

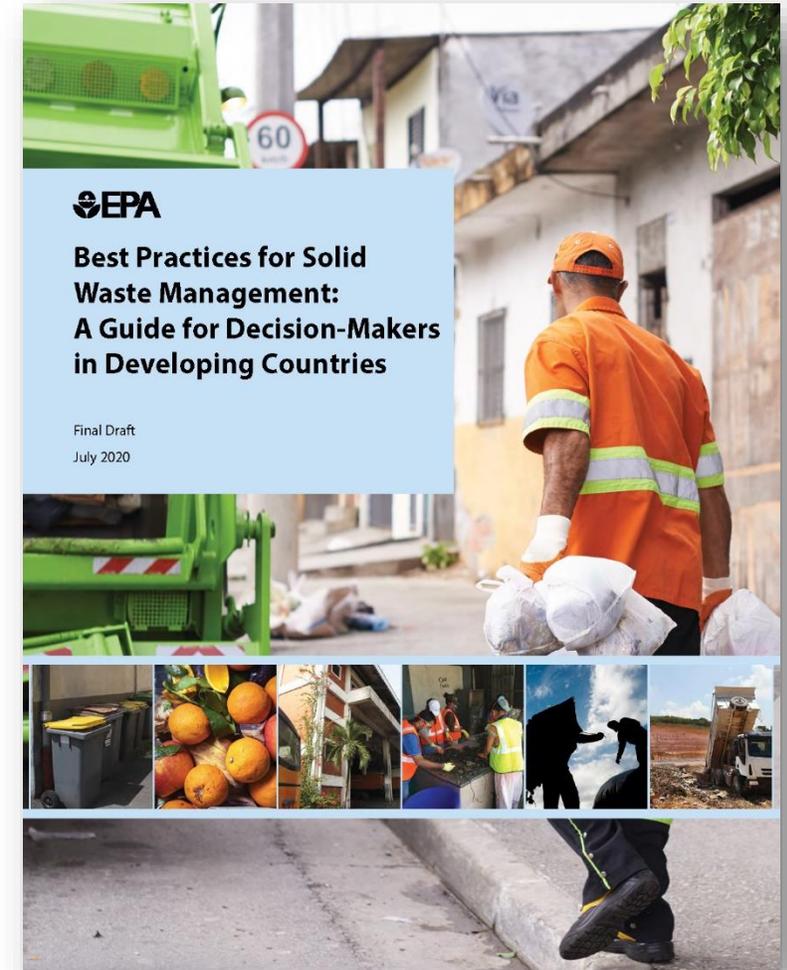
Best Practices for Solid Waste Management: A Guide for Decision-Makers in Developing Countries

