

BEHAVIOR CHANGE IN Solid Waste Management

A Compendium of Cases

PROBLUE
HEALTHY OCEANS • HEALTHY ECONOMIES • HEALTHY COMMUNITIES



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

Public Disclosure Authorized

Public Disclosure Authorized

Public Disclosure Authorized

Public Disclosure Authorized

© 2023 International Bank for Reconstruction and Development / The World Bank
1818 H Street NW
Washington DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org

This work is a product of the staff of The World Bank with external contributions. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of The World Bank, its Board of Executive Directors, or the governments they represent.

The World Bank does not guarantee the accuracy, completeness, or currency of the data included in this work and does not assume responsibility for any errors, omissions, or discrepancies in the information, or liability with respect to the use of or failure to use the information, methods, processes, or conclusions set forth. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Nothing herein shall constitute or be construed or considered to be a limitation upon or waiver of the privileges and immunities of The World Bank, all of which are specifically reserved.

Rights and Permissions

The material in this work is subject to copyright. Because The World Bank encourages dissemination of its knowledge, this work may be reproduced, in whole or in part, for noncommercial purposes as long as full attribution to this work is given.

Any queries on rights and licenses, including subsidiary rights, should be addressed to World Bank Publications, The World Bank Group, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2625; e-mail: pubrights@worldbank.org.

Cover image: monstArrr_ | istock.com

Purpose and Audience

Behavior Change in Solid Waste Management: A Compendium of Cases includes examples of impactful interventions to change behavior in solid waste management in a context of pressing need.

Today the world faces unprecedented challenges in waste management while the state of the municipal waste management sector globally is a matter of concern. To reverse current trends related to waste generation, pollution, and resource management, active collaboration between the various waste actors including governments, civil society, and the private sector will be required along with sustained behavior change.

This compendium is designed to help decision-makers—including policy makers, policy professionals, and practitioners—investigate, understand, and respond to waste management challenges in their communities through interventions considering a behavioral science lens.

The document contains short case studies that uncover and highlight where and what behavioral tools were applied along three main challenges, that is, getting people to generate less waste, getting people to use waste services, and getting people to be more sustainable with their waste.

The cases capture specific actions and approaches that influenced stakeholder behavior and brought improvements to a specific segment of the waste management chain or a specific objective within the waste management sector.

An attempt has been made to present a geographically balanced distribution of countries across continents. Cases include low-, middle-, and high-income economies and highlight examples in contexts that differ in level of capacity, resources, services, and objectives.

Table of Contents

Acknowledgments.....	1
Abbreviations.....	3
List of Figures.....	5
List of Tables.....	6
1. Introduction and Reader’s Guide.....	7
1.1 A word on solid waste management	8
1.2 Behaviorally informed policy and solid waste management	12
1.3 How should one use this compendium?	20
1.4 Case selection.....	21
2. A Compendium of Cases.....	22
2.1 Getting people to use waste services	23
2.1.1 Increase willingness to pay for services	24
<i>Tonga</i>	25
<i>India</i>	34
<i>Nepal</i>	41
<i>Tanzania</i>	47
2.1.2 Empower people to improve accountability.....	54
<i>Mali</i>	55
<i>Morocco</i>	63
<i>India</i>	71
<i>Jamaica</i>	77
<i>Pakistan</i>	82
2.2 Getting people to be more sustainable with their waste disposal	87
2.2.1 Decrease littering (cigarette butts).....	88
<i>Australia</i>	89
2.2.2 Increase reusing and recycling	96

<i>Argentina</i>	97
<i>Brazil</i>	102
<i>England</i>	107
<i>Hong Kong SAR, China</i>	112
<i>Indonesia</i>	118
<i>Israel</i>	126
<i>Nepal</i>	132
<i>Republic of Korea</i>	137
<i>Solomon Islands</i>	143
2.2.3 Increase segregation of organic and other waste	148
<i>Romania</i>	149
<i>Indonesia</i>	157
<i>Colombia</i>	167
<i>Canada</i>	175
<i>China</i>	179
<i>India</i>	185
<i>Thailand</i>	189
2.3 Getting people to generate less waste	194
2.3.1 Change consumption and production behaviors	195
<i>Ireland</i>	196
<i>Philippines</i>	202
<i>Rwanda</i>	210
<i>United Kingdom</i>	215
3. Discussion	222
4. Recommendations	233
5. Glossary	241

Acknowledgments

This report was prepared by a team under the leadership of Kremena Ionkova and Ailin Tomio, with important contributions from Emma De Roy, Sonakshi Yadav, Silpa Kaza, Jonathan George Karver, and Renos Vakis.

Country case studies were developed by and with the valuable contribution of Dhundi Raj Pathak, Ankush Sharma, Bima Wicaksono, Eduardi Prahara, Zijing Niu, Nikola Doychinov, Mahamadou Sacko, Patrick Mathias, Khalid Muhammad, David Lerpiniere, Jorge Luis Castaneda Nunez, Perinaz Bhada Tata, Thierry Martin, Yoon Ju Heo, Darci Campani, Rejane Costa De Oliveira Paredes, Zakarya Baicha, Faafetai Sagapolutele, Ibrahim Ali Khan, Charis Lypiridis, Emanuela Monteiro, Patricia Gomes de Araújo Pereira, Maria Antonia N. Tanchuling, Benedict Requejo, and Ali Abedini.

The team thanks the following officials, academics, and experts for their valuable contributions toward developing this publication: Béla Horváth, Mayor of Sălacea, Romania; Mina Kumari Lama, Mayor of Hetauda SMC, Nepal; Mahendra Prasad Paudyal, Acting Chief Administrative Officer, Bharatpur MPC, Nepal; Anaseini Manuopangai, Acting Director, Ministry of Tourism of Tonga; Omar Sweeney, Managing Director, Jamaica Social Investment Fund, Jamaica; Vaine Kombe, Head of Environment and Sanitation Department, Moshi Municipal Council, Tanzania; Bhim Prasad Timalsina, Head, Social Development Section, Hetauda SMC, Nepal; Oro Coria Lucas, Director- Environmental Management Department, Trelew, Argentina; Adam Schalimtzek, Head of International Relations Division, Israel Ministry of Environmental Protection, Israel; Harshad Barde, CEO, SWaCH Cooperative, Pune, India; Sifaeli Tuluwene Kulanga, Acting Municipal Director, Moshi Municipal Council, Tanzania; Saskia Restorick, Director, Hubbub United Kingdom; Panate Manomaivibool, Assistant Professor, Head of the Circular Economy for Waste-Free Thailand (CEWT) Research Center, the School of Science, Mae Fah Luang University, Chiang Rai, Thailand; Rupert Saville, Head, New South Wales Environment Protection Authority Litter Prevention Unit, Australia; Ganesh Kumar Shrestha, Founding

President and Initiator of Suiro program, Nawa Jeewan Jyoti Club, Hetauda SMC, Nepal; Wawan Some, Head of Zero Waste Community, Surabaya, Indonesia; S. E. Yasmin, Head of Lohjinawi, an environmental NGO based in Surabaya, Indonesia; Melik Masfiatin, Deputy Head of Wehasta, an environmental NGO based in Surabaya, Indonesia; Karen Tindall, Principal Advisor, Behavioural Insights Team, Sydney, Australia; Czarina Constantino-Panopio—National Lead of No Plastics in Nature Initiative, WWF Philippines; Pásztai Zoltán, General Manager, ECO Bihor, Romania; Edson Carr, Project and Planning Manager, NSWMA Jamaica; Brendan Twine, Operations Manager, Mindarie Regional Council, Australia; Januka K. C., Section Head, Sanitation and SWM Section, Bharatpur MPC, Nepal; Dhurba Bhujel, Former Head of Environmental and Social Development Section, Hetauda SMC, Nepal; Bud Fraser, Senior Planning and Sustainability Engineer, Sustainability and Engineering Campus and Community Planning, The University of British Columbia, Canada; Laxmi Pd. Bhandari, Senior Divisional Engineer, Bharatpur MPC, Nepal; Milton Clarke, Environmental Specialist, Jamaica Social Investment Fund, Jamaica; Ashok Shahi, Team Leader, Project Management Team, Global Partnership for Output-Based Aid project, Nepal; Phillip Morgan, Investigator, NSWMA, Jamaica; Meleoni Vakapuna, Tourist Officer, Beautification Unit, Destination Development Division—Ministry of Tourism, Kingdom of Tonga; Narayan B. C., Fund Manager Specialist, Town Development Fund, Nepal; Saima Shafique, WASH Consultant, Pakistan Ministry of Climate Change; Helen White, Special Advisor—Household Food Waste Prevention, WRAP, United Kingdom; Er. Chanda Khadka, Environmental Engineer, Disaster Management, SWM and Environment Section, Hetauda SMC, Nepal; Mallaye Sidibe, Manager, Ville Propre Economic Interest Group, Bamako, Mali; Alassane Diakite, Manager, GASE-Mali Economic Interest Group, Bamako, Mali; Moussa Diarra, Manager Siguida Kanu Economic Interest Group, Bamako, Mali; Yam Lal Kandel, Ward Chairperson, Bharatpur MPC, Nepal; Dilli Ram Sapkota, Chairperson, Suiro program, Bharatpur MPC, Nepal; Laxmi Sapkota, Chairperson, Milan Sachetana Mahila Samuha, Bharatpur MPC, Nepal; Rajendra Timlsena, Chairperson, Gyan Darshan

TLO and Sirjanshil Aama Samuha, Bharatpur MPC, Nepal; Khem Raj Baral, Founding Chairperson, Gyan Darshan TLO and Sirjanshil Aama Samuha, Bharatpur MPC, Nepal; Oscar Nicolás Echeverry, Profesional Universitario Aseo Empresa de Servicios Públicos de Cajicá S.A. E.S.P. Sanitary Collection Enterprise, Cajicá Colombia; Eliane Chiuratto, Cleaning Manager, Curitiba Municipal Department of the Environment, Brazil; Saha Dev Khadka, Supervisor, Private Waste Service Provider, Hetauda SMC, Nepal; Chris Chung, Project Officer, New South Wales Environment Protection Authority Litter Prevention Unit, Australia; Martinez Elgorriaga Luciana, Environmental Education Subprogram- Environmental Management Department, Trelew Argentina; Davies Sandra, Technical Team- Environmental Management Department, Trelew Argentina; Deepak Ghimire, Sanitation Supervisor, Hetauda SMC, Nepal; Tevita Toli, Vavau Branch Manager, Waste Authority Ltd, Kingdom of Tonga; Lola Liavaa, Administration Manager, Waste Authority Ltd, Kingdom of Tonga; Stalini Naufahu, IT & Projects Manager, Waste Authority Ltd, Kingdom of Tonga; Upendra Khanal, Global Partnership for Output-Based Aid Project Coordinator, Environment Section, Dhankuta Municipality, Nepal; Pradeep Amatya, Global Partnership for Output-Based Aid Project Coordinator, Environment Section, Lalitpur Metropolitan City, Nepal; Dipendra Bdr. Oli, Project Coordinator, Global Partnership for Output-Based Aid Project, Solid Waste Management Technical Support Center, Nepal; Agustinus—Subdivision for Pollution Control, Surabaya Municipal Environmental Agency, Indonesia; David Kimario, Environmental Officer, Moshi Municipal Council, Tanzania; Hidaya Mwamtemi, Ward Executive Officer—Bondeni Ward, Moshi Tanzania; Paulo Chageme, Health Officer, Bondeni Ward, Moshi Tanzania; Asri Hardini—Environmental Cadre Regional

Coordinator for East Surabaya, Indonesia; Tarak Bdr K. C., Former Chairperson, Gyan Darshan TLO and Sirjanshil Aama Samuha, Bharatpur MPC, Nepal; Ram Maya Shrestha, Community Outreach Officer, Recycler Sathi, Creasion, Bharatpur MPC, Nepal; Ika Yudha Kurniasari, Founder of Bank Sampah Resik Becik, Indonesia; Joseph Vicent Kimaro, Collection Point Site Supervisor—Manyema and Mbuyuni Markets, Moshi Tanzania; Members, Milan Sachetana Mahila Samuha, Bharatpur MPC, Nepal; Members, Gyan Darshan TLO and Sirjanshil Aama Samuha, Bharatpur MPC, Nepal; Jayashree Rajbhandary, Program Associate, Global Partnership for Output-Based Aid Project, Lalitpur MPC, Nepal; Chiranjibi Yadav, Community Outreach Intern, Recycler Sathi, Creasion, Bharatpur MPC, Nepal; Pratik Bajracharya, Community Outreach Intern, Recycler Sathi, Creasion, Kathmandu, Nepal; and Sujata Koirala, Community Outreach Intern, Recycler Sathi, Creasion, Kathmandu, Nepal.

Funding for this publication was provided by PROBLUE, an umbrella multi-donor trust fund, housed at the World Bank, that supports the sustainable and integrated development of marine and coastal resources in healthy oceans.

Peer reviewers provided critical expert comments. The team is grateful to Frank van Woerden, Marcus Lee, and Tasmia Rahman for their valuable guidance.

