the country that articulated and measured MSWM water and soil pollution reduction goals most frequently. For example, in the Liaoning Medium Cities Infrastructure Project, China established groundwater monitoring wells to prevent the spread of pollution from MSWM sources. The project provided new solid waste disposal capacity of about 2,000 tons per day, including the treatment of highly contaminating leachate at the landfill sites, and helped close several uncontrolled dumpsites. Through the established monitoring, the project reported on reduced groundwater contamination via landfills. In the Zhejiang Qiantang River Basin Small Town Environment Project, the World Bank assisted China in reducing pollution of the surface water, groundwater, and soil. Three open dumps were closed to reduce contamination to groundwater. An external environmental agency monitored the groundwater quality at the closed sites regularly and ensured that the sites were appropriately closed.

Health Impacts

Almost no projects tracked the positive human health outcomes that are expected to follow from improved MSWM. Improved MSWM, including

closing open dumpsites, can prevent disease in surrounding areas. In the World Bank's MSWM portfolio, only 9 percent of the projects articulated links with human health. All five closed projects in this set claimed positive health impacts that were explained by cause-and-effect assumptions, without any quantitative evidence.

Economic and Social Impacts

Some projects tracked economic impacts, mainly related to job creation in the MSWM sector, including in LICs and fragile contexts. Seventeen projects could track economic impacts. Among those, 13 projects were closed and evaluated, and 7 of them reported positive results. The Integration of the Informal Sector section discusses some examples of job creation for informal workers. Among other examples of job creation in the municipal solid waste sector, Mozambique's Maputo Municipal Development Program I and II resulted in employment for about 590 workers in 35 microenterprises that extended waste collection services to 43 suburban neighborhoods covering about 900,000 residents. In Côte d'Ivoire, 7,000 people were given permanent jobs as waste collectors through the Emergency Urban Infrastructure Emergency Recovery Loan (2008–14), greatly exceeding the target of 4,500. In Liberia, the Emergency Monrovia Urban Sanitation Project supported the local government authority in providing employment to skip and tipper truck drivers; skip location, transfer station, and landfill operatives; site managers; and administration staff, in addition to more than 400 street sweepers, of which 60 percent were women. The project also promoted primary waste collection services by community-based enterprises providing employment opportunities for informal waste pickers. However, in the Central African Republic, the Emergency Urban Infrastructure Emergency Recovery Loan could achieve only 15 percent of the targeted 350 jobs.

A small number of projects linked improved MSWM with tourism development, but most either did not measure these effects or could not achieve the desired impacts. In China's Gansu Cultural and Natural Heritage Protection and Development Project, the share of tourists who purchased private tourism services when visiting the project sites increased from

34 percent in 2007 to 64 percent in 2015, exceeding the project end target of 60 percent. This increase in purchases of tourism services was linked to visitor satisfaction with site management, including MSWM. Albania's Coastal Zone Management Project aimed to support the city of Saranda's tourism, partly through improvements in MSWM, but no impacts were measured. In the Montenegro Environmentally Sensitive Tourist Areas Project, there was no provision to measure tourism development outcomes resulting from improved MSWM.

The increased value of reclaimed land is an important but often unrecognized outcome of MSWM activities. Land value can increase, for example, from closing illegal landfills and converting the land to other productive uses. There are opportunities to assess such increases in land value as economic impacts of MSWM activities through well-designed metrics. There were 18 projects in the World Bank portfolio that closed illegal dumps, but most did not have any explicit plans to create or define a more productive use for these open spaces or to capture the land value increase in and around the closed landfills. The results relating to the Balakhani landfill for the Greater Baku region under Azerbaijan's ARP II Integrated Solid Waste Management Project are a leading example of the transformation of urban areas near closed or improved sites that had a transformative impact on the city.

Effectiveness of Bank Group Collaboration

It is too soon to evaluate the effectiveness of most intra-Bank Group efforts to collaborate on MSWM. However, there are some instances of collaboration from the completed and ongoing initiatives. One such Bank Group collaborative effort, a PPP transaction in support of landfill management under West Bank and Gaza's Global Partnership on Results-Based Aid Solid Waste Management Project, was successful initially, but the contractor chose not to continue after the initial contract period because of unfavorable financial terms and difficult working conditions. In Egypt, a possible model for World Bank-IFC collaboration is under way in which policy aspects were addressed within the development policy operation framework, with commitment from senior management to enable IFC transactions. The Cities Initiative combines investment and advice for cities to address pressing urban needs

with private sector participation.² It is expected to provide opportunities for further collaboration. Recent IFC country strategies for the Dominican Republic, El Salvador, and Pakistan propose World Bank and IFC collaboration for MSWM.

¹ The remaining closed projects were not evaluated either because they had a project cost of less than \$5 million (under the Independent Evaluation Group’s mandate, projects costing \$5 million or more are evaluated) or had yet to complete their Implementation Completion and Results Reports.

² For more information on the Cities Initiative, see https://www.ifc.org/wps/wcm/connect/Industry_EXT_Content/IFC_External_Corporate_Site/Infrastructure/Priorities/Cities.

4 | Factors of Effectiveness


Highlights

Four main categories of factors were found to have a strong, often limiting, influence on the effectiveness of the World Bank Group's municipal solid waste management (MSWM) support.

Nature of Bank Group engagement. Extended, well-sequenced, and coherent country engagement that includes support for key policy reforms and investment has been effective in helping countries build an integrated approach to MSWM incrementally. For this reason, improved MSWM is more likely to be achieved when MSWM is the focus of a core project rather than when it is included as a smaller project component. However, the evaluation found few examples of such types of country engagements, mainly in upper-middle-income countries.

Commitment and ability of governments to finance MSWM services sustainably. The inability of governments to ensure sustainable financing is a main constraint on providing adequate MSWM services. This inability can arise at any layer of government (national, provincial, or local), mainly because of lack of political commitment or competing demands for public financing.

Accountability for providing adequate and sustainable services. A lack of transparency and vested interests lodged within service provision for collection and transport can constrain the Bank Group's MSWM operations. Efforts to achieve accountability by addressing political economy challenges, increasing awareness, and supporting behavior change among national governments, local governments, and waste generators can contribute to success.



Land availability. The ability to acquire land for solid waste infrastructure is a systematic constraint across the portfolio, reducing the World Bank's ability to provide support to clients. The constraint is partially attributable to the not-in-my-backyard phenomenon—the generalized opposition of neighboring populations and local governments to siting landfills (or other infrastructure) within their jurisdictions.

This chapter focuses on four factors that have influenced the effectiveness of the Bank Group's MSWM support. These factors are (i) the nature of World Bank support in terms of continuity, coverage, and coherence; (ii) government commitment to ensuring financial sustainability of MSWM; (iii) local governments' accountability for providing adequate and sustainable MSWM services; and (iv) land availability and the not-in-my-backyard (NIMBY) phenomenon (the generalized opposition of neighboring populations and local governments to siting landfills [or other infrastructure] within their jurisdictions).

Nature of World Bank Engagement

Long-term, well-sequenced, and coherent engagement across the evaluation pillars was linked to positive MSWM outcomes. The association shows that to achieve effective MSWM at scale, the Bank Group needs to take an integrated approach that ensures that all phases of the MSWM process are developed over time and strategically. Extended, well-sequenced, and coherent country engagement that includes support for key policy reforms and investment has been effective in helping countries build an integrated approach to MSWM incrementally. These sequenced efforts are linked to wider scope and better performance in access, service delivery, and financial sustainability. The World Bank provided this type of sustained support through a combination of analytics, DPLs, investments, and Program-for-Results financing in five economies (Colombia, Liberia, Maldives, Morocco, and West Bank and Gaza) for more than a decade. In these cases, MSWM outcomes were achieved eventually, partly because there was time to learn from and correct for technical and political challenges (see examples in box 4.1). These engagements show that longer-term engagement through DPLs and investments helps to cover a wider range of issues across the two pillars. The World Bank's consistency and commitment has provided the time needed for institutions to adapt and for key reforms and behaviors to take hold. DPLs have proved important in this regard, but sustained engagement can also occur through a single well-considered long-term investment.

Box 4.1. Positive Municipal Solid Waste Management Outcomes from Sustained Engagement

The World Bank supported municipal solid waste management in Colombia (through three investment project financing projects and two programmatic series of development policy loans [DPLs] since 2005) and Morocco (through four DPLs during 2009–15) with a wide coverage of issues that have yielded several positive results and set the stage for continued transformation of the sector.

In Colombia, the World Bank's support since 2005 has contributed to the development of circular economy policies—the first of their kind in Latin America. The key areas of World Bank engagement have been disposal waste management, recycling, and social inclusion. In 2005, most of the waste generated in the country was disposed of in open dumps or uncontrolled landfills. The World Bank supported policy and regulatory measures, the implementation of integrated solid waste management plans mandated for municipalities, and the regionalization of disposal arrangements. The latest results show that 90 percent of all municipalities are disposing of solid waste adequately, compared with 60 percent in 2009. The second DPL series supports the country's ambitious target of increasing recycling and reuse of waste materials from 8.7 percent in 2019 to 17.9 percent by 2030. The World Bank's support was instrumental in formalizing the role of waste pickers.

In Morocco, a World Bank–supported assessment of the costs of environmental degradation and the analytical basis for the Solid Waste Law set the stage for World Bank support through a series of programmatic DPLs. They contributed to the implementation of the three-phase, 15-year National Solid Waste Program with measurable targets, helping to increase the waste collection rate to 96 percent by 2020. About 160 municipalities have delegated management of collection services to 18 private companies. A strong start was made in building new controlled landfills and rehabilitating illegal dumps, though current achievements are lagging targets: 26 controlled landfills of 80 planned for the end of 2022 and 60 illegal dumps rehabilitated against 300 targeted by the end of 2020. Citizen engagement reports are being implemented in cities through digital development platforms. Allocations from the central budget based on transparent and objective criteria were instrumental in improved municipal solid waste management performance. The municipalities' financial and technical capacity issues that could not be addressed adequately under the DPL series are now supported through the ongoing Local Government Support Program-for-Results Project.

Source: Independent Evaluation Group.

Even strategically important investments can be insufficient if limited to part of the MSWM value chain. The failure to address essential issues at any point along the waste value chain (from waste collection to transport to final disposal) undermines the entire chain's effectiveness. Solutions to integrate the interrelated processes in the solid waste management chain are critical. Azerbaijan is the best example of the need to approach MSWM at the system level (box 4.2).

Box 4.2. Developing Integrated Waste Value Chains: Azerbaijan

The World Bank's Integrated Solid Waste Management Project (2008–18) in Azerbaijan contributed to improved management of the municipal solid waste sector in Greater Baku and other parts of the country in the critical areas of collection, disposal, institutional reform, policy and regulatory environment, financial sustainability, and social inclusion. The project helped transform the city dump into a well-managed sanitary landfill (Balakhani), closed informal dumpsites (totaling 143 hectares), and increased access to collection services to an additional 800,000 residents in the peri-urban areas of Baku. The project also financed the feasibility studies and environmental impact assessments needed to introduce transfer stations to maintain an effective enhanced waste collection and disposal system.

Nevertheless, illegal dumping in Baku—which continues unabated—is undermining the efficiency with which a large share of the waste can be processed, treated, or recycled, and continues to pose environmental and health risks. Despite the project's achievements, nearly 50 percent of the waste collected in Greater Baku fails to reach the authorized treatment and disposal facilities, and a significant proportion of the collected waste is dumped informally. This undermines capacity use at treatment and disposal facilities, reducing their efficiency and entailing high capital and operating costs. This situation is largely attributable to the nonavailability of waste transfer facilities in Greater Baku, a lack of financial incentives for operators to deliver waste to the new treatment and disposal facilities, and a lack of effective control mechanisms and enforcement. This experience underlines the criticality of integrating the interrelated processes in the solid waste management chain.

Source: World Bank 2021a.

Planned outcomes are likely to be better achieved in dedicated projects than in part-MSWM projects. There were 25 dedicated MSWM projects in the World Bank portfolio (projects having nearly 100 percent of project commitments dedicated to MSWM objectives), with \$611 million in commitments. By contrast, there were 68 part-MSWM projects (projects with only one or two generally small MSWM components), with net MSWM commitments of \$1.83 billion, or three times that of the dedicated projects. Dedicated projects mostly had wider scope in objectives and geographical coverage than part-MSWM projects. Among closed and evaluated projects, the percentage of dedicated projects that had moderately satisfactory or better outcomes (73 percent) was significantly higher than the performance of MSWM components of the part-MSWM projects (62 percent; table 4.1).