Krystal Krejci, U.S. Environmental Protection Agency



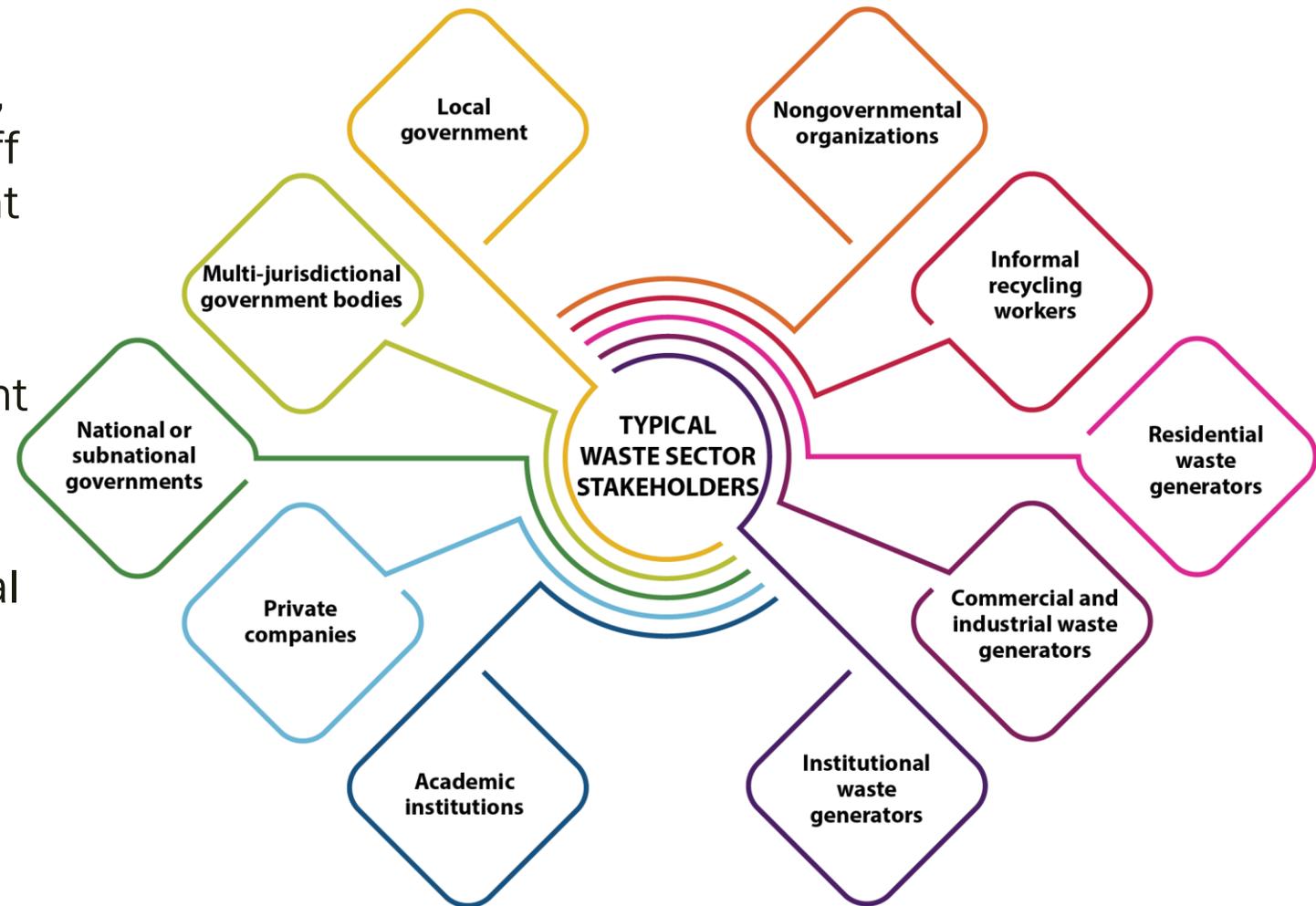
About the Guide

- Inadequate solid waste management presents risks to human health, the environment, and economies in developing countries
- Local authorities are employing a range of strategies to improve solid waste management
- The Guide documents best practices from around the globe to provide decision makers with information and resources
- The Guide leverages experience from multiple international waste management experts and organizations



Applicable to Many Audiences

- Designed for decision-makers, policymakers, and agency staff involved in waste management
- Encourages engagement of a variety of stakeholders to gain support for waste management policies, programs, and services
- Applicable to nongovernmental organizations, private sector actors, or residents



Topics and Content



Specialized Subject Matter

Informal Sector Recycling Best Practices

- Collect information on the sector
- Conduct inclusive outreach
- Create policies
- Offer training
- Engage cooperatives
- Involved non-government organizations
- Identify entrepreneurs
- Consider government employment

Marine Litter Best Practices

- Minimize waste
- Improve waste collection systems
- Bolster recycling efforts



Useful Features

- Highlight solid waste management options and benefits

Best Practices



- Detailed descriptions of projects or activities from cities across the world

Case Studies



- Link to useful guidance materials, tools, and studies

Key Resources



- Considerations when evaluating options for improving solid waste management

Questions for Decision Makers



- Highlight important concepts, issues, or other details to consider

Key Points



- Brief examples of projects or activities from around the globe

Case in Points



- Facilitate easy navigation between topics

Hyperlinked Icons



Useful Features

Case studies detail descriptions of projects or activities from cities across the world