This publication was developed under the general guidance of Bernice K. Van Bronkhorst, Global Director of the Urban, Land and Resilience Global Practice, and Luis-Felipe Lopez-Calva, Global Director of the Poverty and Equity Global Practice.

Abbreviations

3R	Reuse, Reduce, and Recycle
ASEAN ESC	Association of Southeast Asian Nations Environmental Sustainable Cities
CBO	Community-Based Organization
CCBPI	Coca-Cola Beverages Philippines
CEO	Chief Executive Officer
CEWT	Circular Economy for Waste-Free Thailand
CGPM	Clean Green Pakistan Movement
CGS	Community Green Station
CRC	Citizens Report Card
CRED	Community Recycling and Economic Development
CRZW	Chiang Rai Zero Waste
DANE	National Administrative Department of Statistics
DRS	Deposit Refund Scheme
ELA	Collection for the Environment Recycling Corporation
EM	Effective Microorganism
EPA	Environmental Protection Authority
EPC	Sanitary Collection Enterprise (Empresas Públicas de Cajicá)
EPD	Environmental Protection Department
EPR	Extended Producer Responsibility
EU	European Union
FMCG	Fast-Moving Consumer Good
GAIA	Global Alliance for Incinerator Alternatives
GCP	Green Containers Program
GHG	Greenhouse Gas
GIE	Groupement d'Intérêt Economique
GPOBA	Global Partnership for Output-Based Aid
GREEN\$ ePIS	GREEN\$ Electronic Participation Incentive Scheme

IDIS	Interfacing Development Interventions for Sustainability
IEC	Information, Education, and Communication
IOC	Intergovernmental Oceanographic Commission
ISWA	International Solid Waste Association
IVL	Indorama Ventures
KITA	Kitakyushu International Techno-cooperative Association
KKPKP	Kagad Kach Patra Kashtakari Panchayat
LGBTQ2S+	Lesbian, Gay, Bisexual, Transgender, Queer and Questioning, and Two Spirit
LIC	Low-Income Country
LMIC	Lower-Middle-Income Country
MCC	Micro-Composting Center
MEF	Mother Earth Foundation
MoHUA	Ministry of Housing and Urban Affairs
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
NGO	Nongovernmental Organization
NIMBY	Not in My Backyard
NSW	New South Wales
NSWMA	National Solid Waste Management Authority
OECD	Organisation for Economic Co-operation and Development
PAYT	Pay-As-You-Throw
PGIRS	Solid Waste Management Plan (Plan de Gestión Integral de Residuos Sólidos)
PMC	Pune Municipal Corporation
PNDM	National Municipal Solid Waste Management Program (Programme National des Déchets Ménagers)
RDF	Refuse-Derived Fuel
RFID	Radio-Frequency Identification
SAR	Special Administrative Region

SEC	Socio-Economic Class
SGC	Surabaya Green and Clean
SHG	Self-Help Group
SIMBA	Waste Bank Management Information System (Sistem Informasi Manajemen Bank Sampah)
SIREDD	Regional Information System for the Environment and Sustainable Development (Système d'Information Régional de l'Environnement et du Développement Durable)
SUP	Single-Use Plastic
SWaCH	Solid Waste Collection Handling
SWM	Solid Waste Management
SWMTSC	Solid Waste Management Technical Support Centre
TDF	Town Development Fund
THAW	Take Home Action on Waste

TLO	Tole Lane Organization
TPL	Tonga Power Ltd
TWB	Tonga Water Board
ULB	Urban Local Body
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VAT	Value Added Tax
VBWF	Volume-Based Waste Fee
WABAs	Waste Assessments and Brand Audits
WAL	Waste Authority Ltd
WFD	Waste Framework Directive
WRAP	Waste and Resources Action Programme

List of Figures

Figure 1	Waste hierarchy	10
Figure 2	The circular economy with respect to waste management	10
Figure 3	Factors that influence decision-making.....	16
Figure 4	Flyer designed by Moroccan government as part of the communication and outreach plan for PNDM.	66
Figure 5	Handover of a compactor truck to NSWMA	78
Figure 6	Capture from the CGPM website	84
Figure 7	A Ballot Bin in London to collect cigarette butts	91
Figure 8	Schematic of the NSW EPA's Cigarette Butt Litter Prevention strategy.....	92
Figure 9	The NSW EPA's Waste and Sustainable Materials Strategy, which informs the Cigarette Butt Litter Prevention Program.....	93
Figure 10	Sai Kung Town Recycling Store promoting the GREEN\$ ePIS by providing double rewards upon deposit of certain recyclable products.....	115
Figure 11	Workers weighing deposited waste at a waste bank.....	119
Figure 12	Members of Milan Sachetana women's group of Ward No. 9, Bharatpur making handicrafts (upcycling) from used plastics	134
Figure 13	Waste disposal kits provided to residents.....	151
Figure 14	Communities are considered protagonists of Cajicá's environmental campaigns.....	169
Figure 15	Easy guides for source segregation of organic waste and use of bokashi	169
Figure 16	MCC, Kumbakonam.....	186
Figure 17	Levies collected through the scheme (2003–2019).....	198
Figure 18	Posters used during the 2023 Food Waste Action Week campaign.....	217
Figure 19	Map detailing countries from which the 30 case studies were sourced.....	223
Figure 20	Behavior change process, as outlined by the World Bank's Mind, Behavior, and Development Unit	236

List of Tables

Table 1	Financial impact of waste management campaigns.....	13
Table 2	Contextual mechanisms	18
Table 3	Municipal-level SWM progress after the results-based payment scheme.....	45
Table 4	Examples of cases with low and medium to high costs	225

List of Boxes

Box 1	Suggested publications on SWM	11
Box 2	Primary environmental indicators published by observatories	65
Box 3	Behavioral tools used in the 'Getting people to use waste services' category	228
Box 4	Behavioral tools used in the 'Getting people to be more sustainable with their waste disposal' category	229
Box 5	Behavioral tools used in the 'Getting people to generate less waste' category	231
Box 6	A checklist for practitioners to use before applying behavioral insights	238

12345

Introduction and Reader's Guide

1.1 A word on solid waste management¹

Municipal solid waste (MSW), defined to include residential, commercial, and institutional waste,² has increased over time and is projected to continue to grow. By 2050, in a business-as-usual scenario, the world is projected to generate 73 percent more MSW than in 2020. The increase will be driven by economic development, urbanization, and population growth. Given the rapid increase in quantities, significant global advances in waste management practices will be required to bring tangible improvements over the status quo.

High-income countries produce the most waste per capita, where rising incomes and consumption have been associated with higher waste generation. Going forward, waste generation rates in most high-income countries are expected to either remain stable or slightly increase. Middle-income countries, conversely, are projected to see the largest increase in both per capita waste generation and total waste generation. This waste generation will be driven by high levels of growth in both economic activity and population. Urbanization will additionally contribute to this process as higher urban consumption patterns replace rural ones. Waste volumes are projected to grow by more than 2.5 times for low-income countries (LICs) and nearly double for middle-income countries.

Impacts and opportunities

Waste management varies widely among countries and between urban and rural areas. Collection rates are substantially higher in urban areas than in rural areas as waste management has traditionally been an urban service. In lower-middle-income countries (LMICs), waste collection rates in cities are more than double those in rural areas. In high-income countries, collection rates are close to 100 percent. However,

in low-income and lower-middle-income countries, collection rates are 39 and 51 percent, respectively. Uncollected waste in LICs is typically managed independently by households and is openly dumped, burned, or—less commonly—composted. Globally, 33 percent of waste is openly dumped.

Individuals in developing country contexts are disproportionately affected by the repercussions of the growing waste burden. Poor waste management practices have large environmental impacts and pose direct risks to human health. Waste burning is a significant source of air pollution and emits fine particles dangerous to human health. Littering and waste disposal through open dumping can lead to soil contamination and pollution of rivers, lakes, and underground water and of human living environments. Waste discarded into drainage systems leads to blockages, creating risks of flooding and breeding grounds for disease. Significant risk is associated with landslides and fires at landfills and larger dumpsites. Dumpsites and landfills occupy valuable agricultural land and locating new sites for treatment and disposal facilities becomes increasingly difficult with growing levels of urbanization. Scattered dumping also drives market and real estate values downward and negatively affects tourism and local economic development.

Beyond significant local impacts, inadequately managed MSW is a major source of marine litter and contributes to greenhouse gases (GHGs). Marine pollution and GHG emissions from the uncontrolled burning and disposal of municipal waste are now increasingly seen as major intruders on global public goods.³ Over 80 percent of ocean plastics comes from unmanaged or poorly managed MSW on land.⁴ Additionally, solid waste contributed an estimated 1.6 billion tons of CO₂e of GHG emissions in 2016; about 5 percent of global emissions; and approximately 20 percent of global, human-related, methane emissions.⁵

Improved waste management practices provide significant benefits for community health, the environment, tourism, and land values. For instance, enhanced services and circular economy processes bring an increase in jobs and better waste management improves adaptation outcomes. Curbing methane emissions from waste offers an opportunity to slow global warming. Reducing leakage of plastics to world oceans is another international priority and part of the agenda to preserve the health of marine ecosystems.

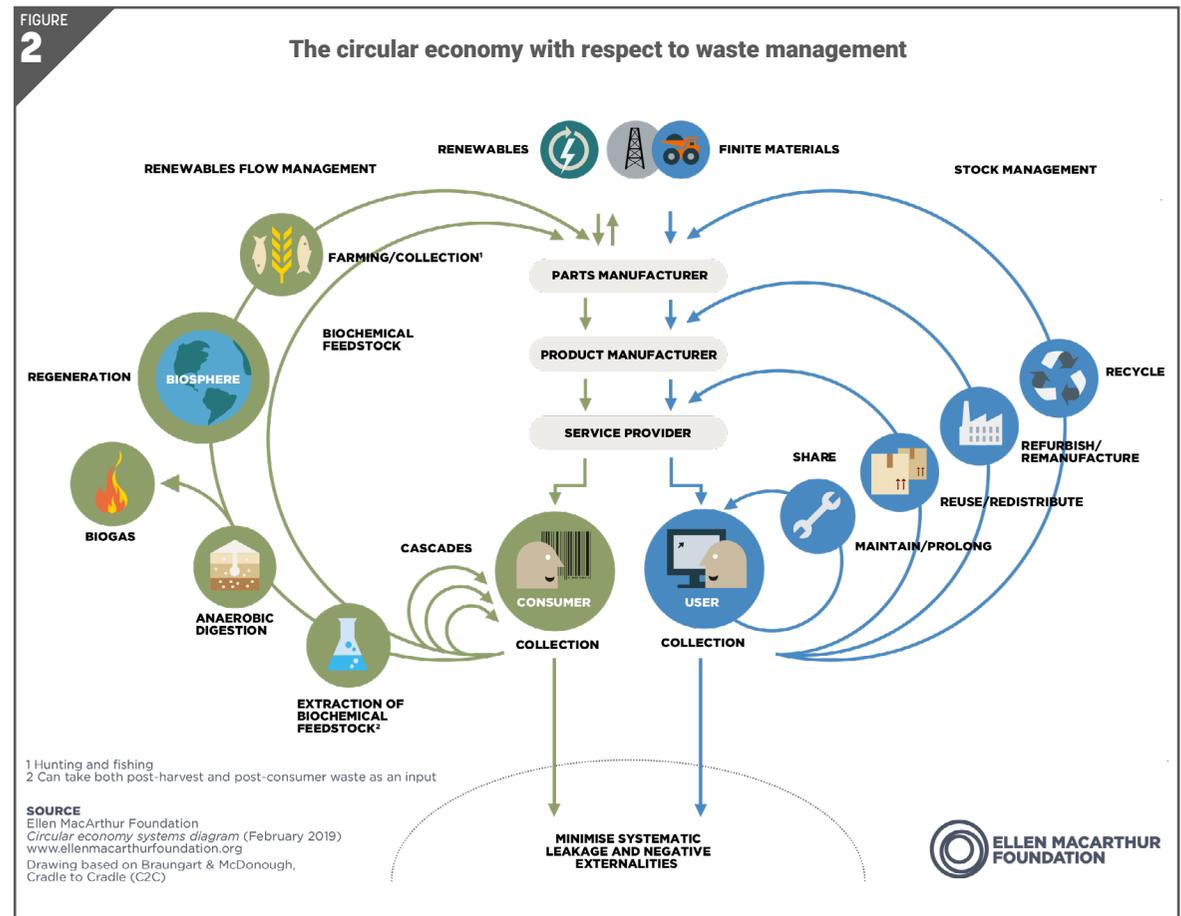
As cities and countries grow rapidly, governments need to develop systems to manage their burgeoning waste volumes. This requires integrated waste management systems across levels of government, clearly assigned institutional responsibilities, adequate policies and economic incentives and financing, capacities for service provision, and proactive inclusion of stakeholders including the informal sector. The recent move toward a circular economy and corresponding initiatives toward resource efficiency and utilization signals willingness to shift toward waste prevention, minimization, and circularity. If a new social contract on consumption patterns and waste generation is accomplished and is endorsed and supported by economic players, industries, and manufacturers, waste generation rates may slow down. However, even with appropriate infrastructure, institutions, regulations, and financing, changes in the environment will not materialize without meaningful changes in how people generate and dispose of waste. Social, psychological, and cognitive elements of human behavior can stall these changes.