Table 4.1. Outcome Achievement in Core MSWM Projects versus Part-MSWM Projects

Solid Waste Management Content	All Projects (no.)	World Bank Commitment (US\$, millions)	Closed and Evaluated Projects (no.)	Projects with MS+ Outcome Rating ^a	
				(no.)	(%)
Dedicated MSWM projects ^b	25	611	15	11	73
Part-MSWM projects ^c	68	1,834	37	23	62
Other ^d	23	181	16	8	50
Total	116	2,626	67	42	63

Source: Independent Evaluation Group.

Note: MS+ = moderately satisfactory or better; MSWM = municipal solid waste management.

a. Ratings were derived by analyzing key performance indicators at the project level for dedicated projects and at the component level for part-MSWM projects.

b. A dedicated MSWM project has nearly 100 percent of project commitment for MSWM objectives.

c. A part-MSWM project has MSWM as one of several sector components and commitment ranges between 5 and 50 percent of project commitment.

d. Hazardous, health, and industrial waste projects.

Part-MSWM projects perform especially poorly when they have small, stand-alone components. The likelihood is high that these components will be stalled, only partially completed, or dropped. For instance, in Egypt's

Integrated Irrigation Improvement and Management Project, the planned piloting of collection and disposal of solid wastes in two command areas did not make progress, though the overall project outcome rating was moderately satisfactory. In Peru's Cusco Regional Development Project and Vilcanota Valley Rehabilitation and Management Project, there was no progress in MSWM components that were expected to contribute to MSWM and tourism development. In Brazil's São Luís Municipal Adaptable Program Loan 4 Project, two components covering construction of a hydraulic landfill were dropped, along with other MSWM activities related to rehabilitating areas of environmental value to improve the quality of water flowing to Bacanga Lake. In Côte d'Ivoire's Emergency Urban Infrastructure Emergency Recovery Loan Project, none of the planned 25 transfer stations were pursued.

However, part-MSWM projects can have a crucial role in jumpstarting engagement with a borrower. This was the intention in Nigeria's Lagos Metropolitan Development and Governance Project that contained a component for policy dialogue on waste management. However, the waste management component did not make progress because of reduced government commitment during implementation. Under Egypt's Enhanced Water Resources Management Project, there was consensus that brought MSWM and industrial wastewater management to the forefront of integrated water resources management, together with improved irrigation and drainage—an innovative combination for the country.

Support to solid waste management through components in the context of flood prevention is strategically important. As outlined in IEG's urban resilience evaluation (World Bank 2019), targeted support to reduce clogging of waterways and pumping stations to enable proper drainage is an integral part of broader support to flood protection projects. Examples include the support to reduce solid waste around flood pumping stations in the Metro Manila Flood Management Project and the Greater Accra Resilient and Integrated Development Project, in which components target, among other items, solid waste management in low-income or informal communities of the Odaw Basin that contribute the highest share of solid waste in the primary Odaw Channel.

Commitment and Ability of Governments to Ensure Financial Sustainability

The lack of government commitment to ensure sustainable financing is one of the main constraints on providing adequate MSWM services. The inability to ensure sustainable financing can arise at any layer of government (national, provincial, or local) and may be an inability to commit to sustainable financing or to follow through on such a commitment through electoral cycles. Several World Bank projects included components for ensuring financial sustainability of MSWM services through arrangements for improved cost recovery via user fees or tariffs, sometimes supplemented by earmarked municipal revenues or budget transfers from provincial or central governments. In some cases, the expected results were not achieved at project completion, and even where favorable results were achieved, the improvements were often not sustained. For instance, data and feedback from officials through case study discussions for Azerbaijan, Morocco, and West Bank and Gaza suggest that cost recovery has declined since project completion. This trend, along with the reduction or discontinuation of budget transfers to compensate for the shortfall, has implications for solid waste management services and outcomes. In Morocco and West Bank and Gaza, reduced resources for upkeep and expansion of sanitary landfills are resulting in increasing problems of leachate contaminating soil and water. In other cases, such as in Azerbaijan, declining cost recovery affects waste collection and transport, leading to a relapse into the practice of disposing of waste in open dumps.

Accountability for Providing Adequate and Sustainable Services

Successful Bank Group MSWM operations often try to address political economy challenges. Political economy challenges in the MSWM sector often include a lack of transparency and vested interests that are lodged within service provision for collection and transport. The case studies revealed that the World Bank often works through informal policy dialogue to address political economy challenges that impede MSWM progress. In Morocco, the

World Bank initiated a dialogue in 2009 on the issues of political economy surrounding the MSWM sector by highlighting the negative impacts from inadequate waste management and the feasible solutions. This helped get the government's buy-in for a DPL series that addressed the range of MSWM issues with multiple national, provincial, and local actors. In West Bank and Gaza, the World Bank tackled a complex geopolitical context and conflict situation by having all parties focus on the positive environmental and health impacts that would be obtained from closing open dumpsites and building a sanitary landfill serviced by improved waste collection and transport. Box 4.3 describes contrasting experiences in two conflict-affected economies: Liberia and West Bank and Gaza.

Box 4.3. Municipal Solid Waste Management in Conflict-Affected Economies: Lessons from World Bank Engagements in Liberia and West Bank and Gaza

Conflict-affected economies face severe constraints caused by fragile institutions and recurring conflicts that create uncertainty and disruptions in normal economic activities. However, solid waste generation continues unabated. An implication is that the larger the urban populations in these economies, the greater the visibility of littering and chronic land and water pollution attributable to inadequate solid waste management. The Independent Evaluation Group reviewed the experiences of Liberia and West Bank and Gaza as a part of this evaluation, and the following is a summary of some key lessons.

The constraints faced by the two economies are a study in contrasts. Liberia, which was ravaged by decades-long conflicts, faces a trifecta of extreme poverty, lack of institutional capacity, and inadequate financial resources. In West Bank and Gaza, recurrent armed conflicts destroy infrastructure and create long-term uncertainty about how to manage solid waste sustainably. In both situations, the role of donor agencies led by the World Bank Group has been critical, not only through long-term commitment of project investments and technical assistance but through the signaling to local stakeholders of the international community's sustained commitment.

(continued)

Box 4.3. Municipal Solid Waste Management in Conflict-Affected Economies: Lessons from World Bank Engagements in Liberia and West Bank and Gaza (cont.)

In Monrovia, World Bank–led donor support institutionalized primary garbage collection as a business through community-based enterprises (small businesses with fixed concession areas), with basic training on collecting domestic waste as a service for fees. In the West Bank, Joint Service Councils pooled the risks of small, local governments to achieve an overall collection rate of 83 percent in the communities. In addition, the Bank Group provided technical assistance through World Bank and International Finance Corporation advisory services and analytics, which developed a public-private partnership framework, drafted contractual documents, and financed a solid waste management output-based aid pilot in the West Bank to support landfill and waste management services. The resulting investments in the Hebron sanitary landfill attracted private sector participation, despite the fragility of the policy environment. Through proven professional management, the services even generated a peace dividend by receiving waste from Israeli settler communities in exchange for tipping fees.

Sources: World Bank 2021c, 2021e.

Accountability for service delivery is associated with positive MSWM outcomes. Addressing political economy issues in the MSWM sector requires paying attention to aspects of monitoring for enhanced accountability across value chain actors. In most client countries, the ability to monitor MSWM service delivery and thus achieve accountability among actors along the MSWM value chain is weak. There are good practice examples in World Bank–supported projects in China, Indonesia, the Kyrgyz Republic, Pakistan, and Tunisia, where the projects financed innovative technological applications to support more effective monitoring to achieve greater accountability. These include support for GPS trackers for trucks, cell phone apps, and internet-based applications for monitoring service delivery and receiving citizen feedback. In Pakistan, this support for enhanced monitoring—through a complaint tracking system—facilitated the systematic organization and standardization of complaint information, which led to increased redress

of complaints for more effective service delivery. But too often, insufficient arrangements for monitoring and evaluation of service delivery and impacts from MSWM make it difficult to assign accountability and close the feedback loop for incentivizing improved performance.

Many political economy challenges have inhibited success in the IFC advisory services portfolio. These include a lack of government commitment or effective collaboration across different levels of government (for example, with local entities) and the difficulty of sustaining commitment across administrations or in the absence of champions. For example, in Samoa, after the chief executive officer of the Ministry of Natural Resources and Environment died, there was lack of consensus in the government on how to move forward with the project, partly because of the opposition expressed by local waste collection contractors. In Kosovo, a change of key ministers and a loss of political champions on municipal waste disposal issues caused IFC to exit the project. In Albania, the project was put on hold partly because of parliamentary elections but also because the responsibility for waste disposal infrastructure was transferred to the Ministry of Environment, which wanted to promote incineration as the main waste treatment solution. IFC did not agree, and the project did not move forward. The key challenges limiting the support in LICs include client governments' lack of awareness of waste issues; lack of strategies for the sector; and lack of appropriate policies, regulations, and institutional capacity (Guerrero, Maas, and Hogland 2013). These conditions foster an environment for open dumping and low willingness to pay for services that limits the feasibility of financial support for MSWM initiatives.

Increased awareness and efforts to support behavior change among national governments, local governments, and waste generators (households and enterprises) help MSWM projects succeed. The World Bank's attention to mechanisms for awareness raising and a recognition that reforms require behavioral change across actors within the MSWM value chain are central to the achievement of MSWM interim outcomes in a few economies (such as Argentina, Benin, Egypt, and West Bank and Gaza). In those cases, the World Bank achieved positive MSWM results by increasing public awareness about the negative effects of open dumping. Awareness-raising campaigns helped prompt public demand for better solid waste collection. Thus, with better

collection, residents were willing to pay. Additionally, as shown in chapter 3, IFC advisory services work supporting a pan-India awareness campaign that was delivered through social media and radio created broader awareness across both consumers and local companies about the hazards of e-waste. In several countries where waste generators' behavior was not addressed (for example, Azerbaijan, Maldives, and Morocco), there was a relapse into old ways of open dumping that undermined progress in the sector.

Land Availability

Inability to acquire land for solid waste infrastructure has limited the World Bank's support to clients. Establishing sustainable solid waste management requires a sustained effort to address complexities related to interjurisdictional governance, the NIMBY phenomenon, integration of the informal sector, and low willingness to pay, among other factors. Most projects identify land acquisition as a constraint in siting infrastructure. In Tunisia's Sustainable Municipal Solid Waste Management Project, construction was stopped after the 2011 revolution because of strong opposition from nearby communities. Most case studies conducted for this evaluation point to challenges in acquiring land for landfills and other infrastructure. The NIMBY phenomenon was clearly articulated with respect to Mitubiri under Kenya's Nairobi Metropolitan Services Improvement Project. Political rivals used the opportunity to fan residents' discontent, requiring a minister to intervene to temporarily stop the works. Complexities in land acquisition were experienced in World Bank support to Azerbaijan, Colombia, and Morocco, where finalizing land acquisition for transfer stations and landfills contributed to project implementation delays. A positive example is Bosnia and Herzegovina's Solid Waste Management II Project, under which there was increased support to regional sanitary landfills as evidenced by the percentage of the local population agreeing to the location of landfill sites. As pointed out in the World Bank report (2021d), unreliable land administration, inadequate urban planning, and poorly functioning land markets in rapidly urbanizing countries greatly complicate the consolidation of land parcels at a reasonable cost to enable siting large-scale public infrastructure such as landfills and transfer stations.

5 | Conclusions and Recommendations

Municipal solid waste is projected to triple in volume in LICs by 2050 (and nearly double in LMICs and UMICs). Most of the waste in LICs and LMICs is managed improperly, untreated, and disposed of in open dumps. Left unmanaged, the growing volume and changing composition of waste—including nonbiodegradable and plastic waste—will continue to contribute to an increase in greenhouse gas emissions and global and local land and water pollution, which affect the health and welfare of impoverished people disproportionately.

Municipal solid waste should be managed through a waste hierarchy approach that puts efforts to reduce consumption and increase reuse ahead of efforts focused on waste collection, recovery, and disposal. The waste management hierarchy complements circular economy thinking, which promotes efforts to recycle end-of-life products back into the economy, in addition to promoting waste reduction and reuse.

The Bank Group has increasingly recognized and advocated for waste hierarchy and circular economy approaches to MSWM. World Bank Group (2021), for example, sets out a goal of pursuing integrated waste management and circular economy approaches to help countries and cities advance climate, development, and broader sustainability goals.