Case in points share brief examples of projects or activities from around the globe



Best practices highlight solid waste management options and benefits



Questions for decision-makers to consider when evaluating options for improving solid waste management



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EXHIBIT 4.3 CASE STUDY

Stakeholder Engagement in Battambang, Cambodia

In 2011, the City of Battambang, Cambodia, launched an effort to overhaul its solid waste management system. The city, which is home to more than 150,000 people, was facing several common solid waste management challenges, including an insufficient operating budget, low collection coverage, waste burning, and associated environmental and public health concerns. Battambang partnered with NGOs, the Cambodian Education and Waste Management Organization, and the Institute for Global Environmental Strategies to scope their solid waste management challenges, engage multiple stakeholder groups, and design strategies for effective solid waste management.

Battambang engaged a variety of key stakeholder groups as a part of this process, including:

Local government staff took part in a city-to-city information exchange with Phitsanulok, Thailand. This exchange helped local government staff form a preliminary strategy for solid waste management, with the benefit of the experiences and hindsight of their Thai counterparts.

NGOs, particularly the Cambodian Education and Waste Management Organization, assisted in facilitating the process and supporting the local government.

Private sector waste collectors CINTRI and Leap Lim were critical partners in the engagement effort, since Battambang does not operate any collection services itself. For reasonable fees the city committed to better collection services. CINTRI also owns and operates the city's dumpsite.

Commercial waste generators, including several markets, agreed to participate in an organic waste segregation pilot project with the Cambodian Education and Waste Management Organization and CINTRI.

Residential waste generators were engaged through the installation of new waste bins and signage, the distribution of brochures, voice announcements, community workshops, and a pilot project. Reasonable fees linked to improved collection services were intended to reduce waste burning. The pilot project identified a need for more education and outreach on waste segregation.

Informal recycling workers operated at the local dumpsite in unsafe conditions, including waste fires. Workers participated in a voluntary training session on the health and environmental impacts of waste fires, and how to extinguish them. Additionally, several informal recycling workers are now employed at the organic waste separation facility.

For more information, see the *Participatory Waste Management Approach for Climate Change Mitigation: The Case of Battambang City* (CES and UNEP 2018).

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CASE IN POINT

Incorporating Solid Waste Management in Primary School Lessons in Cambodia

For more information, see the *Institute for Global Environmental Strategies' guide for Phnom Penh, Cambodia* (Yagasa and Gamariel 2019).

Including solid waste management in school curriculums is an important way to raise awareness with the youth population. The Institute for Global Environment Strategies and the United Nations Environment Programme developed a series of lesson plans for primary school teachers in Cambodia looking to add environmental education and waste management to their curriculum. Students can take lessons about waste reduction, source separation, recycling, and composting; and apply them in their own homes.

Awareness and Education

A key aspect of solid waste management is continuously communicating with and educating stakeholders throughout the project's life, not only during select stages of project development. For example, informing waste generators about solid waste management activities encourages the use of collection services and participation in recycling and organic waste diversion programs. Engaging with local and national policy makers can lead to adoption of solid waste management regulations and increased funding for programs (CCAC Undated(c)).

Traditional awareness-raising programs can include media campaigns, door-to-door visits to discuss solid waste management activities with stakeholders, and community clean up events. Competitions among neighborhoods and communities can help raise awareness for solid waste management and encourage behavior change. Education campaigns can be integrated into school and university curriculums to reach the youth population and encourage good waste management practices.

Appendix C includes a variety of public engagement and communication tools.

Questions for Decision-Makers

- What are the key issues or areas of interest for the project?
- Who are the key stakeholder groups?
- What might be their level of interest?
- Who are the best contacts for the groups?
- What are the best mechanisms for engaging with these groups?
- Are there groups that would oppose, or might be affected by, changes to solid waste management?
- How will stakeholders be engaged throughout the life of the project?