Key principles and policy frameworks

To harness these opportunities, waste management should be integrated across all levels of government. The governance framework for the sector should clearly articulate institutional responsibilities; include adequate policies and financing; and proactively include community, public, and private stakeholders.

Among the various principles in waste management (for example, polluter pays, affordability, proximity), the *waste hierarchy* principle is the most commonly adopted. This concept places environmentally sound waste disposal at its base, with the preferred options of waste recycling, reuse, minimization, and avoidance above it (see Figure 1). The *circular economy* concept builds upon the hierarchy and highlights business opportunities with circular loops rather than linear processes. It aims to maintain the value of products and materials for as long as possible (see Figure 2).

There is strong historical evidence that countries that have moved up the 'hierarchy' have done so over several decades. Countries in the upper echelons of the 'hierarchy' that are transitioning toward a circular economy—such as countries of the European Union (EU) and others—have introduced a comprehensive set of regulations and economic instruments. These instruments stimulate policies underpinned by, among others, (a) elevated waste tariffs that cover the costs of treatment, (b) significant stakeholder participation and compliance, and (c) strict enforcement. As a result of such efforts, the treatment mix in these countries has evolved over time: recycling and composting have been increasing while landfilling has been decreasing. Importantly, for this compendium, the behavior of the various waste actors in these countries has also changed sustainably. It spans waste generators willing to separate their waste and abstain from littering, waste operators willing to invest in separate equipment, product designers and manufacturers willing to apply eco-designs and/or recycled materials, the population at large exercising its 'vote' through more sustainable consumption pattern where reuse, repair, and repurpose are being exercised.



Stakeholder participation and 'social contracts'

The waste management process involves a complex system with numerous stakeholders including businesses, governments, households, community organizations, and waste pickers. This intricate network involves a myriad of behaviors. Actors across the waste management spectrum make countless decisions each day with

respect to how, when, where, and to what degree they consume, dispose of, collect, and reuse products. This includes the quantity of food purchased; the amount of single-use plastics (SUPs) consumed; whether and how individuals recycle, reuse, or compost waste; and how municipal actors handle waste volumes. As governments and practitioners introduce waste-related policies, regulations, and systems, how individuals interact with the system will change as well.

Each participant engages with the waste management system in a unique way and experiences different impacts from its design. While some stakeholders simply seek dependable waste collection services in their neighborhood, others may depend on the waste management sector for their livelihoods and employment. The waste management system can be both a source of convenience and empowerment and a source of marginalization. The success of waste management depends on stakeholder participation and the presence of a social contract with citizens. Waste management systems are much more successful in contexts in which core stakeholders engage in and support waste policies and services. To be successful, waste management initiatives require buy-in from waste generators, especially when it comes to source separation, infrastructure location, and changing of ingrained consumption behaviors. Stakeholder engagement requires not only adequate knowledge of processes and environmental impacts but also a positive perception of the waste management system as a whole.

To excel, a local system needs to foster positive behaviors and help local governments build a more equal and sustainable public service. By ensuring that the waste management system serves all stakeholders, local governments may nurture a widespread sense of 'ownership' of the waste management system that leads to positive social, environmental, and economic outcomes. The stakeholder engagement in waste management is multifaceted. It seeks to inform users of systems and processes, empower people and waste actors, obtain feedback, foster a sense of belonging among residents, change their behaviors, and instill initiative and exercise leadership.

Solid waste management (SWM) is a critical aspect of planning sustainable and healthy cities (see Box 1). Behavioral science can offer useful tools to improve the functioning of relevant policies, programs, and initiatives, as discussed below.

BOX

1

Suggested publications on SWM



Additional reading

Further readings related to governance aspects of the SWM sector, global trends, technology and infrastructure, links between waste management and global public goods, and considerations for reforms are available in companion publications from the World Bank, which include the following:

- [Clean and low-carbon cities: the relationship between the solid waste management sector and greenhouse gases \(2022\)](#)
- [Bridging the Gap in Solid Waste Management: Governance Requirements for Results \(2021\)](#)
- [More Growth Less Garbage \(2021\)](#)
- [Management of Municipal Solid Waste: Approaches and Practices within the World Bank \(2020\)](#)
- [What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050 \(2018\)](#)
- [Decision Maker's Guides for Solid Waste Management Technologies \(2018\)](#)
- [Municipal Solid Waste Management: A Roadmap for Reform for Policy Makers \(2018\)](#)
- [Financing Landfill Gas Projects in Developing Countries \(2016\)](#)
- [Sustainable Financing and Policy Models for Municipal Composting \(2016\)](#)

1.2 Behaviorally informed policy and solid waste management

Behavioral science combines knowledge from several disciplines—including psychology, economics, sociology, and anthropology—to understand how people make decisions. Policy makers can improve the design and implementation of initiatives by incorporating a deeper understanding of behavior change into intervention frameworks.

Policy makers' toolkits have traditionally drawn on a 'rational' interpretation of human behavior. This perspective focuses on the role of deliberative decision-making, suggesting that people evaluate costs and benefits according to their personal values and preferences for maximizing self-interest.⁶ Traditional policies appeal to an individual's understanding that 'good' behaviors are more convenient than 'bad' ones. Such policies disproportionately rely on information provision, assuming that knowledge alone is sufficient for behavior change. However, human decision-making is imperfect and influenced by biases, emotions, and institutional and group contexts. This affects decision-making, behaviors, and consequently public service delivery outcomes.

What is meant by waste management behaviors?

Sustainable waste management interventions are predicated on lasting behavior change. These behavior changes may involve shifts in waste generation (for example, consumption and production patterns), waste sorting (for example, source segregation and reusing), waste treatment and disposal (for example, recycling), or engagement with the waste system (for example, willingness to pay for waste services). Despite their intentions, numerous barriers may impede individuals from adopting

more sustainable waste-related behaviors. These include ingrained habits, insufficient knowledge of solutions,⁷ inconvenience,⁸ and time burdens. Similarly, structural barriers, such as inadequate infrastructure, a lack of facilities, or high costs,⁹ can also undermine proper SWM behaviors.

Behavioral scientists have investigated how different factors affect decision-making. Behavioral tools ranging from low-cost procedural changes to broader, more structural, policy strategies arise from that work. Although some are new to the public policy sphere, many have been used alongside traditional policies for years. In the context of SWM, behavioral tools can make it easier for residents to avert food waste (for example, through different package labeling); improve SWM service delivery (for example, by allowing residents to provide feedback); and increase rates of source segregation (for example, by charging households lower SWM fees if they participate), among other applications.

Several studies have investigated waste-related behaviors to better understand the main factors that drive sustainable decision-making. For example, scientists in Scotland and Northern England examined the impact of social norms on recycling behaviors. They found that neighbor participation in recycling activities (setting

out a recycling box) increased household participation.¹⁰ Another study found that high attachment to the neighborhood, community spirit, and peer pressure between households contributed to higher participation rates.¹¹ In terms of reduction behaviors, researchers found that switching a university's default option to double-sided printing reduced paper consumption.¹² Finally, with respect to reducing littering behavior, researchers found that providing feedback on littering rates decreased the practice.¹³ Most of these studies come from high-income countries or small-scale interventions that have not been replicated in developing countries. To provide a holistic account of waste-related interventions, the compendium has included only a few studies of this type. Further, the authors have selected small-scale interventions or those from high-income countries with highly transferrable elements. Insights from these studies provide a helpful backdrop from which future efforts in resource-constrained environments can learn.

Given the high costs of waste management services, government officials may hesitate to allocate funding to behavior change initiatives. However, adequate funding is central to plan, design, test, roll out, evaluate, and adjust successful initiatives. Public agencies should provision such funding in budgets and view it as an integral component of waste management systems (see Table 1). Similarly, the capacity of administrations to design and develop behavior change programs should be an area of focus. Professional expertise and the involvement of practitioners along with behavior change scientists will be determinants of success. This is especially relevant if the ambition is to transition up the waste hierarchy and progressively implement more challenging practices toward waste minimization and changed consumption patterns.

Much of the needed behavior change will be driven by policy and regulation, including policies promoting landfill diversion (for example, landfill taxes or landfilling quotas), recycling and recovery (for example, dedicated targets, standards for recycled material, eco-design requirements), waste prevention and minimization (for example, green procurement, product taxes, and product bans), and voluntary schemes and philanthropic efforts around social responsibility and environmental action. However, relevant literature has shown that when traditional tools are accompanied

by behavioral tools, uptake of public policies can be improved. In addition, some of these traditional policy instruments may not be appropriate to local contexts where widespread dumping and burning of waste are still high. In such environments, a well-functioning system of waste collection and controlled disposal needs to be in place as a foundation for other policies such as landfill taxes or extended producer responsibility (EPR). In such environments where it may be early to apply advanced policy instruments, socially driven behavior change becomes especially relevant.

TABLE 1

Financial impact of waste management campaigns¹⁴

Campaign That...	Results in financial impact through
Encourages people to recycle more and recycle correctly	Increased volume of material capture leading to higher income from the sale of those materials Increased material quality and purity that increases the value of materials recovered Savings from avoided disposal costs, where financial disposal is costly
Motivates people not to dump waste illegally or drop litter	Reduced municipal operating costs Reduced healthcare costs through fewer dumpsites and healthier living conditions Beautification leading to increased tourism and inward investment Preserves real estate and land market values
Wins buy-in for new waste treatment facilities and infrastructure	Fluid and timely delivery of infrastructure, unhindered by protests and public resistance
Reduces the amount of waste that people generate	Reduced waste management operations and disposal costs Reduced utilization of land for waste
Builds trust between the public and the private sector	Higher and more consistent user fee payments Enhanced public participation in planning efforts
Encourages citizen feedback	Early resolution of overflowing containers, litter, and improper dumpsites Efficient and acceptable services designs that encourage participation and payment

This compendium sheds light on how behavioral tools have implicitly or explicitly guided a subset of SWM interventions to implement policies or steer policy outcomes. The compendium includes case studies that target behavior change across different segments of the waste management system, from households to operators and public and private sector actors.

How were cases selected?

A thorough analytic process was followed to select the cases. First, a broad survey of existing literature and interviews with practitioners working across geographic regions¹⁵ was carried out, resulting in a list of more than 60 potential cases. Second, the authors narrowed the search guided by the following criteria: (a) cases should represent countries of all income levels and geographies, with a focus on developing (low- and middle-income) economies; (b) cases should focus on comprehensive public policy initiatives rather than small-scale experiments; and (c) cases must have been implemented and have demonstrated positive results. In constraining this review to cases with positive results, practitioners can gain a sense of where, how, and for whom certain approaches have been successful.

In the third round, the authors prioritized the most relevant cases and sorted them into two groups: (a) deeper-dive cases where the authors delved more thoroughly into the

intervention, behavioral tools, and preconditions and challenges and (b) briefs, cases where the authors summarized the intervention, main findings, and behavioral tools. The authors retrieved information about each case through a thorough desk review of online materials and discussions with sector practitioners. The authors validated and expanded the preliminary findings with local experts. This included visits to most of the featured countries and cities as well as interviews with local stakeholders (for example, public officials, private service providers, development partners, local think tanks, behavioral scientists, representatives of nongovernmental organizations [NGOs], and informal sector associations active in waste management). A full list of consulted officials and stakeholders is included in the Acknowledgments section. Given the parameters for case selection, the authors analyzed each case study through a behavioral science lens, uncovering and highlighting where behavioral tools were applied. The analysis did not span the entire waste flow chain but focused on the segment where the intervention was made. This means that in some cases improved waste management practice was achieved (for example, an increase in waste segregation or reduction in littering) while the residual waste continued to be disposed of in an environmentally unsafe manner (for example, in unsanitary disposal sites). While all cases include behavioral aspects, the majority did not intentionally apply behavioral tools or adopt a behavioral science perspective. Further, most cases did not use impact evaluations to assess policy outcomes.

While the case studies cover a variety of approaches and results achieved worldwide, they are not meant to be directly emulated as best or recommended practices but rather to provide illustrative examples that can inform locally driven design.

It should also be emphasized that some of the case studies captured in this document showed positive results but had limited impact at scale, over time, or with respect to sectorwide change. Additionally, some interventions were difficult to sustain due to an insufficient enabling environment, lack of or insufficient financing, or declining support from local officials and agencies. Similarly, some of the interventions were developed and implemented by nongovernmental actors, the sustainability of which was difficult once the program or initiative was discontinued.

This document presents 30 cases from different countries and regions. Fourteen cases correspond to low- and lower-middle-income countries, seven cases to upper-middle-income countries, and nine cases to high-income countries. These cases cover the regions of Europe and Central Asia (four cases), East Asia and Pacific (ten cases), South Asia (six cases), Sub-Saharan Africa (three cases), Middle East and North Africa (two cases), North America (one case), and Latin America and Caribbean (four cases). The authors developed deeper-dive cases for Mali, Morocco, Colombia, Indonesia, India, Romania, and Tonga—specifically, one case per geographic region as well as for Oceania. These cases included one LIC, three LMICs, two upper-middle-income countries, and one high-income country.