However, waste hierarchy and circular economy principles are yet to be mainstreamed into many country strategies and operations. Just over one-third of the 55 countries in which the World Bank has supported MSWM activities include references to the waste hierarchy or circular economy aims in their SCDs or CPFs, and only 11 countries with MSWM portfolios included activities geared toward achieving an integrated approach.

Bank Group support does not consistently provide for some elements essential to integrated waste management, including revising policies, planning for cost recovery, involving the private sector, incorporating behavioral

factors, and considering waste pickers. The Bank Group often supports the provision of infrastructure and services that are expected to increase MSWM coverage and improve service delivery. However, to achieve an integrated approach, the Bank Group needs to simultaneously address more of the determinants of MSWM in more of its activities.

The Bank Group infrequently diagnoses and addresses municipal solid waste issues in LICs, where they are most urgent. Less than half of SCDs in LICs—where waste generation and associated negative effects are mounting—diagnose MSWM issues, compared with almost all SCDs in UMICs and HICs, and only two LICs received funding for MSWM. Relatedly, LICs received 1.5 percent of all Bank Group MSWM spending.

There has been limited Bank Group collaboration in support of MSWM. References to the complementary roles that the World Bank and IFC can play in a coherent approach for improved MSWM are absent from most CPFs, CPSDs, and IFC country strategies. MSWM has been a very difficult sector for MIGA to enter because of several constraints related mainly to the lack of bankable projects that would seek guarantees and the capacity limitations of municipalities as counterparts.

The World Bank is helping clients achieve its policy, capacity development, and planning goals, but the links between these goals and MSWM outcomes are not articulated. IFC does not play a strong role in MSWM policy and institutional development. However, in the few instances when it did provide that support through its advisory services, it showed that it can be effective in improving enabling frameworks for private investment in MSWM.

Efforts to identify and clarify MSWM policy and regulatory issues tend to take place in countries where the Bank Group has supported a more integrated approach. The specific link between policies and regulations enacted and overall improvements in MSWM systems are often not articulated. However, successful efforts to enact policy and regulations are found in countries that have undertaken activities geared toward achieving integrated approaches.

World Bank support for basic municipal solid waste infrastructure and service delivery has been generally effective. Infrastructure and service provision are the leading activities in the World Bank's MSWM lending support,

and they were carried out as planned in most MSWM-related projects. These are necessary but not sufficient conditions for improving the MSWM value chain, though.

The effectiveness of infrastructure and service activities is undermined by challenges in achieving financial sustainability. The World Bank addressed the issue of cost recovery and improved financial sustainability in about 40 percent of closed projects, which yielded positive results in just over half of the cases. Lessons can be learned from some lower-middle-income economies (Mozambique, Vietnam, and West Bank and Gaza) where most of the solid waste providers' costs were recovered from user fees. However, several other countries had less success in meeting cost recovery targets, even at project completion.

Very few projects tracked the environmental, social, or economic outcomes of improved MSWM activities. Of the projects that did, many either did not report on outcomes or reported that the intended outcomes were not achieved because of delays or implementation challenges with the MSWM activities. Local governments and regulatory agencies are ultimately responsible for measuring these impact areas, and this measurement may require more specialized and expensive interventions than are provided currently.

Capturing higher-order impacts shows the substantial contributions that MSWM can make toward countries' environmental, social, and economic goals. Good practice examples show how investments in MSWM can contribute to reducing global greenhouse gas emissions (in Bosnia and Herzegovina) and local pollution (especially in China). Other examples show how focused attention on job creation can enhance the economic security and working conditions for lower-income urban populations, including youth and women, and for those living in fragile and conflict-affected situations, as in the Central African Republic and Côte d'Ivoire.

Four factors have a strong, often limiting, influence on the effectiveness of the Bank Group's MSWM support. These factors are (i) the nature of World Bank support in terms of continuity, coverage, and coherence; (ii) government commitment to ensuring the financial sustainability of MSWM; (iii) local governments' accountability for providing adequate and sustainable MSWM services; and (iv) land availability and the NIMBY phenomenon.

Long-term, well-sequenced, and coherent engagement across the evaluation pillars was linked to achieving improved MSWM. Extended, well-sequenced, and coherent country engagement that includes support for key policy reforms and investment has been effective in helping countries build an integrated approach to MSWM incrementally. For this reason, improved MSWM is more likely to be achieved when MSWM is the focus of a core project rather than when it is included as a smaller project component. The evaluation highlights examples of such country engagements, mainly in LMICs and UMICs.

The inability of governments to ensure sustainable financing is a second factor affecting the provision of adequate MSWM services. This inability can arise at any layer of government (national, provincial, or local), mainly because of lack of political commitment or competing demands for public financing. Several World Bank projects included components for ensuring the financial sustainability of MSWM services through arrangements for improved cost recovery via user fees or tariffs, sometimes supplemented by earmarked municipal revenues or budget transfers from provincial or central governments. In some cases, the expected results were not achieved at project completion, and even where favorable results were achieved, the improvements attributable to the projects were often not sustained.

The third factor limiting effectiveness is local governments' accountability for providing adequate and sustainable MSWM services. Accountability for adequate and affordable MSWM services can be undermined by lack of transparency and vested interests in existing arrangements for service provision for solid waste collection and transport. Addressing these political economy issues can be facilitated by improved arrangements for monitoring of MSWM services, for which internet and cell phone-based systems are readily available and affordable. Improved monitoring needs to be combined with increased awareness and behavior change on the part of all stakeholders, including waste generators (households and enterprises), local and national governments, and service providers.

The fourth factor limiting the World Bank's ability to provide support to clients is the inability to acquire land for solid waste infrastructure. The constraint is partially attributable to the NIMBY phenomenon.

The Bank Group is by far the leading source of lending and knowledge on solid waste management. The Bank Group's lending of about \$3 billion for MSWM during FY10–20 far exceeds that of other multilateral development banks. Regarding knowledge, the Bank Group produced two flagship reports on the state of and approaches to MSWM worldwide—*What a Waste* and *What a Waste 2.0*—and has been conducting technical certification courses on MSWM for professionals and policy makers worldwide. Without an international coordination mechanism for MSWM, leading sector experts see scope for a global convening role on MSWM for the Bank Group that goes beyond and builds on current efforts on marine plastic pollution through PROBLUE and advocacy for circular economy approaches for MSWM under the climate change action plan.

Recommendations

The evaluation identifies three areas where the Bank Group can enhance its relevance and effectiveness when supporting countries with MSWM.

Recommendation 1. To achieve more sustainable and scalable outcomes in municipal waste management, Bank Group technical and financial support to clients should give clear priority to the adoption and implementation of waste hierarchy practices, in line with client needs and capabilities for MSWM. To achieve this, the Bank Group's support could build on proven good practice from its own experience in addressing the entire waste value chain (collection, transport, recycling, recovery, and disposal) in an integrated, phased, and incremental manner tailored to client needs and capabilities. This would require greater collaboration among the World Bank, IFC, and MIGA in supporting governments with promoting financial sustainability and accountability in service provision, updating policies and regulations, incentivizing private sector participation, increasing awareness and behavioral change, and integrating waste pickers into MSWM processes.

Recommendation 2. To support the LICs where municipal solid waste is growing most rapidly, the Bank Group should identify constraints on demand and investments and leverage external partnerships to implement context-specific MSWM solutions. To achieve this, the Bank

Group could increase its ASA in LICs and foster external partnerships to find context-specific solutions appropriate to the prevailing policy and service delivery gaps. This would entail, for example, systematically closing illegal dumps, ensuring that the regulatory framework is clear and predictable, and providing incentives to reduce the rate of growth of waste generation and increase recycling, with a view to support LICs to “leapfrog” (move forward rapidly through the adoption of modern systems without going through intermediary steps) to the extent possible.

Recommendation 3. To bring prominence to and spur action on the global municipal solid waste agenda, the Bank Group should take up a clear leadership position, collaborating and convening with developmental partners. The Bank Group could leverage its leading role in financing and knowledge for MSWM by building on and scaling up current partnerships to improve municipal solid waste practices in the context of the climate change action plan and in specific areas, such as addressing riverine and marine plastic pollution through PROBLUE.

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APPENDIXES

Independent Evaluation Group

Transitioning to a Circular Economy

Appendix A. Sustainable Development Goals

Table A.1. Sustainable Development Goals with Drivers and Solid Waste Management Issues

Driver	SDG	Specific Target	SWM Issue	Local/Global Issue
Public health	SDG 11: Sustainable cities	11.1 Ensure access for all to adequate, safe, and affordable basic services; upgrading slums	Uncollected waste dumped in waterways or burned in the open air causes pollution and contamination and clogs the drains, causing flooding and stagnant water, which contributes to waterborne diseases and malaria (affects children the most)	Local
	SDG 3: Good health and well-being	3.2 End preventable deaths of children under five years 3.3 End malaria and combat waterborne diseases 3.9 Reduce illnesses from hazardous chemicals and air, water and soil pollution, and contamination		
	SDG 11: Sustainable cities	11.6 Reduce the adverse environmental impact of cities; special attention to waste management		

(continued)

Driver	SDG	Specific Target	SWM Issue	Local/Global Issue
Environment	SDG 12: Responsible consumption and production	12.4 Environmentally sound management of chemicals and all wastes to minimize their adverse impacts on human health and the environment	Underlines environmentally sound management of all wastes, particularly hazardous wastes (either chemical or biological hazardous wastes)	
	SDG 6: Clean water and sanitation	6.3 Improve water quality by reducing pollution, eliminating dumping, and minimizing release of hazardous materials		
	SDG 15: Life on land	15.1 Ensure the conservation of terrestrial and inland freshwater ecosystems and their services		
	SDG 7: Clean energy	7.2 Increase share of renewable energy in the global energy mix	Renewable energy from (organic) waste	Global
	SDG 13: Climate action	SDG 13: Take urgent action to combat climate change and its impacts	Adequate SWM practices can reduce emissions of GHGs	
	SDG 14: Life below water	14.1 Prevent marine pollution of all kinds, in particular from land-based activities, including marine debris	Prevent waste (especially plastics) ending up in the oceans	

(continued)

Driver	SDG	Specific Target	SWM Issue	Local/Global Issue
Resource value	SDG 12: Responsible consumption and production	12.5 Reduce waste through prevention, reduction, recycling, reuse 12.3 Halve global food waste and reduce food losses along production and supply chains	Waste prevention on top of SWM hierarchy of reduce, reuse, recycle and dispose	Global (cont.)
Inclusivity	SDG 8: Decent work and economic growth	SDG 8: Promote inclusive and sustainable economic growth, employment, and decent work for all	SWM services in developing countries often provided by individuals and small and microenterprises	

Source: Adapted from Rodić-Wiersma and Wilson 2017.

Note: GHG = greenhouse gas; SDG = Sustainable Development Goal; SWM = solid waste management.

Reference

Rodić-Wiersma, Ljiljana, and David C. Wilson. 2017. “Resolving Governance Issues to Achieve Priority Sustainable Development Goals Related to Solid Waste Management in Developing Countries.” *Sustainability* 9 (3): 404.