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Useful Features



Key resource boxes link to useful guidance materials, tools, and studies

Key Resources

- [Solid Waste Management \(UNEP 2005a\)](#)
- [The Weight of Nations: Material Outflows from Industrial Economies \(Matthews et al. 2009\)](#)
- [Sustainable Materials Management: The Road Ahead \(U.S. EPA 2009\)](#)
- [What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050 \(Kaza et al. 2018\)](#)
- [Global Waste Management Outlook \(UNEP and ISWA 2015\)](#)

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Section 2

Understanding the Need for Solid Waste Management

Solid waste management systems are designed to protect the environment and improve conditions in cities worldwide.

This section reviews the key benefits of effective solid waste management systems, and common challenges that prevent cities from establishing and effectively implementing those systems.

Why Is Solid Waste Management Important?

Inadequate solid waste management can impact cities and their residents in myriad ways. These impacts can generally be categorized into three categories:

- Human health.** The improper handling of waste can impact human health (e.g., decomposing organic waste attracts rodents, insects, and stray animals). In some cities, human fecal matter and urine are not separated from solid waste, which attract insects and germs that spread disease (e.g., typhoid, cholera). Mosquitoes also pose a concern when they breed in solid waste (e.g., used tires); mosquitoes can be vectors for diseases such as malaria, dengue, and the Zika virus.
- Environmental.** Inadequate control of leachate, water that filters through waste and draws out chemicals, at disposal sites can lead to environmental contamination of soils and waterbodies, impacting local ecosystems (U.S. EPA 2018d). Mismanaged waste is also a threat to stray animals and wildlife as animals may try to consume waste that contains food residue or scraps. Open burning of waste produces emissions of black carbon, a component of particulate matter that has a significant impact on regional air quality.

KEY POINT

Marine Litter and the Environment

Inadequate solid waste management contributes to the global marine litter challenge. In fact, studies suggest that as much as 85 percent of marine litter comes from land-based sources. For more information on sources, impacts, and strategies for reducing marine litter, see the [Marine Litter](#) section.

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Key point boxes highlight important concepts, issues, or other details to consider



Hyperlinked icons throughout facilitate easy navigation between topics



Key Resources

Dumpsite Management

- Closing Dumpsites Knowledge Base (ISWA 2017a)
- Waste Atlas (Database of Global Waste Management Sites) (D-WASTE 2020)
- Improving Solid Waste Disposal in San Cristobal Municipality, Dominican Republic (U.S. EPA 2018c)
- Municipal Solid Waste Knowledge Platform [CCAC Undated(a)]
- A Roadmap for Closing Waste Dumpsites: The World's Most Polluted Places (ISWA 2016)
- Training Module: Closing an Open Dumpsite and Shifting from Open Dumping to Controlled Dumping and to Sanitary Land Filling (UNEP 2005b)
- Municipal Solid Waste Management in Developing Countries (Coursera 2019)
- Closure and Rehabilitation of Open Dumps (CCAC 2014)
- Waste Collection: A Report (Kogler, 2007)

Key Resources

Sanitary Landfills

- Global Methane Initiative: Biogas Tools and Resources (GMI 2020)
- Municipal Solid Waste Knowledge Platform [CCAC Undated(a)]
- Sector Environmental Guideline Solid Waste (USAID 2018)
- International Guidelines for Landfill Evaluation (ISWA 2011)
- Landfill Operational Guidelines, 2nd Edition (ISWA 2010)
- Improving Solid Waste Disposal in San Cristobal Municipality, Dominican Republic (U.S. EPA 2017b)
- Sanitary Landfill Design and Siting Criteria (Cointreau 2004)
- International Best Practices Guide for Landfill Gas Energy Projects (GMI 2012)



Download the Guide

www.epa.gov/international-cooperation/environmentally-sound-management-waste-international-initiatives

Krystal Krejcik
United States Environmental Protection Agency
Office of Resource Conservation and Recovery
Email: Krejcik.krystal@epa.gov