This is the first publication trying to capture global examples of SWM in one location, using a behavioral lens. Some data limitations were present due to the longevity of interventions and cases covered, many of which were in developing or emerging economies and resource-constrained circumstances. Nonetheless, the compendium is extensive with respect to the availability of data and comprehensive storyline of events.

Case studies are presented chronologically. They include the following sections:

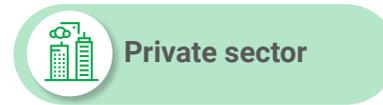
- **Case summary:** Brief description of the intervention and relevant outcomes.
- **Challenge statement:** Relevant SWM policy challenge pre-intervention.
- **Context and description of challenges:** The SWM situation and relevant government action before the intervention, with reference to behavior change. It should be noted that since some of the cases developed and evolved over many

years, the base year may be well in the past. To acknowledge the baseline situation, population numbers are provided before the intervention. The recent or current population size is provided in the endnotes, as applicable.

- **Decisions and actions:** Relevant stakeholder and/or government actions to improve the SWM situation in response to challenges identified in the 'Context and description of challenges' section.
- **Reference case study:** This section is present in eight case studies. It includes a summary of one or more interventions that complement that described in the embedded case study.
- **The design:** Outline of the intervention and highlights of its behavioral components.
- **What behavioral tools are present in this initiative?** Behavioral tools used across the relevant categories, namely social and motivational, financial, and system design mechanisms. Briefs contain descriptions of prominent behavioral tools used. Deeper-dive cases contain descriptions of all behavioral tools used.
- **Preconditions and challenges:** This section is included only in the deeper-dive case studies. It outlines factors that created an enabling environment for the intervention and facilitated its success. It also highlights issues that stakeholders faced during the intervention's implementation.
- **Results:** The intervention outcomes and impact. As applicable, it may include the most recent state of the SWM system.
- **Complementary actions to consider:** Suggestions practitioners could consider if they develop analogous interventions.
- **Want to know more?** Links to the intervention or governing authority, should readers wish to gain additional information.

The cases are presented through a behavioral science lens. They capture specific actions and approaches that influenced stakeholder behavior and brought improvements to a specific segment of the waste management chain. For example, if a case improved proper waste disposal, the case describes the activities and relevant results within the disposal aspect of the waste flow chain; it does not trace the waste to its intermediary or final treatment and disposal sites nor does it describe the overall waste sector system in terms of technical, environmental, social, financial, policy, or institutional system setup and practice.

Each case study includes an icon to denote the primary stakeholder group targeted, although cases may target multiple stakeholders in practice. Stakeholder groups correspond to the following categories and icons:



Cases targeted these stakeholders to modify how waste was generated and/or managed, the design and/or delivery of SWM services, and how stakeholders interacted with the SWM system.

The behavioral framework used

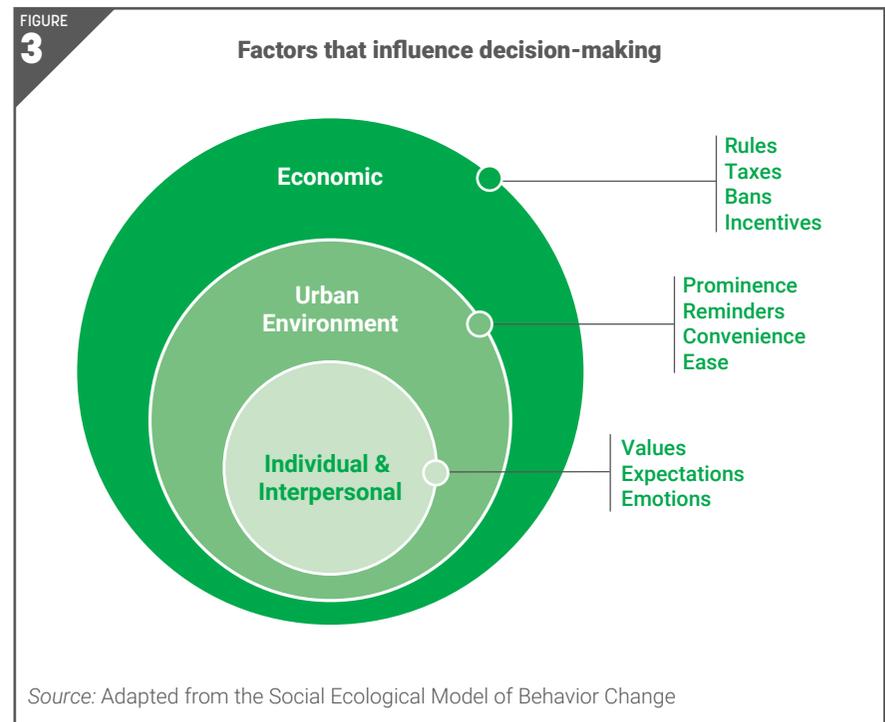
Actors rarely behave purely rationally as traditional economic models assume nor do they make decisions in isolation. Multiple factors influence the decision-making process that underpins pro-environmental behavior.¹⁶ Individual and collective waste-related behaviors are influenced by the economic, environmental, and (inter) personal contexts in which they occur (Figure 3).^{17,18} These contexts—which often interact—can affect the extent to which individuals engage with and participate in waste management systems.¹⁹

In the **economic** context, legal instruments, such as plastic bans and taxes, encourage proper actions and discourage sanctioned ones. These tools are often included in policy makers' traditional toolkits. Economic instruments play an important role in both pre- and post-consumer ends of the waste cycle. However, without complementary measures, they can be insufficient to drive sustained behavior change in waste management.

In the **urban environment** sphere, contextual factors such as the location of waste infrastructure and the design of goods and services guide us to act in certain ways. The physical environment can be particularly helpful to change habits—such as waste disposal—which become reflexive behaviors once established.²⁰ The perceived

convenience of waste disposal, for instance, affects whether households participate in waste programs.²¹

The **(inter)personal** context considers the myriad factors that affect individual behaviors and decision-making, including cognitive biases,²² personal norms,²³ and



motivations.²⁴ In tandem, the influence of our leaders and our society's defining norms also affect how individuals make decisions.²⁵ One of the most influential elements is how groups behave and the people individuals admire behave. Exposure to the decisions of individuals can influence other's behavior, such as one's willingness to recycle.²⁶

By the same token, practitioners can influence waste-related behaviors by making modifications to the aforementioned contexts. The compendium draws on the dominant contexts in which decision-making occurs (economic, urban environment, and [inter]personal) to group behavioral tools. This makes it easy to apply behavioral tools within programs. These contexts translate into the following mechanisms:

- (a) **Financial mechanisms** influence economic contexts. Behavioral tools in this category create extrinsic motivations for behavior change. Positive, negative, or randomly assigned incentives each have different influences on behavior. The authors acknowledge the rich discussion among behavioral scientists regarding paternalism and consciously chose to include tools within this category that influenced but did not mandate behaviors. The compendium includes both traditional tools and variations recommended by behavioral science. In this way, tools such as material rewards and negative incentives—while considered traditional policy tools—are included as these tools attempt to influence but do not coerce behavior. In doing so, the compendium aligns with published frameworks on influencing behavior such as the Behavioural Insights Team's EAST and MIND-SPACE.^{27,28} Practitioners are encouraged not to rely on such tools exclusively.
- (b) **Social and motivational mechanisms** influence individual and interpersonal contexts. Tools in this category may target an individual's social networks and their personal motivations or highlight the expectations or actions of their peers

to influence behavior and choices. These mechanisms include behavioral tools such as social norms, framing, and messengers.

- (c) **System design mechanisms** influence environmental contexts. Tools in this category refer specifically to changes to the physical environment in which decisions are made. These changes can either make the desired behavior easier to accomplish or make the undesired behavior more difficult. This mechanism includes behavioral tools such as default options, environmental cues, process simplifications, and accessible services.

The mechanisms are not mutually exclusive. Certain mechanisms may be more suited to specific situations and will depend on the barriers impeding behavior change. Behavioral science tries to understand the most influential aspect when promoting a certain message, product, service, or public policy. As there are often multiple barriers to pro-environmental behavior, these mechanisms are meant to coalesce to collectively guide behavior change. One can use these mechanisms to guide management activities and inform their use of behavioral tools. In waste management programming, practitioners can decide which mechanisms best suit their needs and which behavioral tools to test.

What behavioral tools were used?

Using the methodological framework, the authors investigated each case study through a behavioral lens, uncovering a suite of applied behavioral tools. The authors then grouped these tools under their relevant contextual mechanism (see Table 2). Table 2 contains a brief definition of each tool and an illustrative example of its applicability. For more information and links to relevant research, please visit the **Glossary**.

TABLE
2

Contextual mechanisms

Social and motivational	What does it mean?	How one could apply it?
Framing	How choices or information is presented	Media billboards which highlight the cost savings of making smarter choices and reducing unnecessary organic waste
Social comparison	Denoting the performance of identity groups in reference to that of their peers	Regional authorities rank municipalities on their waste collection rates
Social norms	Collectively held beliefs about a given behavior	A municipality deploys signs highlighting that the majority of residents frown upon discarding cigarette butts on the street
Creating accountability	Making behaviors observable and holding actors responsible for their conduct	Independent agents verify the service quality of waste collection providers
Emotional appeals	Leveraging positive (for example, pride, hope) or negative (for example, fear) emotions to direct actions	A town uses a mascot to relay waste-related messages and praise residents for contributing to a clean environment
Feedback	Providing individuals with information on their performance	Households receive letters with the quantity of food they throw out each month
Messengers	Using ordinary citizens (for example, block leaders) or influential figures (for example, celebrities, religious figures, government officials) to deliver information	The town priest encourages parishioners to engage with the waste management system and teaches them about source segregation
Gamification	Adding game-like elements into programming	A points system that rewards residents for waste-related activities
Nonmaterial rewards	Individuals receive symbolic rewards for performing certain behaviors	Residents receive public recognition for being a 'waste champion'
Financial	What does it mean?	How could one apply it?
Material rewards	Individuals who perform certain behaviors receive cash or material items that have monetary value	Households are entered into a lottery if they pay waste collection fees on time
Negative incentives	Fines or penalties incurred for failing to comply with outlined regulations or rules	Authorities issue fines to residents who litter
Appealing to loss aversion	Drawing on predisposed tendencies to avoid losing something (for example, money), the disappointment of which is greater than the comparable joy of gaining that same item	A municipality allocates payments to households for proper use of waste services and rescinds them if households reach a set measure, for example, quality of segregated organic waste
System design	What does it mean?	How could one apply it?
Accessible services	Convenient services or infrastructure	Communal collection points located nearer residents, to reduce distance from house to containers
Timely messages	Verbal or written reminders about a behavior	Stickers on waste bins that indicate which products are permissible
Defaults	Preset options that are selected if an actor does nothing	A municipality automatically enrolls households into a source segregation program. Residents must opt out if they are unwilling to participate.
Saliency	Increasing the prominence of information or items	Attractive and engaging media campaigns
Physical cues	Features of the environmental context which elicit certain behaviors	Waste authorities deploy smaller residual waste bins and larger recycling bins to households to deter unnecessary landfilling
Simplifying behaviors and decisions	Streamlining information and/or increasing the ease of performing a behavior	A municipality distributes waste bins to households to make source segregation easier to execute
Foot in the door	A small request is followed up by a larger request	A municipality asks residents to participate in a survey on waste-sorting behavior. They follow up with a request for residents to sort their waste over a defined period.

1.3 How should one use this compendium?

This compendium provides an easy and interactive tool to simplify the search for waste management policy initiatives and behavior change tools in response to policy initiatives. It is intended to inform and benefit the design of waste management projects by offering case studies and a menu of behavior change initiatives.

When using this compendium, the reader should consider two questions:



1.

What is the main policy challenge?

Cases are divided according to three challenges (cases can have multiple challenges):

- a) Getting people to generate less waste**
e.g., Ireland implemented a levy on single-use plastics to deter consumption
- b) Getting people to use waste services**
e.g., the Tongan government incorporated waste fees into electricity bills to increase payment
- c) Getting people to be more sustainable with their waste** e.g., Cajicá, Colombia provided citizens with green bins and a pre-treating material to increase organic waste segregation



2.

What is the policy objective?

Cases are subdivided into six specific objectives (cases can have more than one objective but here we only reference the main objective):

- a) Change consumption and production behaviors** (four cases)
- b) Increase willingness to pay for service** (four cases)
- c) Increase reusing and recycling** (nine cases)
- d) Empower people to improve accountability** (five cases)
- e) Increase segregation of organic and other waste** (seven cases)
- f) Increase proper disposal of cigarette butts** (one case)

1.4 Case selection

To review cases, readers should click the following figures. Recommended cases will pop up in each category. The available information and the behavioral tools used could be analyzed as needed.