Table B.1. World Bank Projects

Project ID	Project Name	Country or Economy	Region	GP	Approval FY	Exit FY	SWM Commitment (US\$, millions)
P057950	Solid Waste Mgmt.	Bosnia and Herzegovina	ECA	ENB	2006	2011	2.1
P059803	Nura River Clean-Up	Kazakhstan	ECA	ENB	2003	2011	6.5
P066488	Municipal Program	Kenya	AFR	URL	2010	2017	50.0
P071340	Lagos Metropolitan Dev. and Governance	Nigeria	AFR	URL	2007	2014	112.0
P073977	Integrated Irrigation Impr. and Mgmt.	Egypt, Arab Rep.	MENA	WAT	2005	2016	1.2
P075728	Guangdong/Prd Ur. Envmt.	China	EAP	WAT	2004	2012	9.0
P075732	Shanghai Urban APL2	China	EAP	URL	2006	2015	18.0
P075776	3A-W Africa Stockpiles 1 GEF	Africa	AFR	ENB	2006	2012	7.2
P076658	Health Sec. Reform Phase 2 APL	Lesotho	AFR	HNP	2006	2010	0.7
P077752	Shandong Envmt. 2	China	EAP	WAT	2007	2014	13.2
P078342	Ust-Kamenogorsk Env. Remed.	Kazakhstan	ECA	ENB	2011	2018	22.0
P078382	Kampala Inst. and Infrast. Dev. Prj.	Uganda	AFR	URL	2008	2014	13.1
P079027	Municipal Infrastructure Development	Tajikistan	ECA	URL	2006	2016	5.3

(continued)

Project ID	Project Name	Country or Economy	Region	GP	Approval FY	Exit FY	SWM Commitment (US\$, millions)
Po79116	Solid Waste (Mestap)	Montenegro	ECA	WAT	2004	2012	6.7
Po81880	Municipal Services	Turkey	ECA	URL			
Po82295	Coastal Cities Envmt. Sanit.	Vietnam	EAP	WAT	2007	2015	31.2
Po82625	Vilcanota Valley Rehab. and Mgmt. Project	Peru	LAC	URL	2005	2011	1.6
Po82725	Decentral City Mgmt. 2	Benin	AFR	URL	2006	2012	5.3
Po82993	GEF-PCB Mgmt. and Disposal	China	EAP	ENB	2009	2015	2.1
Po83929	Punjab Municipal Services Improvement	Pakistan	SAR	URL	2006	2014	10.0
Po86807	Coastal Zone Mgmt. (APL1)	Albania	ECA	ENB	2013	2017	2.4
Po87224	Han River Urban Environment	China	EAP	WAT	2008	2015	31.1
Po89926	Solid Waste Management Project	Argentina	LAC	URL	2006	2015	33.2
Po90037	POPs Stockpiles Mgmt. and Destruction	Moldova	ECA	ENB	2016	n.a.	19.5
Po91949	Gansu Cultural and Natural Heritage	China	EAP	URL	2008	2015	5.0
Po92618	Liaoning Med. Cities Infrs. 2	China	EAP	WAT	2007	2015	36.3
Po94315	Municipal APL4: São Luís	Brazil	LAC	WAT	2009	2016	23.9
Po95012	Sustainable Municipal Solid Waste Mgmt.	Tunisia	MENA	URL	2007	2014	17.2

(continued)

Project ID	Project Name	Country or Economy	Region	GP	Approval FY	Exit FY	SWM Commitment (US\$, millions)
P096332	Maputo Municipal Development Program	Mozambique	AFR	URL	2007	2012	3.6
P096812	Yunnan Urban Env.	China	EAP	WAT	2009	2017	57.6
P097985	Integrated Coastal Zone Mgmt. Project	India	SAR	ENB	2016	2017	231.0
P099369	Ceara Regional Development	Brazil	LAC	URL	2009	2017	6.9
P099460	GEF-PCB Management Project	Vietnam	EAP	ENB	2010	2010	0.1
P099809	TF Emergency Environment Management	Iraq	MENA	ENB	2015	n.a.	68.9
P100383	Istanbul Municipal Infrastructure Proj.	Turkey	ECA	URL	n.a.	n.a.	n.a.
P100478	GEF Managing Healthcare Waste and PCB	Tunisia	MENA	ENB	2010	2010	0.1
P100935	Avian Flu	Afghanistan	SAR	URL	2007	2010	0.2
P101279	Solid Waste Management Program Project	Colombia	LAC	URL	2010	2016	20.0
P101474	Urban Local Govt. Development	Ethiopia	AFR	URL	2008	2015	30.0
P103189	3A-Africa Stockpiles 1 MMT GEF	Africa	AFR	ENB	2006	2013	4.4
P104595	Emergency Urban Infrastruct. ERL	Central African Republic	AFR	URL	2007	2017	5.4

(continued)

Project ID	Project Name	Country or Economy	Region	GP	Approval FY	Exit FY	SWM Commitment (US\$, millions)
P104937	Solid Waste Sector DPL	Morocco	MENA	URL	2009	2010	132.7
P104960	Amman Solid Waste Management	Jordan	MENA	URL	2009	2014	25.0
P104994	Bishkek and Osh Urban Infrastructure	Kyrgyz Republic	ECA	URL	2008	2016	0.4
P105404	Southern West Bank Solid Waste Management	West Bank and Gaza	MENA	URL	2009	2016	11.0
P105711	Africa—Ethiopia Stockpiles 1 GEF	Africa	AFR	ENB	2007	2013	0.9
P106622	Second HIV/AIDS Project	Jamaica	LAC	HNP	2008	2013	1.9
P106885	GEF Integrated POPs Management Project	Philippines	EAP	ENB	2012	2016	2.9
P107314	Nairobi Metropolitan Services Improvement	Kenya	AFR	URL	2012	n.a.	120.0
P107998	Solid Waste Management 2	Bosnia and Herzegovina	ECA	URL	2009	2018	40.0
P108078	Environmental Management Project	Maldives	SAR	ENB	2007	2017	20.6
P110020	Emergency Urban Infrast. ERL	Côte d'Ivoire	AFR	URL	2008	2014	14.1
P110679	ARP II-Integrat'd Solid Waste Management	Azerbaijan	ECA	URL	2008	2019	76.6
P111153	Strategic Cities Project	Tanzania	AFR	URL	2010	n.a.	24.5

(continued)

Project ID	Project Name	Country or Economy	Region	GP	Approval FY	Exit FY	SWM Commitment (US\$, millions)
P111155	Zanzibar Urban Services Project	Tanzania	AFR	URL	2011	n.a.	23.2
P112073	Federal Integrated Water Sector	Brazil	LAC	WAT	2012	2019	59.0
P112074	Sergipe Water	Brazil	LAC	WAT	2012	2021	16.9
P113145	Emergency Urban Env. Project	Benin	AFR	ENB	2010	2018	5.6
P114515	Intg. Solid Waste Mgmt.	Belarus	ECA	URL	2010	2017	42.5
P115664	Emergency Monrovia Urban Sanitation	Liberia	AFR	URL	2010	2017	0.0
P116656	Zhejiang Qiantang River Basin Small Town	China	EAP	URL	2011	2017	10.0
P117318	Cusco Regional Development	Peru	LAC	URL	2014	2019	15.1
P118090	Enhanced Water Resources Management	Egypt, Arab Rep.	MENA	WAT	2013	2017	4.9
P118405	Reg. Dev.	Moldova	ECA	WAT	2009	2013	3.8
P119063	Gama Sanitation and Water Project	Ghana	AFR	WAT	2013	n.a.	33.0
P119085	National Ganga River Basin Project	India	SAR	WAT	2011	n.a.	510.0
P119090	Hospital Waste Management Support	Vietnam	EAP	HNP	2011	2020	15.0

(continued)

Project ID	Project Name	Country or Economy	Region	GP	Approval FY	Exit FY	SWM Commitment (US\$, millions)
P119421	Preparing for New POPs Chemicals	China	EAP	ENB	2017	n.a.	17.5
P119902	Reg./Inst. Framework and Remediation POP	China	EAP	ENB	2008	2016	6.6
P121648	Gaza Solid Waste Management	West Bank and Gaza	MENA	URL	2014	n.a.	6.2
P121848	Beitbridge Emergency Water Supply and Sanitation	Zimbabwe	AFR	WAT	2011	2013	0.8
P121881	Waste Picker Social Inclusion	Brazil	LAC	URL	2010	2014	2.7
P122139	Industrial Waste Management	Montenegro	ECA	ENB	2018	n.a.	10.0
P123323	Ningbo Municipal Solid Waste Recycling	China	EAP	URL	2013	n.a.	68.0
P126832	GEF Municipal Solid Waste Management	China	EAP	ENB	2006	2013	6.1
P127955	Solid Waste Sector DPL3	Morocco	MENA	URL	2013	2013	97.5
P130163	Ari Atoll Solid Waste Management Project	Maldives	SAR	ENB	2017	n.a.	3.9
P130444	Social Inclusion and Alternative	Philippines	EAP	ENB	2007	2012	1.5
P130461	OBA for Municipal Solid Waste Management	Nepal	SAR	URL	2013	2017	4.6
P130637	Urban Dev. and Local Governance	Tunisia	MENA	URL	2015	n.a.	150.0

(continued)

Project ID	Project Name	Country or Economy	Region	GP	Approval FY	Exit FY	SWM Commitment (US\$, millions)
P131864	Kabul Urban Transport Efficiency Improvement	Afghanistan	SAR	TRA	2014	n.a.	5.4
P132268	GPOBA Solid Waste Mgt. West Bank	West Bank and Gaza	MENA	URL	2013	2018	6.4
P132386	Second Urban Infrastructure Project (UIP2)	Ukraine	ECA	WAT	2014	n.a.	78.0
P143921	Adriatic Sea Env. Pollution Control (I)	Western Balkans	ECA	WAT	2014	2019	6.6
P144438	DTF: Local Government Support Program	Morocco	MENA	URL	2014	2019	0.7
P147381	Zhuzhou Brownfield Remediation Project	China	EAP	ENB	2015	n.a.	12.0
P149724	Municipal Services Emergency Project	Lebanon	MENA	URL	2014	2018	4.0
P150374	Somali Urban Investment Planning	Somalia	AFR	URL	2016	n.a.	1.2
P150395	Sustainable Urban Development Program	India	SAR	URL	2015	n.a.	40.0
P150475	DPL for Sustainable Development	Colombia	LAC	ENB	2002	2010	17.5
P151416	Urban Development Project	Kyrgyz Republic	ECA	URL	2016	n.a.	2.2
P153604	Poyang Lake Water Environment Management	China	EAP	WAT	2017	n.a.	33.0

(continued)

Project ID	Project Name	Country or Economy	Region	GP	Approval FY	Exit FY	SWM Commitment (US\$, millions)
P153814	Metro Manila Flood Management Project	Philippines	EAP	WAT	2018	n.a.	114.2
P154683	Environment and Mining Project	Zambia	AFR	ENB	n.a.	n.a.	n.a.
P154782	Nat'l Slum Upgrading Project	Indonesia	EAP	URL	2017	n.a.	43.3
P154947	Regional Infrastructure Development Fund	Indonesia	EAP	URL	2017	n.a.	20.0
P154978	Replication and Mainstreaming of Rekompak	Indonesia	EAP	URL	2016	2018	0.3
P155963	Punjab Jobs and Competitiveness P4R	Pakistan	SAR	FCI	2016	n.a.	15.0
P156239	Pazcifico: WSBS Infrastructure Project	Colombia	LAC	WAT	2017	n.a.	49.4
P158124	Green Urban Financing and Innovation	China	EAP	URL	2019	n.a.	56.0
P158502	Jharkhand Municipal Development Project	India	SAR	URL	2019	n.a.	35.3
P159961	Cheesemanburg Landfill and Urban Sanitation	Liberia	AFR	URL	2017	n.a.	10.5
P160739	Clean Environment Project	Maldives	SAR	ENB	2017	n.a.	122.1
P161320	Cause (REP II)	Solomon Islands, the	EAP	SSI	2018	n.a.	3.3
P161402	Competitive and Livable City of Karachi	Pakistan	SAR	URL	2019	n.a.	4.6

(continued)

Project ID	Project Name	Country or Economy	Region	GP	Approval FY	Exit FY	SWM Commitment (US\$, millions)
P16144	Municipal Solid Waste Management	Senegal	AFR	URL	2020	n.a.	125.0
P164260	Utility Efficiency and Quality Improvement	Belarus	ECA	WAT	2019	n.a.	28.3
P164310	Integrated Solid Waste Management and Carbon Finance Project	Brazil	LAC	ENB	2010	2015	50.0
P164330	Accra Resilient and Integrated Development	Ghana	AFR	URL	2019	n.a.	134.0
P165388	Punjab Green Development Program	Pakistan	SAR	ENB	2013	2015	1.3
P166075	Freetown Emergency Recovery Project	Sierra Leone	AFR	URL	2018	n.a.	3.5
P167347	Emergency Debris Management	Sint Maarten	LAC	URL	2019	n.a.	25.0
P167359	Stormwater Management and Urban Resilience	Benin	AFR	URL	2019	n.a.	85.0

Source: Independent Evaluation Group.

Note: AFR = Africa; DPL = development policy loan; EAP = East Asia and Pacific; ECA = Europe and Central Asia; ENB = Environment, Natural Resources, and Blue Economy; FCI = Finance, Competitiveness, and Innovation; FY = fiscal year; GP = Global Practice; GPOBA = Global Partnership on Results-Based Aid; HNP = Health, Nutrition, and Population; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; n.a. = not applicable; SAR = South Asia; SSI = Social Sustainability and Inclusion; SWM = solid waste management; TRA = Transport; URL = Urban, Disaster Risk Management Resilience, and Land; WAT = Water.

Table B.2. International Finance Corporation Investments 2010–20

Project ID	Approval Year	Country	Category	Category	Project Name	Status	IFC Financing (US\$, thousands)
35271	2020	Brazil	UMIC	WTE	Foxx-Barueri WTE	Active	24,000
26512	2009	Brazil	UMIC	SWM	Estre Ambiental	Closed	24,433
35160	2014	China	UMIC	SWM	ESIP Aihuishou	Active	5,000
40570	2018	China	UMIC	WTE	Canvest Loan	Active	49,946
41819	2019	China	UMIC	WTE	BGE Green Bond	Active	59,570
29846	2012	China	UMIC	WTE	C&G WTE	Closed	5,000
36962	2016	China	UMIC	WTE	Canvest WTE	Closed	59,994
29690	2011	India	LMIC	E-waste recycling	Attero Recycling	Active	5,000
33184	2013	Pakistan	LMIC	WTE	InfraV-KOEL	Closed	2,500
37838	2019	Serbia	UMIC	WTE	Belgrade WTE	Active	84,000
40216	2018	Sri Lanka	LMIC	WTE	Fairway WTE	Dropped	6,700
31944	2012	Sri Lanka	LMIC	WTE	RenewGen	Dropped	2,200
34552	2015	Turkey	UMIC	OMF, compost, WTE	HKA	Closed	70,000

Source: Independent Evaluation Group.

Note: IFC = International Finance Corporation; LMIC = lower-middle-income country; OMF = organo-mineral fertilizer; SWM = solid waste management; UMIC = upper-middle-income country; WTE = waste to energy.

Table B.3. International Finance Corporation Advisory Services 2010–20

Project ID	Country, Economy, or Region	Cat.	App. Year	Name	Status	AS for	SWM/Urban/SWM with Urban Infrastructure	Amount (US\$)
564807	Albania	UMIC	2009	Integrated Solid Waste Management	Closed	PPP	SWM	483,353
599053	Albania	UMIC	2013	Solid Waste	Closed	Concession	SWM	1,009,189
601694	Brazil	UMIC	2017	Waste Mgmt.	Active	Acquisition	SWM	81,092
601792	Brazil	UMIC	2017	Barueri	Active	Advisory	WTE	1,463,700
600354	Brazil	UMIC	2015	Curitiba Waste	Closed	PPP	SWM	987,195
602916	Egypt, Arab Rep.	LMIC	2019	Alternative Fuels for Cement	Active	Investment		1,151,606
599055	Egypt, Arab Rep.	LMIC	2013	PPP Program—Extension of MoU	Closed	PPP	WTE	59,317
603648	Guinea	LIC	2020	Guinea Solid Waste	Active	PPP	Landfill	2,121,866
582307	India	LMIC	2013	e-waste Advisory Project	Active	PPP	SWM/e-waste	157,394
601307	India	LMIC	2016	Infrastructure Advisory to Cities	Active	Investment	SWM with others	604,133
27812	India	LMIC	2009	APUFIDC Urban Sector—PPP	Closed	PPP	SWM/WTE	145,500
587127	India	LMIC	2012	Orissa SWM PPP—Berhampur	Closed	PPP	SWM	1,238,996
03875	Indonesia	LMIC	2020	Legok Nangka Waste to Energy PPP	Active	PPP	WTE	1,975,635
602772	Jordan	UMIC	2020	Swaqa Hazardous Waste Landfill	Active	PPP	Landfill	43,106
29108	Kosovo	UMIC	2010	Solid Waste	Closed	PPP	SWM	673,270
604022	LAC	UMIC	2019	LAC Cities Platform	Active	Investment	Urban	1,382,610
590467	Lesotho	LMIC	2012	Health Waste	Closed	PPP	Health waste	2,928,126

(continued)

Project ID	Country, Economy, or Region	Cat.	App. Year	Name	Status	AS for	SWM/Urban/SWM with Urban Infrastructure	Amount (US\$)
28082	Maldives	UMIC	2010	PPP—Solid Waste Management	Closed	PPP	SWM	1,119,660
29603	Montenegro	UMIC	2010	Berane Solid Waste	Closed	PPP	SWM/landfill	530,444
593767	Russian Federation	UMIC	2013	Resource Efficiency Program	Closed	Investments	Resource efficiency	678,908
599200	Samoa	UMIC	2013	SWM PPP	Closed	PPP	SWM/landfill	588,125
600610	Serbia	UMIC	2015	Belgrade WTE PPP	Active	PPP	WTE	1,622,882
603163	South Africa	UMIC	2019	Africa Cities Platform	Active	Investments	Urban	249,460
601115	Turkey	UMIC	2016	ECA Cities Platform IP	Active	PPP	SWM with urban infra.	409,500
603138	Ukraine	LMIC	2019	ECA Cities Platform II	Active	Investments	Urban	940,000
588148	West Bank and Gaza	LIC	2012	Solid Waste Management Project	Closed	PPP	SWM/landfill	255,156

Source: Independent Evaluation Group.

Note: App. = approval; AS = advisory services; Cat. = category; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; LIC = low-income country; LMIC = lower-middle-income country; MoU = memorandum of understanding; PPP = public-private partnership; SWM = solid waste management; UMIC = upper-middle-income country; WTE = waste to energy.

Appendix C. Evaluation Methodology

Evaluation Questions

The evaluation aimed to assess how well the World Bank Group has supported client countries to manage municipal solid waste to advance goals related to development and sustainability, including climate goals. The main lines of inquiry that guided the evaluation were as follows:

- » How relevant is the Bank Group’s approach and engagement in meeting client country needs in terms of the latest evidence and thinking on municipal solid waste management (MSWM) practices and country context and readiness?
- » How effective have Bank Group engagements been in delivering improved MSWM for clients?
- » How coherent has Bank Group engagement been in collaboration among the World Bank, the International Finance Corporation (IFC), and the Multilateral Investment Guarantee Agency (MIGA), and collaboration and partnerships with other actors to support better outcomes for client needs in MSWM?

Overarching Principles

The evaluation design employed the following participatory, theory-based, and case-based approaches. These approaches, combined with a range of methods for data collection and analysis, allowed for triangulation of findings to ensure their robustness.

- » **Participatory approach.** The evaluation team consulted from the outset with technical staff across the World Bank’s Global Practices, IFC, and MIGA working on MSWM to identify key areas in which the evaluation can add value and contribute to learning. Feedback from these respondents helped the team frame the evaluation questions and design. This engagement continued throughout the evaluation to ensure comprehensive data coverage and compilation, to learn from operations experience, and to resolve ambiguities in findings and analysis.

- » **Theory-based approach.** The evaluation proposed a theory of change that traced Bank Group support to outcomes across relevant sectors. The knowledge gained from the country-level case studies and other components of the evaluation was used to refine and simplify the framework to two pillars that formed the basis for the evaluation (table C.1).
- » **Case-based approach.** The evaluation included a case-based analysis of the Bank Group portfolio in seven countries and economies. Because of coronavirus pandemic-related travel restrictions, the team gathered information for these country case studies through web-based meetings with government and implementing agency officials and other stakeholders, in addition to Bank Group staff, rather than conducting site visits.

Table C.1. Evaluation Framework for Improved Municipal Solid Waste Management

Pillar 1		Pillar 2
Improved policies and institutions		MSWM infrastructure, access, and service delivery
<ul style="list-style-type: none"> » Policies and regulation (including E&S) » Institutional development » Capacity building at local and other government levels » Planning 		<ul style="list-style-type: none"> » Infrastructure provision (landfills, equipment) » Access to MSW services and service delivery » MSWM operations Accompanied by <ul style="list-style-type: none"> » Financial sustainability » Awareness and behavior change » Private sector participation » Integration of the informal sector
Improved, sustainable, and equitable municipal solid waste management		
Environmental impacts		
<ul style="list-style-type: none"> <i>Local:</i> reduced water and soil pollution <i>Global:</i> reduced marine plastic pollution; reduced GHG emissions 	<ul style="list-style-type: none"> » Improved health » Improved quality of life » Improved welfare of informal waste pickers 	<ul style="list-style-type: none"> » Employment » Increased land value » Increased investment and private sector growth

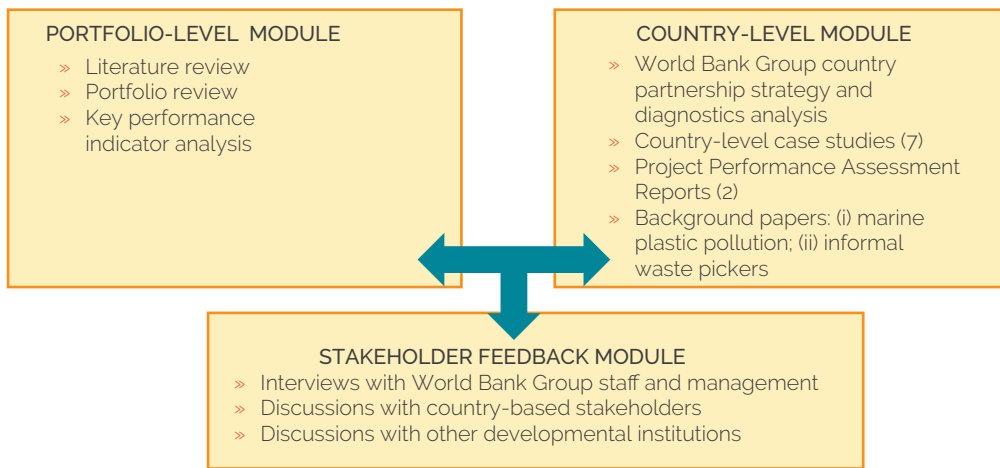
Source: Independent Evaluation Group.

Note: E&S = environmental and social; GHG = greenhouse gas; MSW = municipal solid waste; MSWM = municipal solid waste management.

Evaluation Components

The evaluation components are grouped into portfolio-level and country-level modules and stakeholder interviews, as shown in figure C.1. The components combine quantitative and qualitative evaluative evidence to address the evaluation questions.

Figure C.1. Evaluation Design



Source: Independent Evaluation Group.

Portfolio-Level Modules

Targeted literature review. This exercise involved a targeted coverage of wider research, publications, and analytical news features from prominent sources on MSWM, and from the Bank Group’s research papers, reports, publications, and other sector analytical work. The review covered products from fiscal years (FY)10–20 but reached back to previous years as needed to support individual country case studies.

Portfolio review analysis. The portfolio analysis covered the identified cohort of Bank Group projects, investments, advisory services and analytics, and guarantees approved, closed, or matured during FY10–20 (listed in appendix B). Targeted data and information were extracted from project documents, including Project Appraisal Documents, Implementation Completion and Results Reports, and Implementation Status and Results Reports; Independent Evaluation Group (IEG) Implementation Completion and Results Report Reviews and Project Performance Assessment Reports for World Bank

projects; and evaluations of Expanded Project Supervision Reports for IFC investments and Project Completion Reports for IFC advisory services.

Key performance indicator analysis. This analysis was carried out for all closed and evaluated World Bank projects. The exercise involved mapping project key performance indicators and available evidence to elements of pillars 1 and 2 and impacts in the evaluation framework (table C.1) and rating their performance on a binary scale as effective or not effective. The basis for judging effectiveness was moderately satisfactory or better performance against targets, in line with standard IEG methodology. These ratings were aggregated for each element to get a picture of relative performance across elements. This in turn allowed for a nuanced analysis of how the elements interacted with one another in producing overall MSWM outcomes at the project and country levels.

Country-Level Modules

Country strategy analysis. For the World Bank, Country Partnership Strategies, Country Partnership Frameworks, and Systematic Country Diagnostics covering the period 2010–20 were analyzed in terms of MSWM issues raised in the documents (classified by the elements of the evaluation framework pillars and impacts), strategies proposed, and specific proposals for a work program. In all, 180 Country Partnership Frameworks for 113 countries and 105 Systematic Country Diagnostics for 95 countries were analyzed. For IFC, IEG analyzed 21 Country Private Sector Diagnostics for 21 countries and 37 country strategies for 37 countries. The findings from this analysis formed an important basis for judging the relevance of Bank Group support for MSWM.

Country-level case studies. The evaluation team prepared case studies for seven countries and economies. The countries and economies were chosen to have a balanced coverage of regions; income categories; fragile country and economy contexts; spread of municipal solid waste issues; and investment, technical assistance, and development policy loans. The list of case study countries and economies and their salient characteristics is presented in table C.2. A standardized questionnaire structured along the lines of the evaluation questions and the evaluation framework elements was used for discussions with Bank Group and country- and economy-based respondents. The standardized questionnaire allowed for a comparative analysis across the country and economy experiences.