1.

Click one of these three diagrams to select a challenge:

Getting people to use waste services



Getting people to be more sustainable with their waste disposal



Getting people to generate less waste



2.

From the array of objectives that pop up, click the desired objective.

Increase willingness to pay for services

Empowering people to improve accountability

Reduce littering (cigarette butts)

Increase reusing and recycling

Increase segregation of organic and other waste

Change consumption and production behavior

Endnotes

- ¹ Unless indicated otherwise, this section draws on several earlier World Bank publications, including World Bank. (2021). *Bridging the gap in solid waste management: Governance requirements for results*; Kaza, S., S. Shrikanth, S., & Chaudhury, S. (2021). *More growth less garbage*. World Bank; World Bank. (2018). *What a Waste 2.0*; World Bank. (2022). *Clean and low-carbon cities: The relationship between the solid waste management sector and greenhouse gases*. Technical Brief; World Bank. (2020). *Management of municipal solid waste: Approaches and practices within the World Bank*.
- ² In line with the definition of MSW given by the Organisation for Economic Co-operation and Development (OECD), Eurostat, United States Environmental Protection Agency (US EPA), and the 'What a Waste 2.0' report produced by the World Bank (2018).
- ³ World Bank. (2021). *Bridging the gap in solid waste management: Governance requirements for results*. World Bank, Washington, DC.
- ⁴ Ocean Conservancy. (2015). *Stemming the tide: Land-based strategies for a plastic free ocean*. Ocean Conservancy, McKinsey Center for Business and Environment.
- ⁵ United Nations Environment Programme and Climate and Clean Air Coalition. (2021). *Global methane assessment: Benefits and costs of mitigating methane emissions*. UNEP, Nairobi.
- ⁶ Thaler, R. H. (2016). Behavioral economics: Past, present and future. *American Economic Review*, 106, 1577–1600. doi: 10.1257/aer.106.7.1577
- ⁷ Heidbreder, L. M., Bablok, I., Drews, S., & Menzel, C. (2019). Tackling the plastic problem: A review on perceptions, behaviors, and interventions. *Science of the Total Environment*, 668, 1077–1093.
- ⁸ Beitzten-Heineke, E. F., Balta-Ozkan, N., & Reefke, H. (2017). The prospects of zero-packaging grocery stores to improve the social and environmental impacts of the food supply chain. *Journal of Cleaner Production*, 140, 1528–1541.
- ⁹ Massoud, M., Lameh, G., Bardus, M., & Alameddine, I. (2021). Determinants of waste management practices and willingness to pay for improving waste services in a low-middle income country. *Environmental Management*, 68(2), 198–209.
- ¹⁰ Tucker, P. (1999). Normative influences in household waste recycling. *Journal of Environmental Planning and Management*, 42(1), 63–82. doi: 10.1080/09640569911307
- ¹¹ Harder, M.K., Woodard, R., & Bench, M.L. (2006). Two measured parameters correlated to participation rates in kerbside recycling schemes in the UK. *Environmental Management*, 37(4), 487–495. doi: 10.1007/s00267-004-0124-8
- ¹² Egebark, J., & Ekström, M. (2016). Can indifference make the world greener? *Journal of Environmental Economics and Management*, 76, 1–13. doi: 10.1016/j.jeem.2015.11.004
- ¹³ Sibley, C. G., Liu, J. H. (2003). Differentiating active and passive littering: A two-stage process model of littering behavior in public spaces. *Environment and Behavior*, 35(3), 415–433.
- ¹⁴ World Bank. (2021). *Bridging the gap in solid waste management: Governance requirements for results*. World Bank, Washington, DC.
- ¹⁵ Geographic regions include all six continents.
- ¹⁶ Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29, 309–317. doi: 10.1016/j.jenvp.2008.10.004
- ¹⁷ McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, 15(4), 351–377. doi: 10.1177/109019818801500401
- ¹⁸ Sallis, J. F., Owen, N., & Fisher, E. B. (2008). Ecological models of health behavior. In K. Glanz, B.K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice*, (4), 465–486. Jossey-Bass.
- ¹⁹ Mintz, K. K., Henn, L., Park, J., & Kurman, J. (2019). What predicts household waste management behaviors? Culture and type of behavior as moderators. *Resources, Conservation and Recycling*, 145, 11–18. doi: 10.1016/j.resconrec.2019.01.045
- ²⁰ Cheng, X., Long, R., & Yang, J. (2022). Interactive effects of two-way information and perceived convenience on waste separation behavior: Evidence from residents in eastern China. *Journal of Cleaner Production*, 374, 134032. doi: 10.1016/j.jclepro.2022.134032
- ²¹ Cheng, X., Long, R., & Yang, J. (2022). Interactive effects of two-way information and perceived convenience on waste separation behavior: Evidence from residents in eastern China. *Journal of Cleaner Production*, 374, 134032. doi: 10.1016/j.jclepro.2022.134032
- ²² Juárez Ramos, V. (Ed.). (2018). *Analyzing the role of cognitive biases in the decision-making process*. IGI Global.
- ²³ Onel, N., & Mukherjee, A. (2017). Why do consumers recycle? A holistic perspective encompassing moral considerations, affective responses, and self-interest motives. *Psychology and Marketing*, 34, 956–971. doi: 10.1002/mar.21035
- ²⁴ Busemeyer, J. R., Townsend, J. T., & Stout, J. C. (2002). Motivational underpinnings of utility in decision making. *Emotional cognition: From brain to behaviour*, 197–219.
- ²⁵ Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. *Advances in Experimental Social Psychology*, 24, 201–234
- ²⁶ Shaw, P. J. (2008). Nearest neighbour effects in Kerbside Household Waste Recycling. *Resources, Conservation and Recycling*, 52, 775–784. doi: 10.1016/j.resconrec.2007.11.004
- ²⁷ Service, O., Hallsworth, M., Halpern, D., Algate, F., Gallagher, R., Nguyen, S., Ruda, S., Sanders, M., Pelenur, M., Gyani, A., Harper, H., Reinhard, J., & Kirkman, E. (2014). EAST: Four simple ways to apply behavioural insights. The Behavioural Insights Team. Retrieved from https://www.bi.team/wp-content/uploads/2015/07/BIT-Publication-EAST_FA_WEB.pdf
- ²⁸ Dolan, P., Hallsworth, M., Halpern, D., King, D., & Vlaev, I. (2010). MINDSPACE: influencing behaviour for public policy. Cabinet Office. Retrieved from <https://www.bi.team/wp-content/uploads/2015/07/MINDSPACE.pdf>

12345

A Compendium of Cases



2.1 Getting people to use waste services



RETURN TO CASE
SELECTION

2.1.1 Increase willingness to pay for services



RETURN TO CASE
SELECTION

Getting people to use waste services in Tonga

Objective: Increase willingness to pay



Case Summary

The Kingdom of Tonga introduced several methods to increase SWM payments. The waste authority incorporated SWM fees into water bills, employed special collection agents, and introduced prepaid waste bags. When these actions did not have the desired effect, the waste management authority (Waste Authority Ltd [WAL]) integrated waste fees with residents' electricity bills. Complementarily, the authority launched an extensive outreach campaign, provided a free trial period for waste collection, and conducted payment enforcement. These tactics successfully increased residents' willingness to pay for SWM services. In response, the bill collection rate rose from 40 percent to approximately 85 percent over seven years. As revenues increased, authorities continually improved and expanded SWM operations. WAL currently provides regular waste collection and disposal services to 96 percent of the population across five main islands.



Challenge statement

Irregular SWM services dissuaded households from paying monthly SWM fees. Most residents burned or openly dumped their waste.

Context and description of challenges

The Kingdom of Tonga (2006 population: 101,991)¹ is a small nation made up of over 170 islands in the Pacific Ocean. As residents' lifestyles changed and tourism grew, the country increasingly relied on packaged and imported goods. These factors increased waste generation levels beyond the island's disposal capacity.² In 2005, Tonga's per capita waste generation rate was approximately 0.4 kg (not including the tourism sector) and most residents lived on the main island of Tongatapu, which generated 67 percent of the total waste.³ At the time, the Ministry of Health provided SWM services, which were restricted to Tongatapu's capital city. Residents who subscribed paid TOP 20 (USD 8.50) per month per household for weekly collections.⁴ Roughly 12 percent of urban residents used this service due to its irregularity while others subscribed to a private contractor. Most urban residents, however, did not see waste as a priority.⁵ About 75 percent of households burned their waste as they felt it was the easiest option.⁶ Ingrained norms further dissuaded proper waste disposal practices.⁷

In 2005, the national government made changes to the SWM system in Tongatapu. It codified the new system through the Solid Waste Management Act⁸ which established a new public organization, Waste Authority Ltd. (WAL), to provide SWM services. Within the new system, households paid TOP 10 (approximately USD 5) per month for collection services, and commercial entities paid a variable monthly rate of TOP 17–128 (approximately USD 8.5–64.0) based on size.⁹ To increase recovery rates, WAL collaborated with local women's groups, to which it paid a 10 percent commission to collect residents' monthly SWM payments. However, urban residents did not see these groups as legitimate and were disinclined to pay. WAL also ran awareness-raising campaigns with little effect.¹⁰ With a limited customer base

and increasing operating costs, WAL struggled to maintain SWM infrastructure and equipment. The SWM service quality subsequently deteriorated. Revenue increased marginally from 11 percent in 2007 to 25.4 percent in 2011. WAL was forced to rely on government subsidies and donor organizations for financial support. This unsustainable financial model threatened SWM operations in Tonga.¹¹ In response, WAL revamped its SWM fee collection strategy to simultaneously improve customer satisfaction and increase the SWM fee recovery rate. These efforts are the subject of the current case study.

Decisions and actions

In 2011, WAL launched a joint billing system to collect SWM fees. The system integrated SWM fees into water bills to increase cost recovery rates. SWM fees for households and commercial entities remained unchanged. This initiative alone improved the collection rate from 20 to 40 percent in urban regions.¹² However, the main government water supply delivered by the Tonga Water Board (TWB) covered only urban areas. Additionally, only a subset of urban residents had water meters and could use the joint wastewater billing system. Rural communities had a separate water supply. These factors made it difficult to collect waste fees from households that did not have water meters. Second, it was difficult for WAL to obtain details of and follow up with nonpaying residents.¹³

Between 2013 and 2015, WAL improved its waste infrastructure (management, equipment, and facilities) after receiving funding from the Asian Development Bank. In 2014–2015, WAL tried to increase fee payments from rural residents by introducing prepaid stickers and waste bags. These prepaid items were voluntary. By 2015, waste collection services covered 65 and 25 percent of urban and rural households, respectively. Despite improvements, many rural households did not receive SWM services. Additionally, among those that did, many residents chose not to pay. In the absence of enforcement measures for nonpayments, cost recovery declined over time.¹⁴



In 2016, WAL upgraded the payment system. In collaboration with the local power distribution authority, Tonga Power Ltd (TPL), WAL launched a joint electricity-waste bill modality. Under this new system, WAL integrated waste fees into the electricity billing system. The electricity supply covered the entire country, including the outer islands which rectified the coverage issues experienced under the waste-water billing system.¹⁵ TPL provided regular information to WAL on payment compliance issues, which improved enforcement.¹⁶ TPL received 3.5 percent of the total waste fee collected as a commission from WAL.¹⁷

In 2019, WAL increased monthly collection fees for households (TOP 15 or USD 6.6 per month) and commercial entities (TOP 50–800 or USD 22–352). In 2020, WAL expanded its waste management services and user fee model to the outer island group of Vava'u and later to Haapa'i and 'Eua islands.¹⁸



REFERENCE CASE STUDY

Simplifying waste payments in Georgia

Utility services are typically provided at the individual household level at a defined address. If municipal waste services are billed in a similar manner (that is, per household), then customer databases can be linked. A waste fee can then be added to and separately identified on each utility bill. The advantages of this approach are its administrative simplicity once databases are linked, convenience for customers, and the potential for high fee collection ratios. Disadvantages are that administrative costs can be high relative to the amount of revenue collected, linking relatable databases is complex, and clients are limited to the clients of the utility company. For example, in Tbilisi, Georgia, each household had to pay a waste collection fee per kilowatt of electricity consumed by the household each month. After adding the waste fee to the electricity bill, revenues from the municipal waste collection in Tbilisi for years before 2015 reached a fee collection ratio of 92 percent, the best outcome of all municipalities in the country.¹⁹

The design

WAL provided weekly door-to-door commercial, residential, and industrial (for non-process waste) collection services across Tongatapu. Residents disposed of waste in containers or plastic bags and placed these vessels curbside or on raised platforms for collection.²⁰ Donor organizations provided financial assistance toward landfill development as well as technical assistance to WAL on waste treatment site management.²¹ Revenues collected through the user fee system supported daily SWM operations (wages, fuel, truck repairs, and communication campaigns). In 2018, waste collection and landfill operation costs amounted to TOP 42 per ton (approximately USD 19 per ton) and TOP 17.7 per ton (approximately USD 8 per ton), respectively.

WAL's service improvements and revised fee collection mechanism were key to increasing residents' willingness to pay. Clients had to pay all parts of their electricity bills to avoid disconnection. Residents were regularly updated on their monthly fees and were required to cover any missed payments as lump sums. Before disconnection, WAL scheduled a follow-up consultation and issued a formal warning notice after 12 consecutive months of nonpayment.

In concert with the introduction of the joint billing system with TPL, WAL launched a communication campaign (*Clean Green Tonga*) across television, social media, radio, web, and print mediums.²² The communication campaign focused on improving waste management practices in schools, communities, and businesses. WAL also conducted educational workshops and provided information to primary and high school students on waste collection, disposal, and treatment. To deter waste burning and improper disposal, WAL, the police, and the Ministry of Environment officers issued warnings and conducted in-person visits to offenders. In the years following the rollout of this new system, WAL continued to engage the public on cleanliness and waste management. It also created a feedback mechanism to allow residents to comment on service delivery and offer suggestions for improvements.²³



In 2018, Tonga's Ministry of Tourism created *Masani Connect* competitions in villages across Tonga. The competitions ran throughout each calendar year with extensive participation from villages across the main and outer islands. The competition assessed villages against several criteria, three of which pertained to cleanliness and proper waste disposal. Villages frequently organized cleanup events to score highly on these criteria. Other criteria related to properly contained animals, the presence of home gardens, the abundance of indigenous plants, and the upkeep of vacant lots. A national task force—consisting of individuals from the Ministry of Internal Affairs, the Ministry of Tourism, the Department of Environment, and the Ministry of Health—assessed villages against the slated criteria. In December, governors of each island presented prizes to the top three villages from each island during an award ceremony. The remaining villages received consolation prizes.²⁴

In 2020, WAL expanded operations beyond Tongatapu, starting with the outer island group of Vava'u. Residents of Vava'u had experience with waste collection under the earlier Japanese Waste Project (JPRISM I). Given this experience, public awareness on waste-related topics among Vava'u residents had improved. Before expanding SWM services, WAL held public meetings and launched an outreach program through radio campaigns²⁵ and information booths at local events.²⁶ WAL also invited respected cultural, religious, and government leaders to community consultations and workshops to get their buy-in. WAL then worked with these influential figures to increase residents' support for the new paid waste collection system. Complementarily, WAL provided free weekly residential waste collection services for six months with the understanding that payment was going to be phased in. Similarly, businesses received one free month of services. Under this model, residents could experience the superior service quality of paid-for and better-funded SWM.

Clean Green Tonga represented at Tonga's International Day for Disaster Risk Reduction. © Avalaoetau Stalin Naufahu, Clean Green Tonga



What behavioral tools are present in this initiative?

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: Decreasing hassles associated with service payments can increase uptake.²⁷ In the present case study, waste authorities coupled SWM collection fees with utility bill payments. This system increased the ease with which residents and businesses could pay for basic services. Residents did not have to contend with multiple payment services or systems.



Foot in the door: Individuals are more likely to comply with a larger request if they first agree to a small request.²⁸ In the current case study, residents in Tonga's outer island groups lacked experience with paid waste services. The waste management authority offered an introductory period of free weekly collection services. Residents on Vava'u received six months of free SWM services. Residents on Haapai and Eua islands received 10–11 months of free services. During this time, residents experienced the quality of pay-for-use waste services. This experience increased residents' receptivity to the revised SWM system and their willingness to pay when WAL subsequently introduced fees.



Salience: Attractive and eye-catching campaigns can increase citizen engagement. WAL used a multipronged outreach campaign to increase willingness to pay. WAL ran advertisements and signage through the *Clean Green Tonga* campaign to encourage residents to take ownership of their communities and do their part to keep them clean. The organization also ran television ads, social media campaigns, and a fortnightly radio program on the environment and health.²⁹ WAL's social media page was influential in promoting public awareness of SWM services. WAL used social media to provide up-to-date information on SWM services (for example, schedule changes). WAL ran mass media campaigns on specific waste-related topics, including waste burning, illegal dumping and littering, unpaid waste service fees, and sanitation.



Accessible services: Access to convenient infrastructure can be a strong determinant in whether or not an individual performs a given behavior.³⁰ In the Kingdom of Tonga, WAL provided weekly door-to-door collection services to residential, commercial, and industrial entities.

SOCIAL AND MOTIVATIONAL MECHANISMS



Social comparison: The literature suggests that social comparisons and relative ranking systems can elicit competitive behavior.³¹ The Ministry of Tourism held annual competitions to increase community cleanliness and grassroots SWM engagement. Each competition ran from January to December each calendar year. During the 2021 competition, 61 villages in Tongatapu, 26 in Vava'u, 19 in Haapai, 4 in Niuatoputapu, 15 in 'Eua, and 40 in Vava'u participated.³² The competitions assessed villages on both waste-related and other criteria. The former assessed villages on visible cleanliness (presence of litter and improper waste disposal), proper waste storage areas, and clean roadsides. The National Task Force of the Masani Connect visited and inspected villages two to three times annually. The *Masani Connect* competition and other cleanup initiatives influenced public perception and engagement on SWM.³³



Messengers: Individuals are greatly influenced by the individual who conveys information. In the current case study, community leaders (governors and nobles), religious figures, town officers, and women and youth helped increase residents' support for SWM services.³⁴ At community meetings, leaders encouraged residents to support WAL. Town and District Officers coordinated community meetings to promote government-supported programs (that is, waste management). Women and youth (50 individuals per village) led cleanup activities. Religious figures regularly spoke to their church members about proper SWM behaviors during their sermons. After the new payment system was in place, community groups, leaders, and schools continued to play a key role in relaying important information on pollution.



Feedback: In certain contexts, feedback can be an effective tool to promote positive waste management behaviors.³⁵ WAL created a feedback mechanism where residents could comment on service delivery and offer suggestions. The public could submit feedback via phone, WAL's social media page, or written letters. WAL's social media pages allowed the public to quickly and efficiently communicate with WAL. It also allowed WAL staff to quickly address any issues and complaints, for instance, regarding damaged waste bins.





Creating accountability: Studies suggest that an individual's desire to maintain a good public image leads to socially acceptable behaviors, especially when those behaviors are observable.³⁶ At the end of every month, TPL provided WAL with details of customers who paid their waste fees. WAL contacted customers who did not pay to remind them of their obligation.³⁷ Additionally, authorities held residents liable for improper waste disposal. WAL used information contained in discarded or burned waste to identify residents. WAL, the police, and Ministry of Environment officers then issued written warnings to residents who illegally dumped or burned their waste. They also conducted frequent home visits to offending residents to confirm that they cleaned up their waste. This system ensured that residents were held accountable for their SWM practices and obligations. It also deterred future grievances.

FINANCIAL MECHANISMS



Negative Incentives: In select cases, penalties can promote positive waste management behavior. Specifically, residents' perceived certainty of receiving a penalty can affect their behavior.³⁸ The present case study applied this tool in a traditional way. TPL disconnected residents' electricity if they did not pay mandatory fees—including SWM fees—for 12 months. Residents were required to make up lost payments. This penalty system encouraged residents to pay for waste services.



Material rewards: In certain contexts, monetary incentives can promote the uptake of positive SWM behaviors.³⁹ The present case study applied this tool in a traditional way. Annual *Masani Connect* competitions offered prizes to incentivize residents' participation. Each island awarded monetary prizes to the top three villages. In 2021–2022, the top-ranked large villages received TOP 4,000 (USD 1,706), the second-ranked villages received TOP 3,000 (USD 1280), and the third-ranked villages received TOP 2,000 (USD 853). Small villages received TOP 3,000 (USD 1,280), TOP 2,500 (USD 1,067), and TOP 2,000 (USD 853) for the first, second, and third place, respectively. The remaining participating villages each received TOP 800 (USD 340) as consolation prizes.⁴⁰



Preconditions and challenges

- » **Strong leadership played a role in WAL's success.** The public was responsive to WAL's Chief Executive Officer (CEO) and his team of motivated staff. Residents perceived these individuals as hard-working officials committed to improving public cleanliness. This perception extended to residents' positive impressions of WAL more broadly.
- » **Multistakeholder collaboration was a cornerstone of the intervention's success.** TPL, the Ministry of Environment, the Ministry of Health, the Ministry of Tourism, the Water Authority, and donors came together to operationalize this initiative. For instance, the integrated electricity fee hinged on a collaboration with TPL. Donor investments supported WAL's development of proper infrastructure and helped procure equipment to improve service quality.
- » **The initiative benefited from strong political will.** Government ministers and politicians actively supported changes in Tonga's waste management landscape. These actors also held residents accountable for improper behavior. The Ministry of Environment, Ministry of Health, and Police collectively enforced littering and illegal dumping.
- » **Tonga experienced some challenges in increasing payment compliance.** The Kingdom used an iterative approach and cycled through multiple interventions to increase fee recovery rates. These included using women's groups as collection agents, incorporating waste bills into residents' water bills, and using prepaid waste bags and bins.



Results

By redesigning its fee collection system and upgrading MSW services, WAL created a successful SWM model. The joint billing system increased WAL's capacity for service delivery. In 2022, waste collection covered 100 percent of households on the island of Tongatapu (relative to 20 percent in 2006), 94 percent on Vava'u, 63 percent on Haapai, and 100 percent on 'Eua.⁴¹ WAL's reliable and convenient SWM services increased residents' compliance and payment of SWM fees. As of 2018, SWM fee recovery rates in both rural and urban regions of Tongatapu increased to approximately 85 percent (relative to baseline levels of 40 and 12 percent in urban and rural areas, respectively).⁴² The fee recovery rate also exceeded 70 percent on the outer island of Vava'u.⁴³ Revenue collected through household and commercial waste fees made up the majority (97.6 percent) of WAL's annual budget.⁴⁴ Complementary initiatives have similarly attracted widespread public support. In 2021–2022, *Masani Connect* competitions garnered village participation rates of 75–90 percent.⁴⁵

In 2022, WAL introduced a source segregation (recycling/organic waste) initiative to the main island and is currently exploring its expansion to the outer islands.⁴⁶ The national government is also considering a graduated fee system that corresponds to electricity consumption.



Complementary actions to consider

- » Landfilling continues to be commonplace, both in Tonga and elsewhere. In addition to performing waste collections, practitioners may also consider incorporating behaviorally informed strategies to increase waste minimization and reuse. Such practices would reduce the landfill burden and transition toward more desirable environmental practices. Practitioners could use local volunteers or survey instruments to understand barriers to this transition. These results may help governments develop evidence-based strategies.
- » Ingrained waste behaviors can be difficult to shift if they disrupt the traditional way of doing things. Governments may consider co-opting the support of women—who are often disproportionately responsible for waste management activities—or other influential community members as change agents.



Want to know more?