Table C.2. Case Study Countries and Economies—Salient Characteristics

Country or Economy	Region	Country Income Category	World Bank Group Projects (no.)	Original MSW Commitment (US\$, millions)	Focus Issues
Azerbaijan	ECA	UMIC	2	110	Infrastructure; institutional development; financial sustainability; access and service delivery
Colombia	LAC	UMIC	3	289	Accountability; informal worker integration; financial sustainability
Liberia	AFR	LIC	1	15	FCS context; infrastructure; local government capacity; access
Morocco	MENA	LMIC	4	464	Development policy loan instrument; policy; institutions; infrastructure; financial sustainability; access and service delivery
Nigeria	AFR	LMIC	1	74	Planning; policy; infrastructure; financial sustainability; access and service delivery
Kenya	AFR	LMIC	2	75	Infrastructure; informal sector; local government capacity
West Bank and Gaza	MENA	LMIC	3	24	FCS context; infrastructure; local government capacity; access; financial sustainability; waste pickers; ICT for citizen engagement and education

Sources: World Bank Business Warehouse; International Finance Corporation and Multilateral Investment Guarantee Agency databases.

Note: AFR = Africa; ECA = Europe and Central Asia; FCS = fragile and conflict-affected situations; ICT = information and communication technology; LAC = Latin America and the Caribbean; LIC = low-income country; LMIC = lower-middle-income country; MENA = Middle East and North Africa; MSW = municipal solid waste; UMIC = upper-middle-income country.

Project Performance Assessment Reports. Two Project Performance Assessment Reports were prepared: one for an investment project in Azerbaijan and the other for a four-part development policy loan series in Morocco, which together covered the full range of pillar 1 and pillar 2 elements and impacts. Because of pandemic-related travel restrictions, the team conducted these assessments with the support of local consultants and institutions and through web-based video or audio meetings with stakeholders.

Background papers. The evaluation commissioned two background studies: one on marine plastic pollution and the other on informal waste pickers. Leading international experts in these fields conducted the two studies. The motivation for commissioning these papers was the importance of both the topics and the focus the Bank Group's Board of Executive Directors and senior management place on them, together with the limited portfolio on marine plastic pollution and relatively less attention to the important issue of informal waste pickers in World Bank analytical work. The paper on marine pollution took stock of current thinking and strategic approaches in this area and made forward-looking proposals for addressing marine plastic pollution. The paper on informal waste pickers provided a comprehensive literature review and instructive examples of work in integrating informal waste pickers with formal MSWM processes in several countries. Selected content from these papers, backed by evidence, helped give a larger context to and supplemented the portfolio review on these two topics.

Stakeholder Feedback

The team conducted stakeholder interviews through web-based videoconferencing or by telephone because of pandemic-related travel restrictions.

Interviews with Bank Group Staff and Management

The evaluation team met with most World Bank, IFC, and MIGA staff and managers who work on the municipal solid waste sector. The interviews used semistructured formats in two parts: one covering MSWM issues generally and the other focusing on operations in which the staff or managers have worked. Within the World Bank, the staff and managers were

drawn from the Urban, Disaster Risk Management, Resilience, and Land; Water; and Environment, Natural Resources, and Blue Economy practices, which share most of the World Bank's MSWM portfolio. For IFC, the respondents were from the investment area and infrastructure department. The purpose of the interviews was to verify the tone and direction of the findings and conclusions from the portfolio and country modules and to gather additional insights from individual experiences. The interviews covered issues of internal coherence and collaboration among the World Bank, IFC, and MIGA.

Discussions with Country-Based Stakeholders

Discussions with country-based stakeholders were held in the context of country case studies and project performance assessments. The respondents were officials from ministries covering urban, environment, and water portfolios; implementing agencies for World Bank projects; nongovernmental organizations; and academics. A structured questionnaire was used for these discussions that was organized in two parts. The first part was organized in line with the evaluation questions and the evaluation framework pillar elements. The second part was specific to the project experience in the country. The team also held discussions with the World Bank country director and managers and country-based World Bank staff. These discussions were directed toward the World Bank's perspective of issues, opportunities, and constraints in expanding MSWM activities in the country and triangulating feedback from the country-based stakeholders.

Discussions with Other Developmental Institutions

The evaluation team held discussions with staff of the Asian Development Bank, the European Bank for Reconstruction and Development, and the Japan International Cooperation Agency. The team also corresponded with staff of the African Development Bank and the Inter-American Development Bank. A co-task team leader also held discussions with a range of international experts on MSWM in 2019 at the International Solid Waste Association's annual conference in Bilbao, Spain, the theme

of which was circular economy and waste management. The purpose of the meetings with other developmental institutions was to understand the scale and coverage of their involvement in the MSWM sector and the constraints they face in raising the sector's profile among other urban services. Interviews with experts from the International Solid Waste Association were valuable in understanding the current thinking and directions in the sector, especially on the practical challenges of adopting circular economy principles and extended producer responsibility, the lack of attention to MSWM in low-income countries, and barriers to private sector involvement.

Evaluation Coverage

This evaluation covers all World Bank, IFC, and MIGA support for MSWM during the period FY10–20. There were 117 World Bank investment and policy lending operations approved or ongoing in FY10–20, implemented in 55 countries (table C.3). Of those operations, 82 were closed, and IEG evaluated 68 of them. Together, these operations aimed to support improvements along the entire waste chain, covering collection, transport, treatment, and disposal of municipal solid waste. The study took stock of the World Bank's 122 analytical products for 40 countries during FY10–20 and reviewed selected publications and reports. There were 13 IFC investments in 7 countries, of which IEG validated 1. There were 26 IFC advisory services that covered MSWM issues in 19 countries, of which 14 were closed, and IEG validated 9. IFC investments were mainly for waste-to-energy conversion from landfill gas recovery, except for one landfill investment and three investments for e-waste recycling and composting. Most IFC advisory services were for public-private partnership transactions that supported waste-to-energy facilities and sanitary landfills. The rest were a mix of concessions, acquisitions, and lines of credit for MSWM services as part of urban services. MIGA has one active recent guarantee for a new sanitary landfill that was issued along with advisory. The evaluation drew on evidence and ratings from products that IEG evaluated and validated.

Table C.3. World Bank Group Municipal Solid Waste Management Activities (Approved and Ongoing, FY10–20)

Activity Category	Countries (no.)	Projects and Activities (no.)	Commitments (US\$, millions)	Closed/ Matured and Evaluated Projects/ Activities (no.)
World Bank projects	55	116	2,626	68
World Bank ASA	40	156	44	n.a. ^a
IFC investments	7	13	398	1
IFC advisory services	19	26	23	9
MIGA guarantees	1	1	106	0

Source: Independent Evaluation Group.

Note: ASA = advisory services and analytics; FY = fiscal year; IFC = International Finance Corporation; MIGA = Multilateral Investment Guarantee Agency; n.a. = not applicable.
a. World Bank ASA are not rated.

Ensuring the Validity of Findings

IEG took several steps to ensure a consistent approach across evaluation team members for the country strategy analysis, portfolio review, key performance indicator analysis, and country case studies. The team prepared clear protocols for search, identification, and recording of evidence. For clarity and consistency, these protocols were based on the evaluation framework elements, and this approach was applied across all exercises. To ensure interrater reliability, each team member carried out pilot tasks using identical subject matter, and the results were compared with narrow differences in interpretation and alignment approaches across individuals. The team applied triangulation across evaluation components, cross-validating findings from case studies with findings from the portfolio review and literature review. Four peer reviewers at the Approach Paper stage and three peer reviewers at the report stage provided feedback, and the team consulted an adviser

throughout the study to verify that the evaluation was using the available evidence and to confirm the validity of analysis and conclusions from the wider sector perspective.

Triangulation

The evaluation triangulated evidence from three modules and across elements within the modules. The team updated and validated findings from the literature review through discussions with external sector experts. Findings from the portfolio review were confirmed in depth for subsets of projects through country case studies and project performance assessments. Broader findings and conclusions were subject to a reality check and cross-validated through discussions with country-based respondents, Bank Group staff, and external experts.

Study Limitations

The evaluation faced limitations arising from low data availability on environmental, social, and economic impacts of MSWM activities and from travel restrictions because of the coronavirus pandemic. The evaluation design had anticipated the low availability of data on impacts and had planned for targeted studies in two to three cities to assess impacts from Bank Group support for MSWM. The evaluation had also intended to conduct interview or focus group sessions with informal waste pickers and nongovernmental organizations working with them to expand the low level of evidence available in this area. Another area for site-based inquiry was good practices in using cell phone and internet technology for raising awareness on MSWM issues and for holding service providers accountable for their performance, especially in low-income and lower-middle-income countries. Verifying the balanced provision of services along the waste value chain in Bank Group-supported situations was another area for examination. Without the ability to travel, the evaluation had to depend on secondary sources, stylized facts, and anecdotal evidence to compile data and information on these topics. The study also commissioned a background paper on informal waste pickers by a leading international expert to raise the breadth and quality of evidence on this subject.

Appendix D. Plastics: Background Paper

Solid Waste Management and Plastics

This background paper is for the Independent Evaluation Group's evaluation *Transitioning to a Circular Economy: An Evaluation of the World Bank Group's Support for Municipal Solid Waste Management (2010–20)*. It was prepared by Professor Steve Fletcher, professor of Ocean Policy and Economy and director of Revolution Plastics, University of Portsmouth, United Kingdom, and member, United Nations Environment Programme International Resource Panel.

Key Messages

- » **Mismanaged plastic waste is a global crisis affecting people, nature, and the economy.** Plastic waste that leaks from the plastics life cycle into nature threatens the functionality of important ecosystems, impinges on the health of individuals, and creates massive financial losses from the plastics economy. Plastic production and consumption is also a significant contributor to climate change through its reliance on oil-based materials.
- » **Plastics are particularly challenging to manage within a solid waste management process** because they are frequently embedded within a range of other materials and objects, which makes them difficult to separate into a specific waste flow for appropriate treatment. Tackling the negative effects of plastics in waste flows is not an isolated problem that can be tackled by better solid waste management.
- » **The plastics economy is highly linear, with very low recycling rates.** In 2018, 35.7 million tons of municipal solid waste plastic was generated in the United States, of which 8 percent was recycled, 16 percent was incinerated for energy recovery, and the remaining 76 percent was landfilled. This pattern is replicated (and is frequently much worse) globally.

- » **Plastic pollution in the ocean is primarily a land-based problem, and it is getting worse.** Many plastics in the environment originate from land-based activities and sources, particularly from urban areas and agricultural practices. Without meaningful action, it is predicted that the annual flow of plastics entering the ocean will rise from 11 million metric tons to 29 million metric tons.
- » **Rivers are a critical transport pathway of plastics through the environment and to the ocean.** Although estimates vary, at present, 67–95 percent of all plastics entering the ocean are discharged from up to 30 rivers, mostly located in China and Southeast Asia.
- » **Mismanaged plastic waste arises disproportionately in cities in Asia.** Therefore, reliable municipal solid waste management (MSWM) systems in cities in Asia that keep plastics out of rivers are critical.
- » **African and South American cities are emerging sources of plastic pollution.** It is critical to learn the lessons of how to combat plastic pollution in Southeast Asia and share those lessons in Africa and South America. Focusing on solid waste management in urban areas will be important, as will preventing plastics from reaching rivers.
- » **Isolated interventions to reduce mismanaged plastic waste, including improved MSWM, are unlikely to be successful.** An isolated intervention to reduce mismanaged plastic waste risks failing because a complete circular or end-to-end solution is absent. Isolated interventions can move a problem rather than solve it.
- » **Focusing long-term investment on a combination of upstream and downstream policies is much more likely to generate effective results than isolated interventions.** Coordinated actions across the plastics life cycle to reduce the volume of plastics in the economy (upstream interventions) and better handle the treatment of the plastics within the economy (downstream interventions) generate systemic action.
- » **Systemic and coordinated action is required to tackle the global plastics crisis.** Adopting systems thinking is critical to developing effective interventions to address mismanaged plastic waste and design a system of interventions that together tackle the plastics crisis substantively.