[Tonga Combined Utilities Business Plan 2018-2022](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Statistics Department Tonga. (2008). *Tonga 2006 census of population and housing. Vol 1: Administrative report and basic tables*. Kingdom of Tonga, Nuku'alofa, Tonga. Retrieved from <https://tongastats.gov.to/document-library/#6-24-2006>
Population in 2021: 100,179, Source: Tonga Statistics Department. (2021). *Population and housing factsheet 2021*. Kingdom of Tonga.
- ² Lutui, V. (2001). *Waste management practices, perceptions and attitudes in Tonga*. University of Wollongong, Australia. Retrieved from <http://ro.uow.edu.au/theses/2897>
- ³ Lal, P., & Takau, L. (2006). *Economic costs of waste in Tonga*. IWP-Pacific Technical Report (International Waters Project) no. 33. ISBN: 978-982-04-0353-6. Retrieved from http://www.globalislands.net/userfiles/tonga_3.pdf
- ⁴ Ibid.
- ⁵ Prescott, N., Palaki, A., Tongia, S. & Niu, L. (2007). *Household survey and waste characterization for Nukuhetulu, Tonga*. IWP-Pacific Technical Report (International Waters Project) no. 54. SPREP, Samoa.
- ⁶ Lal, P. & Takau, L. (2006). *Economic costs of waste in Tonga*. IWP-Pacific Technical Report (International Waters Project) no. 33. Retrieved from http://www.globalislands.net/userfiles/tonga_3.pdf
- ⁷ Šrot, N. (2010). *Social Learning and Waste Management: A Tongatapu Case Study*. Lund University, Sweden. Retrieved from https://library.sprep.org/sites/default/files/65_6.pdf
- ⁸ Act 11 of 2005: *Waste Management Act*. Kingdom of Tonga. Retrieved from <http://www.pacificsoe.org/tonga/wp-content/uploads/2016/11/Waste-Management-Act-2005.pdf>
- ⁹ Based on information received from Stalini Naufahu, IT & Projects Manager, WAL (February 13, 2023).
- ¹⁰ Šrot, N. (2010). *Social learning and waste management: A Tongatapu case study*. Lund University, Sweden. Retrieved from https://library.sprep.org/sites/default/files/65_6.pdf
- ¹¹ Asian Development Bank. (2011). *Nuku'alofa Urban Development Sector Project: Draft Design and Monitoring Framework*. RRP TON 42394-22. ADB, Philippines.
- ¹² Waste Authority Ltd. (2017). *Annual report FY2016–2017*. Government of the Kingdom of Tonga.
- ¹³ Based on information received from Stalini Naufahu, IT & Projects Manager, WAL (February 13, 2023).
- ¹⁴ Waste Authority Ltd. (2017). *Annual report FY2016–2017*. Government of the Kingdom of Tonga.
- ¹⁵ Based on information received from Stalini Naufahu, IT & Projects Manager, WAL (February 13, 2023).
- ¹⁶ Based on information received from Tevita Toli, Vava'u Branch Manager, WAL (February 12, 2023).
- ¹⁷ Waste Authority Ltd. (2022). *Annual report 2022*. Government of Kingdom of Tonga.
- ¹⁸ Katayama, H. (2022). *Waste management service expansion to outer islands*. J-PRISM. Retrieved from https://www.sprep.org/sites/default/files/documents/publications/%E3%80%90FIN%E3%80%91_JPRISM_Good_Practice_Tonga_web.pdf
Waste Authority Ltd. (2020). *Annual report 2019–2020*. Government of the Kingdom of Tonga.
- ¹⁹ World Bank. (2021). *Bridging the gap in solid waste management: Governance requirements for results*. World Bank, Washington, DC.
- ²⁰ J-PRISM II. (2022). *Solid waste management country profile: Tonga*. SPREP, Samoa. Retrieved from https://library.sprep.org/sites/default/files/2022-08/0722_Jprism_C-profile03_Tonga_fix.pdf
- ²¹ Based on information received from Lola Liavaa Tonga, Administration Manager, WAL. (February 14, 2023).
- ²² Waste Authority Ltd. (2016). *Annual report FY2015–2016*. Government of the Kingdom of Tonga.
- ²³ Waste Authority Ltd. *Annual report 2016, 2018, 2019*. Government of Kingdom of Tonga.
- ²⁴ Based on information received from Anaseini Manuopangai, Acting-Director, Ministry of Tourism, Tonga (February 02, 2023).
- ²⁵ Katayama, H. (2022). *Waste management service expansion to outer islands*. J-PRISM. Retrieved from https://www.sprep.org/sites/default/files/documents/publications/%E3%80%90FIN%E3%80%91_JPRISM_Good_Practice_Tonga_web.pdf
- ²⁶ Waste Authority Ltd. (2019). *Annual report 2018–2019*. Government of the Kingdom of Tonga.
- ²⁷ Sunstein, C. R. (2013). *Simpler: The future of government*. Simon & Schuster, New York.
- ²⁸ Sternthal, B., Scott, C. A., & Dholakia, R. R. (1976). Self-perception as a means of personal influence: The foot-in-the-door technique. *ACR North American Advances*.
- ²⁹ Waste Authority Ltd. (2017). *Annual report 2016–2017*. Government of Kingdom of Tonga.
- ³⁰ Prime Minister's Strategy Unit. (2002). *Waste Not, Want Not: A strategy for tackling the waste problem in England*. Crown, Great Britain.
- ³¹ Klege, R. A., Visser, M., Datta, S., & Darling, M. (2022). The power of nudging: Using feedback, competition, and responsibility assignment to save electricity in a non-residential setting. *Environmental and Resource Economics*, 81, 573–589. doi: 10.1007/s10640-021-00639-w
- ³² Based on information received from Meleoni Vakapuna, Tourist Officer, Beautification Unit; Destination Development Division, Ministry of Tourism, Tonga (March 20, 2023).
- ³³ Based on information received from Anaseini Manuopangai, Acting-Director, Ministry of Tourism, Tonga (February 02, 2023).
- ³⁴ Based on information received from Stalini Naufahu, IT & Projects Manager, WAL (February 13, 2023).



- ³⁵ Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic and Applied Social Psychology*, 21(1), 25–36. doi: 10.1207/s15324834basp2101_3
- ³⁶ Ekström, M. (2012). Do watching eyes affect charitable giving? Evidence from a field experiment. *Experimental Economics*, 15(3), 530–546.
- ³⁷ Based on information received from Tevita Toli, Vava'u Branch Manager, WAL (February 12, 2023).
- ³⁸ Hao, M., & Xu, S. (2023). The impact of penalty on residents' waste separation behavior: A moderated mediation model. *Polish Journal of Environmental Studies*, 32(2), 1145–1158. doi: 10.15244/pjoes/156789
- ³⁹ Abila, B., & Kantola, J. (2019). The perceived role of financial incentives in promoting waste recycling—Empirical evidence from Finland. *Recycling*, 4(1), 4. doi: 10.3390/recycling4010004
- ⁴⁰ Based on information received from Meleoni Vakapuna, Tourist Officer, Beautification Unit; Destination Development Division, Ministry of Tourism, Tonga (March 20, 2023).
- ⁴¹ Waste Authority Ltd. (2022). *Presentation of JPRISM activities*. Government of Kingdom of Tonga.
- ⁴² Waste Authority Ltd. (2018). *Annual report FY2017–2018*. Government of Kingdom of Tonga.
- ⁴³ Katayama, H. (2022). *Waste management service expansion to outer islands*. J-PRISM. Retrieved from https://www.sprep.org/sites/default/files/documents/publications/%E3%80%90%E3%80%91_JPRISM_Good_Practice_Tonga_web.pdf
- ⁴⁴ Based on information received from Stalini Naufahu, IT and Projects Manager, WAL (February 13, 2023).
- ⁴⁵ Based on information received from Meleoni Vakapuna, Tourist Officer, Beautification Unit; Destination Development Division, Ministry of Tourism, Tonga (March 20, 2023).
- ⁴⁶ Waste Authority Limited. (2023). *Business Plan (Final) 2018–2022*. In *Combine Utilities Business Plan 2018–2022*. Government of Kingdom of Tonga.



Getting people to use waste services and be more sustainable with their waste disposal in India

Main objective: Increase willingness to pay

Other objectives: Increase source segregation of organic and other waste; increase reusing and recycling



Case Summary

The city of Pune worked with informal workers to improve the city's waste management system and working conditions of waste pickers. Following an agreement between the Solid Waste Collection Handling (SWaCH) cooperative of pickers and the municipality, SWaCH established door-to-door waste collections and charged users a monthly fee (approximately USD 1) for the service. The municipality launched an extensive outreach campaign to encourage compliance with waste management collections. Regular service delivery encouraged residents to engage with the SWM system. Payment compliance and source segregation within served areas increased to almost 100 and 50 percent, respectively. Pune is an excellent example of integrating the informal sector with municipally run MSW services.

Female waste collector in Pune, India. © Brodie Lewis



Challenge statement

Waste collection in Pune was irregular and primarily carried out through communal bin collections by the municipality. The system made way for improper dumping and did not facilitate separation at source. Informal waste workers scavenged for recyclables from the city's communal bin waste storage areas and landfills to earn a living.

Context and description of challenges

Pune (2006 population: 3 million)¹ is one of the largest cities in the state of Maharashtra. In 2007, residents generated 0.4 kg of MSW per capita per day.² Informal workers were prevalent at waste storage areas within the city as well as its open dumpsites and landfills. A registered trade union, called the Kagad Kach Patra Kashtakari Panchayat (KKPKP), was engaged with organizing the informal workers who recovered valuable recyclables. Owing to their work and the prevailing social hierarchy, the general population often marginalized waste pickers.³

In 2000, the national government introduced the Municipal Solid Waste (Management and Handling) Rules to curb open dumping and improve public cleanliness.⁴ The rules mandated door-to-door collections, source segregation, and recycling.⁵ In the absence of a dedicated SWM department and sufficient institutional capacity, Pune could not comply with the national rules by expanding the service it had been providing. Its door-to-door waste collection services reached only 7 percent of the city.⁶ Additionally, as Pune did not charge fees for SWM services, it could not recoup costs.⁷

The State of Maharashtra set a 2007 deadline for cities to submit implementation plans to achieve full door-to-door collections. Further guidance encouraged cities to engage cooperatives or women's groups as service providers. This deadline gave Pune the impetus to look into ways to improve its SWM services and provide a better platform for informal waste workers.

Decisions and actions

In 2005, Pune initiated a two-year pilot program to bridge its municipal service delivery gap. It established door-to-door waste collection services for 125,000 households, with support from the KKPKP and the local university. The pilot simultaneously provided more formalized work for 1,500 informal waste workers.⁸ The pilot required households to segregate waste into recyclable and organic streams.⁹ KKPKP workers charged households a monthly fee for waste services (Rs 5–40 or USD 0.1–0.9). They tailored the user fee to household income, which they retained in full.

In 2008, the KKPKP established a member-owned waste cooperative called Solid Waste Collection Handling (SWaCH). Women made up the majority of cooperative members.¹⁰ The municipality signed a legal agreement with SWaCH to formalize its work in the SWM system. Thereafter, SWaCH managed all waste collection including the source-separated recyclables while the municipality managed secondary waste collection, disposal, and treatment. The municipality gave SWaCH collection and protective equipment and provided social security benefits.¹¹

In 2017, Pune introduced SWM bylaws mandating household source segregation.¹² In 2018, Pune introduced additional SWM charges (INR 100–500 or USD 1.5–7.5 depending on property value)¹³ to cover waste treatment and disposal costs. Pune collected these through property taxes. Over the years, SWaCH gradually increased waste collection fees. As of 2022, SWaCH workers charged households INR 50–75 (USD 0.7–1.0) and commercial institutions INR 150 (USD 2). The municipality subsidized collection fees for informal areas.¹⁴

The design

Councils at the ward and kothi (neighborhood) levels governed SWaCH activities. These councils regulated collections, managed workers, and sustained the cooperative.¹⁵ Councils included cooperative members and members from the local municipal authority. SWaCH coordinators (one for every two kothis) supported outreach



with and mediated discussions among local stakeholders (waste pickers, municipal actors, and households). They also managed the collection of household waste and user fees.¹⁶ The cooperative operated a helpline to address citizens' concerns on waste collection and disposal. It established a separate helpline for SWaCH workers (related to health, education, and so on).¹⁷

Under the door-to-door collection model, residents were expected to segregate their dry (recyclable) and wet (organic) waste. During door-to-door waste collection services, SWaCH workers provided hands-on demonstrations, pamphlets, and verbal instructions to teach households how to segregate their waste at source.¹⁸ This constant communication strategy and regular engagement underpinned the SWaCH model and humanized waste collection.

SWaCH workers collected waste daily from households using pushcarts.¹⁹ They sold the recyclable waste to local dealers as a secondary source of income. Workers deposited organic and residual waste in community bins or handed it directly to municipality-operated waste collection trucks.²⁰ The municipality provided SWaCH with sheds to further segregate waste. The workers also facilitated household and commercial organic waste composting.

SWaCH charged households a monthly fee for collection services. To sensitize households, Pune held regular neighborhood meetings with citizens and SWaCH members.²¹ Influential figures such as elected representatives and municipal counselors also led door-to-door outreach campaigns. The campaigns centered around users' willingness to pay. Municipal staff members followed up with in-person visits to households that failed to pay the collection fees.²²

SWaCH ran educational and outreach activities to promote compliance with the revised SWM system. The government provided financial and administrative support. For example, media outlets (for example, social media campaigns, video messaging, movie theater advertisements, and billboards) disseminated messaging around source segregation.²³ SWaCH and municipal staff collectively organized cleanup activities. They focused manpower on areas with frequent open dumping.

To foster accountability, SWaCH workers and municipal staff monitored areas prone to open dumping.²⁴ They intercepted the practice and gave residents a waste collection schedule to promote better waste behaviors.²⁵



Batteries for recycling in New Delhi, India. ©Radiokafka, Dreamstime.com



What behavioral tools are present in this initiative?

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: Individuals must have easy access to information, presented in simple and concrete terms.²⁶ SWaCH created easy-to-understand infographics to encourage proper waste segregation. These pamphlets included types of waste (that is, wet, dry, hazardous, and sanitary) and materials that fall into each category.



Accessible services: Access to convenient waste collection services can mediate participation in waste management.²⁷ SWaCH workers provided door-to-door collection services to over half of Pune's properties. Service convenience, quality, and regularity increased residents' willingness to pay.



Salience: Research suggests that individuals are more likely to respond to stimuli in their environment that attract attention.²⁸ In the present case study, the municipality of Pune and SWaCH relied heavily on information and education campaigns for households and schools. These actors undertook activities including rallies, social media campaigns, billboards, and public service announcements. Pune Municipal Corporation (PMC) also recruited college students and artists to create artwork (for example, murals) related to proper waste disposal. These activities often reinforced the legal mandate surrounding proper waste management practices.²⁹

SOCIAL AND MOTIVATIONAL MECHANISMS



Messengers: Research suggests the identity of the person delivering a message can affect whether individuals are receptive and how they ultimately behave.³⁰ In the present case study, authority figures (local elected representatives, municipal counselors, and PMC staff) and change agents (SWaCH staff) led outreach campaigns. Municipal authority figures relayed messaging around the city's regulations and administrative guidelines. Pune trained waste pickers to facilitate household communication campaigns. Trained workers relayed information on segregation as part of daily door-to-door waste collection. Workers also segregated waste in front of households to teach them proper techniques. The municipality also worked directly with children and youth. SWaCH coordinators conducted outreach activities in one to two schools each month. These activities taught youth about proper waste practices and encouraged them to participate in local activities such as wall painting and community events.