- » **The plastics partnership and advocacy landscape is very crowded, complex, and fragmented and lacks a clear voice and leadership.** This can confuse key messages and obscure the evidence base by presenting many different interpretations. Occasionally, by adopting extremely challenging positions, some groups can block rather than support action to tackle mismanaged plastic waste.
- » **Citizen behavior change campaigns can reduce the demand for plastics and underpin improved plastic waste management.** Citizens play a critical linking role between plastics demand and disposal, largely through household purchasing preferences and disposal practices. A targeted campaign for householders to buy only plastics that are known to be properly collected and managed has the potential to reduce mismanaged plastic waste significantly.
- » **Planning how to achieve systemic change is critical.** The transition to a more sustainable plastics economy is more likely to happen with a focused plan that has a rigorous monitoring and evaluation framework to determine progress.
- » **Reducing the amount of plastic entering the economy is the most effective way of reducing mismanaged plastic waste.** Focusing on upstream interventions, such as removing or replacing plastics in products, will reduce the plastics entering the economy and plastics cycle and reduce the volume of plastic available to leak into nature.
- » **MSWM is extremely useful where there is an absence of effective upstream interventions.** MSWM interventions are most useful where upstream interventions are ineffective (or absent) and mismanaged plastic waste is commonly generated through waste processing activity.
- » **Economic (dis)incentives work.** There is growing evidence that economic (dis)incentives (such as the introduction of charges for carrier bags) to shift relatively minor consumer behaviors are effective, as are more substantial taxes to alter commercial behavior, as evidenced by the greater reduction in waste sent to landfills where taxes are higher.
- » **Bio-based and biodegradable plastics have a role to play in shifting away from oil-based plastics,** but they currently lack standards, and material development is in its infancy.

Options for sustained interventions by the World Bank Group to tackle mismanaged plastic waste and pollution include the following:

- » **Focus on upstream interventions** to reduce the volume of plastics in the economy. Embedding design-for-circularity principles into plastic and plastic-containing product design is a priority.
- » **Focus interventions on preventing plastics entering rivers** (and restoring highly plastic-polluted rivers), particularly the main plastic-carrying rivers in Southeast Asia.
- » **Focus on coastal cities in Southeast Asia** as key sources of mismanaged plastic waste. Solid waste management is likely to have a disproportionately positive effect on a city scale in this region.
- » **Anticipate and prepare for African and South American cities to become globally significant sources of plastic pollution** and take preemptive action.
- » **Focus on interventions that support systemic change** in the plastic economy by making sure interventions are coordinated and work in concert.
- » **Focus on citizen behavior change interventions** only where the waste infrastructure system means the behavior of citizens can make a difference.
- » **Consider adopting a global advocacy leadership role to push for a global sustainable plastics economy.** Currently, the absence of a unifying voice and leadership is blocking coordinated action.

Appendix E. Carbon Offset Projects

Carbon offset programs allow individuals and companies to invest in environmental projects around the world to balance out their own carbon footprints. The projects are usually based in developing countries and are most commonly designed to reduce future emissions.

The World Bank’s municipal solid waste management portfolio includes 25 carbon offset projects that were approved or completed during 2010–20, with a total outlay of \$196 million (table E.1; table E.2). These projects are attached to parent investment projects and in most cases have longer project durations than the parent projects. The carbon offset projects fall under the following categories:

- » Composting;
- » Landfill gas recovery;
- » Landfill gas recovery and electricity generation;
- » Landfill gas recovery and electricity generation and composting.

The largest number of projects is in the Latin America and the Caribbean Region (9 of 25), but the largest share of commitments went to the Middle East and North Africa Region (45 percent: \$89 million of \$196 million). There was only 1 project in the South Asia Region drawing 3 percent of total commitments (US\$5.5 million of \$196 million). There were no projects in the Europe and Central Asia Region.

Twenty-one of the 25 carbon offset projects are closed, and 4 are active. Only 5 of the 21 closed projects have met or exceeded targets for reductions in greenhouse gas emissions.

Table E.1. Carbon Offset Projects in Solid Waste Management Portfolio

Region	Projects (no.)	Sum of World Bank Lending (US\$, millions)	Share of Total Commitments (%)	GHG Emission Reduction		
				Target (tons, millions)	Achievement (tons, millions)	Achievement (%)
AFR	4	19.7	10	0.65	0.02	3
EAP	5	18.3	9	1.21	0.24	20
LAC	9	63.3	32	2.34	1.89	81
MENA	6	89	45	2.63	0.78	29
SAR	1	5.5	3	0.15	0.15	100
Total	25	195.8	100	6.99	3.08	44

Source: Independent Evaluation Group.

Note: AFR = Africa; EAP = East Asia and Pacific; GHG = greenhouse gas; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SAR = South Asia.

Table E.2. Municipal Solid Waste Management: Carbon Offset Projects (Approved or Ongoing during 2010–20)

Project ID	Project Name	Country	Region	Project Status	Approval FY	Exit FY	Global Practice or Practice Group	World Bank Lending (US\$, millions)	Activity	Target	Achieved
P079182	BR Nova Gerar Landfill Rio de Janeiro	Brazil	LAC	Closed	2006	2017	EAE	8.5	LFG recovery; electricity generation; composting	543,324	544,670
P086035	CN-CF-Tianjin Landfill Gas Recovery	China	EAP	Closed	2007	2015	URL	0.6	LFG recovery; electricity generation	605,534	236,999
P088546	Mx: Waste Management and Carbon Offset	Mexico	LAC	Closed	2005	2017	EAE	0.9	LFG recovery; electricity generation	1,022,598	1,022,598
P088934	AR Olavarria Methane Capture Project	Argentina	LAC	Closed	2005	2015	URL	0.5	LFG recovery	9,000	0
P093856	UG-CF Sustainable Envir. SIL (FY06)	Uganda	AFR	Closed	2010	2016	ENB	8.4	Composting	196,949	16,549

(continued)

Project ID	Project Name	Country	Region	Project Status	Approval FY	Exit FY	Global Practice or Practice Group	World Bank Lending (US\$, millions)	Activity	Target	Achieved
P094495	UY Montevideo Landfill Gas Capture	Uruguay	LAC	Closed	2007	2012	ENB	7.0	LFG recovery	201,923	0
P094739	PE Huaycoloro Landfill Gas Recovery	Peru	LAC	Closed	2006	2014	EAE	3.7	LFG recovery; electricity generation	500,000	327,352
P098012	UG-CF Kampala Solid Waste ERPA (FY10)	Uganda	AFR	Closed	2010	2015	URL	2.1	LFG recovery	74,144	0
P098638	NG-Lagos Landfill Gas and Composting (FY06)	Nigeria	AFR	Closed	2008	2014	URL	2.1	LFG recovery; electricity generation; composting	141,676	0
P098737	EG-ONYX Solid Waste Alexandria-Carbon	Egypt, Arab Rep.	MENA	Closed	2006	2016	ENB	0.0	LFG recovery	1,100,000	354,595
P099670	TN-Jebel Chekir Solid Waste Carbon	Tunisia	MENA	Closed	2006	2019	URL	0.0	LFG recovery	454,543	301,327
P099672	Tunisia-Nine landfills Carbon Finance	Tunisia	MENA	Closed	2006	2019	URL	0.0	LFG recovery	547,097	119,414

(continued)

Project ID	Project Name	Country	Region	Project Status	Approval FY	Exit FY	Global Practice or Practice Group	World Bank Lending (US\$, millions)	Activity	Target	Achieved
P101253	AR SALTA LANDFILL GAS CAPTURE PR	Argentina	LAC	Closed	2008	2016	URL	0.7	LFG recovery	9,000	0
P104482	ILKD D-CF-Pontianak Landfill Gas	Indonesia	EAP	Closed	2007	2014	ENB	0.0	LFG recovery	200,000	0
P105389	LKD BR Nova Gerar CDM SWM Project 2	Brazil	LAC	Closed	2009	2015	URL	10.0	LFG recovery; electricity generation	54,000	0
P106652	PK: Lahore Composting Project	Pakistan	SAR	Closed	2009	2017	CCG	5.5	Composting	151,092	151,092
P107410	JO-Amman Landfill Gas Recovery	Jordan	MENA	Closed	2009	2015	URL	15.0	LFG recovery; electricity generation	320,000	0
P110935	EG-CAIRO SOUTHERN ZONE COMPOSTING	Egypt, Arab Rep.	MENA	Closed	2008	2014	ENB	4.0	Composting	100,000	0
P127455	UY-Montevideo LFG Capture and Flaring	Uruguay	LAC	Closed	2012	2018	URL	2.0	LFG	—	—

(continued)

Project ID	Project Name	Country	Region	Project Status	Approval FY	Exit FY	Global Practice or Practice Group	World Bank Lending (US\$, millions)	Activity	Target	Achieved
P112329	NG: Lagos Earth-care Compost Project	Nigeria	AFR	Active	2010	—	CCG	7.1	Composting	236,646	0
P115080	PH-CF-Methane Recovery from Waste Program	Philippines	EAP	Active	2010	—	CCG	10.0	LFG recovery	12,000	5,849
P121917	MA-CN Municipal Solid Waste Carbon Financing Program	Morocco	MENA	Active	2014	—	URL	70.0	LFG recovery; electricity generation	112,000	0
P124663	BR Caixa Solid Waste Mgt	Brazil	LAC	Active	2012	—	URL	30.0	LFG recovery; electricity generation	—	—
P099679	ID-CF-Landfill Bekasi landfill Gas Flaring	Indonesia	EAP	Closed	2008	2015	URL	0.0	LFG recovery	195,000	126,363
P104022	ID-CF-Makassar Landfill Gas Flaring	Indonesia	EAP	Closed	2009	2015	ENB	7.7	LFG recovery	200,000	0

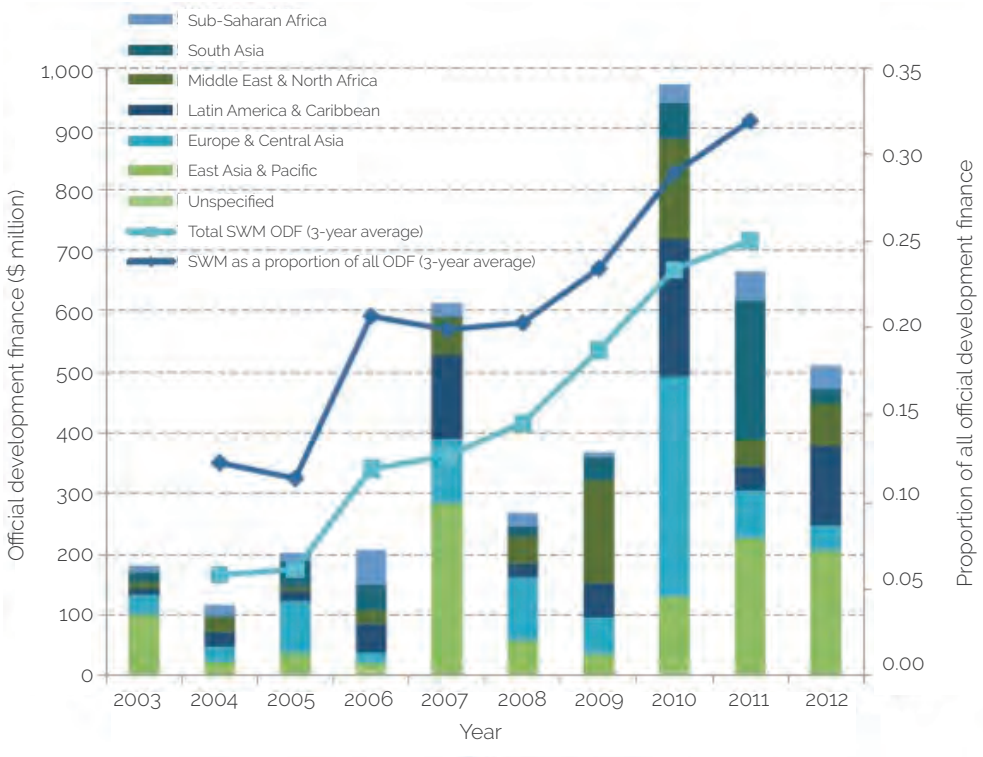
Source: Independent Evaluation Group.

Note: AFR = Africa; CCG = Climate Change Group; EAE = Energy and Extractives; EAP = East Asia and Pacific; ENB = Environment, Natural Resources, and Blue Economy; FY = fiscal year; LAC = Latin America and the Caribbean; LFG = landfill gas; MENA = Middle East and North Africa; SAR = South Asia; SWM = solid waste management; URL = Urban, Disaster Risk Management, Resilience, and Land; — = not available.

Appendix F. Role of Donors and Development Partners

Official development finance to solid waste management (SWM) has more than doubled since 2003 and reached \$510 million in 2012 (figure F.1). East Asia and Pacific is the major recipient of development finance with a 40 percent share in 2012. This Region is followed by Latin America and the Caribbean, Middle East and North Africa, Europe and Central Asia, Sub-Saharan Africa, and South Asia. Over 2003–12, China received the most loans and grants for SWM. Azerbaijan, India, Morocco, República Bolivariana de Venezuela, Turkey, and Vietnam are the other major recipients of development finance for SWM. The share of SWM in all official development finance has increased; however, support for SWM is still a very small proportion of total development finance (0.32 percent). Compared with \$15 billion in development finance supporting the water supply and sanitation sector, only \$0.5 billion in development finance was provided to SWM (figure F.2). Thirty-four donors provided financial support to SWM-related activities in 2012. Eight of these were multilateral institutions, and the rest were bilateral donors. Germany was the largest donor in 2012 with \$126 million, followed by the Asian Development Bank (US\$125 million), Japan (US\$110 million), the Inter-American Development Bank (US\$43 million), the International Development Association (US\$23 million), and the European Union (US\$20 million; figure F.3). These donors provided almost 90 percent of SWM-focused official development finance in 2012 (Lerpiniere et al. 2014).

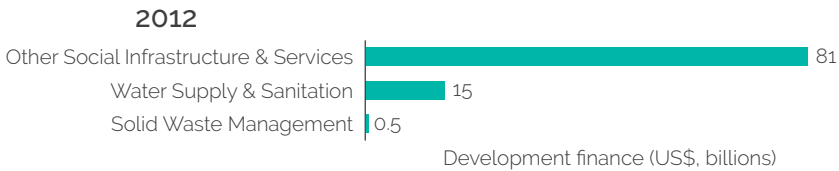
Figure F.1. Official Development Finance for Solid Waste Management by Recipient Region



Source: Lerpiniere et al. 2014.

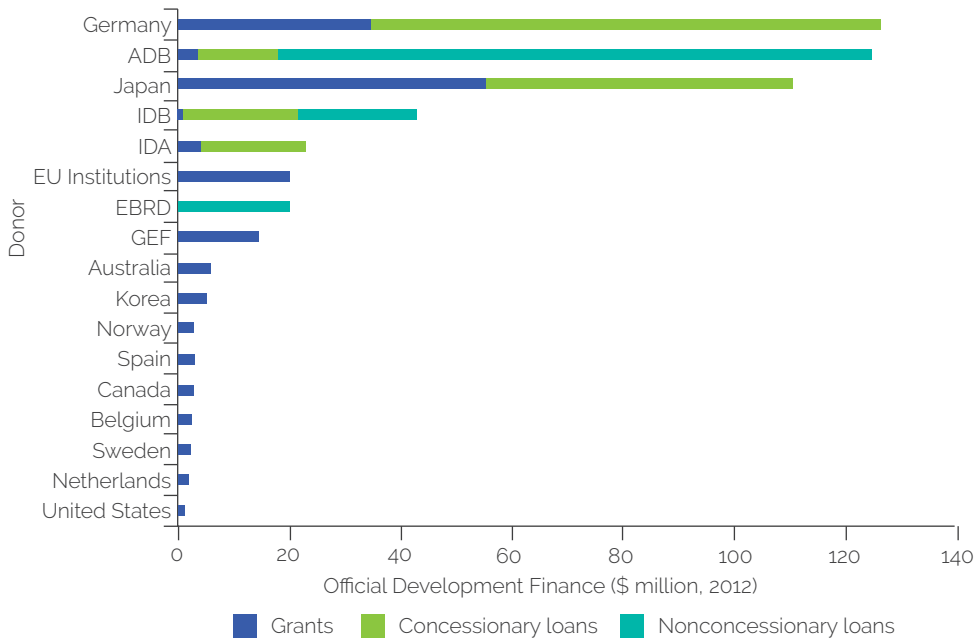
Note: ODF = official development finance; SWM = solid waste management.

Figure F.2. Development Finance in Social Infrastructure and Services



Source: Lerpiniere et al. 2014.

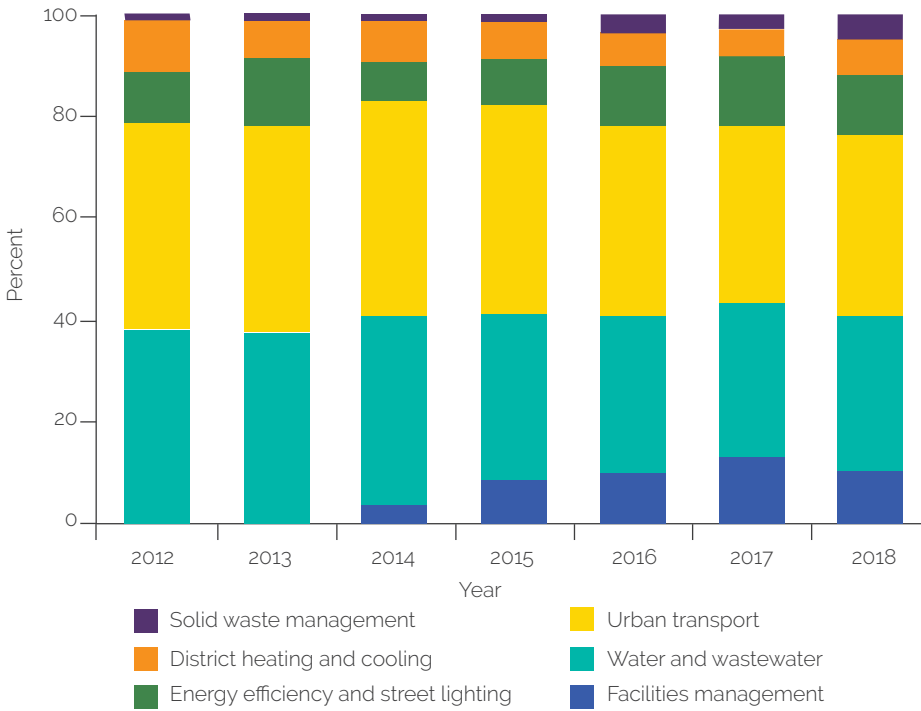
Figure F.3. Major Donors in Solid Waste Management Development Finance



Source: Lerpiniere et al. 2014.

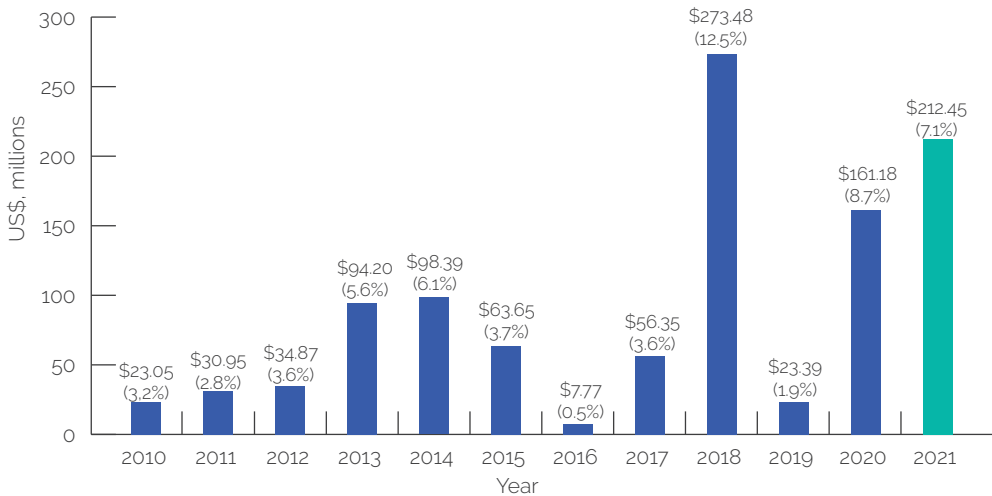
Note: ADB = Asian Development Bank; EBRD = European Bank for Reconstruction and Development; EU = European Union; GEF = Global Environment Facility; IDA = International Development Association; IDB = Inter-American Development Bank.

Figure F.4. European Bank for Reconstruction and Development Lending for Solid Waste Management, 2012–18



Source: European Bank for Reconstruction and Development 2019.

Figure F.5. Asian Development Bank Urban Sector Solid Waste Management Projects: Annual Commitments



Source: Asian Development Bank.

African Development Bank

Among the water supply and sanitation portfolio, only one project is apparently dedicated to municipal SWM.¹ The extent of municipal SWM coverage under water supply and sanitation projects is not clear.

Inter-American Development Bank

In the past 15 years (2005–19), the Inter-American Development Bank’s Water and Sanitation Division has approved 27 dedicated investment programs, with \$708 million associated with municipal SWM sector activities, within a framework of operations totaling \$1,724 million.² Although the Water and Sanitation Division’s portfolio has traditionally been focused on the drinking water, sewerage, and wastewater treatment subsector, there has been greater development of other subsectors in recent years, such as waste, which in 2014 represented 13 percent of the division’s total portfolio. The waste management and management project portfolio in this period was varied and included programs for the integral management of solid waste in urban areas, the environmental recovery of bodies of water, or the institutional and regulatory strengthening of the subsector and the reform of policies.

Likewise, between 2005 and 2019, the division approved 50 nonreimbursable technical cooperations in the waste subsector, totaling \$22.1 million. These technical cooperations have financed studies associated with investment loans (because of the lack of information that would allow progress in the preparation and approval of investment loans) and comprehensive waste management plans, with special attention to intervention models that incorporate informal recyclers in waste management in large cities.

Global Partnership on Waste Management

The Global Partnership on Waste Management (which stopped functioning in 2019) was an open-ended partnership for international organizations, governments, businesses, academia, local authorities, and nongovernmental organizations.³ According to the organization’s website (published June 26, 2016), it was launched in November 2010 to enhance international cooper-

ation among stakeholders; identify and fill information gaps; share information; and strengthen awareness, political will, and capacity to promote resource conservation and resource efficiency. The partnership's objectives were to enhance international cooperation, outreach, advocacy, and knowledge management and sharing; to identify and fill information gaps in waste management to protect human health and environment; and to tackle adverse impacts of unsound waste management. It also sought to raise awareness, political will, and capacity to promote resource conservation and resource efficiency through waste prevention and by recovering valuable material and energy from waste.

Implementation Methodologies

Expected outcomes. The Global Partnership on Waste Management promoted a holistic approach to waste management. The level of waste management activities is increased through enhanced international cooperation, advocacy, awareness, political will, and outreach. Information that is already available is shared, and additional information is created to fill the gaps. Better coordination among member institutions allows them to benefit from one another's actions. Efficient and synergized activities avoid duplication and promote efficiency of efforts. A wider range of partners and stakeholders are approached for enhanced and coordinated activities.

Coordination Mechanisms and Governance Structure

The steering committee was the organization's governing body, reviewing and providing guidance on the partnership's overall workplan and the progress made. The steering committee met at least once a year, in person or through electronic means.

Partners

The organization's partners were the United Nations Environment Programme, the International Solid Waste Association, the International Telecommunication Union, and the Basel Convention Regional Centre for Asia and the Pacific.

Public-Private Infrastructure Advisory Facility

The World Bank–administered Public-Private Infrastructure Advisory Facility helps governments in developing countries to strengthen policies, regulations, and institutions that enable sustainable infrastructure with private sector participation. In 2020, \$984 million was invested across 19 projects in municipal solid waste, compared with \$4.3 billion across 57 projects in 2019 and the five-year average of \$4.5 billion across 52 projects. Most investment commitments (US\$767 million) were channeled to treatment and disposal projects. Among treatment and disposal projects, incineration and waste-to-energy (landfill gas recovery) technology were the most popular modes, at \$730 million. The investment commitments in 2020 will add capacity of 733,000 tons of solid waste processing in developing countries. Investment commitments in municipal solid waste occurred in three countries: Bulgaria, China, and Serbia.

The energy sector outpaced the transport sector, attracting \$29.8 billion across 145 projects. This accounted for 65 percent of 2020 global Private Participation in Infrastructure investments. The transport sector received only \$10.5 billion across 41 projects, accounting for 23 percent of investment commitments in 2020. Municipal solid waste received \$1 billion across 19 projects, the water sector attracted \$4 billion over 46 projects, and information and communication technology received \$446 million for 1 project.

Other External Partnerships

Other World Bank external partnerships are with the Solid Waste Association of North America and the Collaborative Working Group on Solid Waste Management in Low- and Middle-Income Countries.

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Lerpiniere, David, David C. Wilson, Costas Velis, Barbara Evans, Hinrich Voss, and Kris Moodley. 2014. "A Review of International Development Co-operation in Solid Waste Management." International Solid Waste Association, Vienna.

¹ For more information, see <https://operationsdatabase.opendataforafrica.org/oyilyhd/adb-projects>.

² For more information, see <https://www.iadb.org/en/projects>.

³ For more information, see <https://sustainabledevelopment.un.org/partnership/?p=7462>.



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