Frame messaging to personal values, identities, or interests: How an issue is presented can mediate an audience's interest in the topic.³¹ To shift waste-related habits and increase residents' willingness to pay for waste services, Pune used high-level and localized communication campaigns. The city framed these campaigns around residents' interests. For instance, they often underscored the financial benefits of adopting the user fee-based collection system.



Creating accountability: Research suggests that holding individuals responsible for their actions can influence their behavior.³² During door-to-door campaigns, PMC staff communicated messages around administrative bylaws. PMC staff visited households that continuously failed to segregate their waste (for example, over the span of three to four months). These staff also hand-delivered payment notices to households that failed to pay for waste services. Additionally, SWaCH staff monitored locations subject to chronic open dumping. If residents brought and intended to dump waste in these areas, staff either took the bags or provided residents with a waste collection schedule.





Preconditions and challenges

- » Despite their integral role in the SWM system, informal waste workers often go unrecognized by formal governing authorities. Workers in Pune benefited from organizing themselves into a registered union. The union increased workers' negotiating power with the city and ensured that it recognized their work.
- » Pune sends approximately 60 percent of MSW generated to the local landfill 25 km away. About 35 percent of the landfill was already used.³³ The city has been unable to address increasing waste generation rates, which could complicate long-term waste disposal.

Results

SWaCH created a low-cost and resource-efficient waste collection model. It illustrates an effective model to bridge the gap between the informal sector and municipal waste management service needs. The organization has had considerable success in helping waste pickers in the city transition from scavenging to service provision. SWaCH improved work conditions and legitimized waste pickers' work. In 2022, 3,652 SWaCH workers—70 percent of whom were women—provided door-to-door waste collection services to 66 percent (953,072 households, including 160,000 informal establishments) of Pune's properties.³⁴ SWaCH's reliable services and continuous engagement increased residents' willingness to pay for collection services, leading to a fee recovery rate of nearly 100 percent.³⁵ On average, SWaCH members collected USD 6.8 million in user fees annually.³⁶ Complementarily, Pune reported an approximately 50 percent source segregation rate in 2017.³⁷ Additionally, pushcarts prevented the consumption of millions of liters of petrol annually, while recycling led to CO₂ emission reductions.³⁸ As co-benefits, SWaCH increased women's social standing³⁹ and improved the public perception of waste workers.⁴⁰



Complementary actions to consider

- » Cultural beliefs can perpetuate illegal dumping. For instance, in Pune, residents disposed of plastic and altar adornments in water bodies.⁴¹ Religious figures can be key messengers in promoting behavior change initiatives. Practitioners who face similar issues in other regions could train religious leaders to disseminate waste-related messaging to help shift ingrained waste practices.
- » Certain income levels may each have different barriers to proper waste disposal. Practitioners could research the drivers of open dumping for different socioeconomic groups and tailor services and outreach accordingly.



Want to know more?

[KKPKP Pune](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Census (2011), Primary Census Abstracts, Registrar General of India, Ministry of Home Affairs, Government of India.
Population in 2021: approximately 4.29 million. Source: Biswas, A., Parida, S., Chaudhary, K., Singh, R., Tewari, S., & Singh, S. (2021). Waste-wise cities: Best practices in municipal solid waste management. Centre for Science and Environment and NITI Aayog, New Delhi.
- ² Modak, P. (2007). *Strategic Action Plan for Integrated Solid Waste Management Plan, Pune (Volume I)*. Environmental Management Centre, India.
- ³ Archer, D. (2019). *Closing the loop: Innovative partnerships with informal workers to recover plastic waste, in an inclusive circular economy approach*. Regional Policy Guide. United Nations Economic and Social Commission for Asia and the Pacific. Retrieved from <https://repository.unescap.org/handle/20.500.12870/101>
- ⁴ Municipal Solid Wastes (Management and Handling) Rules, 2000. Ministry of Environment and Forests, Government of India
- ⁵ Archer, D. (2019). *Closing the loop: Innovative partnerships with informal workers to recover plastic waste, in an inclusive circular economy approach*. Regional Policy Guide. United Nations Economic and Social Commission for Asia and the Pacific. Retrieved from <https://repository.unescap.org/handle/20.500.12870/101>
- ⁶ Chikarmane, P. (2012). *Integrating waste pickers into municipal solid waste management in Pune, India*. WIEGO Policy Brief (Urban Policies) No 8. WIEGO, Cambridge, UK.
- ⁷ Urban Management Centre. (2019). *The critical role of community based organizations in urban sanitation and waste management: A compendium of case studies*. Ministry of Housing and Urban Affairs, Government of India. Retrieved from <https://nulm.gov.in/PDF/ResourceMaterial/COMPENDIUMONBESTPRACTICE.pdf>
- ⁸ Samson, M. (2015). *Forging a new conceptualization of "the public" in waste management* (WIEGO Working Paper No. 32). WIEGO, Cambridge, UK.
- ⁹ Estrada, M., Galvin, M., Maassen, A., & Hörschelmann, K. (2022). Catalysing urban transformation through women's empowerment in cooperative waste management: The SWaCH initiative in Pune, India. *Local Environment*. doi: 10.1080/13549839.2022.2090532
- ¹⁰ Ibid.
- ¹¹ Chikarmane, P. (2012). *Integrating waste pickers into municipal solid waste management in Pune, India*. WIEGO Policy Brief (Urban Policies) No 8. WIEGO, Cambridge, UK.
- ¹² Pune Municipal Corporation. (2017). *Solid Waste Management Strategy Plan 2017–2025*. Retrieved from https://www.pmc.gov.in/sites/default/files/miscellaneous/swm_appeal_english.pdf
- ¹³ The Bridge Chronicle. (2018). *PMC proposes user charges for garbage management*. Retrieved from <https://www.thebridgechronicle.com/pune/pmc-proposes-user-charges-garbage-management-26626>
- ¹⁴ Based on information received from Harshad Barde, CEO, SWaCH (December 01, 2022).
- ¹⁵ Chikarmane, P. (2012). *Integrating waste pickers into municipal solid waste management in Pune, India*. WIEGO Policy Brief (Urban Policies) No 8. WIEGO, Cambridge, UK.
- ¹⁶ Based on information received from Harshad Barde, CEO, SWaCH (December 01, 2022).
- ¹⁷ SWaCH Pune Seva Sahakari Sanstha Ltd. (2014). *SWaCH Newsletter. Volume 3, Issue 2*. Retrieved from <http://globalrec.org/wp-content/uploads/2014/03/Swach-Newsletter-English.pdf>
- ¹⁸ Based on information received from Harshad Barde, CEO, SWaCH (December 01, 2022).
- ¹⁹ Centre for Public Impact. (2021). *Waste management cooperative: Pune, India*. Retrieved from <https://www.centreforpublicimpact.org/case-study/waste-management-cooperative-pune-india>
- ²⁰ UMC – CEE. (2014). *Compendium of good practices in urban solid waste management: Involving waste-pickers to improve door-to-door collection*. NIUA, India.
- ²¹ Chikarmane, P. (2012). *Integrating waste pickers into municipal solid waste management in Pune, India*. WIEGO Policy Brief (Urban Policies) No 8. WIEGO, Cambridge, UK.
- ²² Based on information received from Harshad Barde, CEO, SWaCH (December 01, 2022).
- ²³ Ibid.
- ²⁴ Kulkarni, P. (2012, April 25). Special cleanliness drive. *The Times of India*. Retrieved from <https://timesofindia.indiatimes.com/city/pune/special-cleanliness-drive/article-show/15686454.cms>
- ²⁵ Based on information received from Harshad Barde, CEO, SWaCH (December 01, 2022).
- ²⁶ Service, O., Hallsworth, M., Halpern, D., Algate, F., Gallagher, R., Nguyen, S., Ruda, S., & Sanders, M. (2014). *EAST: Four simple ways to apply behavioural insights*. The Behavioral Insights Team.
- ²⁷ Prime Minister's Strategy Unit. (2002). *Waste Not, Want Not: A strategy for tackling the waste problem in England*. Crown, Great Britain.
- ²⁸ Kahneman, D., Thaler, R. H. (2006). Anomalies: Utility Maximization and Experienced Utility. *Journal of Economic Perspectives*, 20(1), 221–234.
- ²⁹ Based on information received from Harshad Barde, CEO, SWaCH (December 01, 2022).
- ³⁰ Byerly, H., Balmford, A., Ferraro, P. J., Wagner, C. H., Palchak, E., Polasky, S., Ricketts, T. H., Schwartz, A., & Fisher, B. (2018). Nudging pro-environmental behavior: evidence and opportunities. *Frontiers in Ecology and the Environment*, 16(3), 159–168.
- ³¹ Andrews, A. C., Clawson, R. A., Gramig, B. M., & Raymond, L. (2013). Why do farmers adopt conservation tillage? An experimental investigation of framing effects. *Journal of Soil and Water Conservation*, 68, 501–11.
- ³² Lerner, J. S., Tetlock, P. E. (1999). Accounting for the Effects of Accountability. *Psychological Bulletin*, 23 (2), 255-75.
- ³³ Sohkhlet, D., Nagargoje, S. (2020). Municipal Solid Waste Management: A comparative study between Sydney (Australia) and Pune (India). *E3S Web of Conferences*, 170, 04001. doi:10.1051/e3sconf/202017004001



- ³⁴ Based on information received from Harshad Barde, CEO, SWaCH (December 01, 2022).
- ³⁵ Ibid.
- ³⁶ Prize for Cities—SWaCH Pune Seva Sahakari Sanstha. World Resources Institute. Retrieved from <https://prizeforcities.org/project/swach-pune-seva-sahakari-sanstha>
- ³⁷ Pune Municipal Corporation. (2017). Solid Waste Management Strategy Plan 2017–2025. Retrieved from https://www.pmc.gov.in/sites/default/files/miscellaneous/swm_appeal_english.pdf
- ³⁸ Ibid.
- ³⁹ Estrada, M., Galvin, M., Maassen, A., & Hörschelmann, K. (2022). Catalysing urban transformation through women's empowerment in cooperative waste management: The SWaCH initiative in Pune, India. *Local Environment*. doi: 10.1080/13549839.2022.2090532
- ⁴⁰ Tangri, N. (2012). Pune, India: Waste pickers lead the way to zero waste. GAIA. Retrieved from <https://www.no-burn.org/wp-content/uploads/ZW-Pune.pdf>
- ⁴¹ Archer, D. (2019). *Closing the loop: Innovative partnerships with informal workers to recover plastic waste, in an inclusive circular economy approach*. Regional Policy Guide. United Nations Economic and Social Commission for Asia and the Pacific. Retrieved from <https://repository.unescap.org/handle/20.500.12870/101>



Getting people to use waste services in Nepal

Main objective: Increase willingness to pay

Other objectives: Empower people to improve accountability



Case summary

Five Nepalese municipalities introduced a set of initiatives to improve service quality and municipal solid waste management (MSWM). The initiatives simultaneously targeted service providers and residents. Each municipality introduced bespoke SWM upgrades and source segregation programs. They also introduced monthly waste fees to recoup costs. To foster accountability, each quarter an auditor assessed and dispersed funds to municipalities that met community cleanliness targets. The subsidies were phased out gradually as municipal operations improved. Jointly, municipalities and community groups conducted outreach and communication campaigns to equip residents with the tools needed to improve their MSW practices. The initiatives enhanced service provision (approximately 70 percent average collection rate), financial sustainability (>100 percent increase in revenue), and citizen engagement.



Plastic bottles at a garbage dump in a local village in south Nepal. ©Jedrasza, istock.com



Challenge statement

Technical and financial constraints limited SWM service provision and quality in Nepalese municipalities.

Context and description of challenges

Nepal (2011 population: 26,494,504)¹ generated 0.32 kg of MSW per capita per day (2013).² Under the 2011 Solid Waste Management Act, local municipalities were responsible for operating and maintaining their SWM infrastructure. The act also



Children walk past a heap of garbage dumped on roadside of Kathmandu. © Sanjit Pariyar, shutterstock.com

included a provision for household waste collection fees.³ However, in practice, both coverage and cost recovery rates were low.

Historically, SWM was an overlooked aspect of municipal operations in cities across Nepal. With growing urbanization rates, an increase in waste generation,⁴ and budgetary limitations, municipalities struggled to adequately collect, treat, and dispose waste. Low-income and rural regions often went underserved. Large and small towns were subject to waste collection rates of 90 and 62 percent, respectively.⁵ Waste collection coverage rates across the five municipalities covered in this case (Ghorahi, Dhankuta, Lalitpur, Pokhara, and Tansen) ranged from 10 to 86 percent. While the municipality of Lalitpur introduced an SWM fee payment system, the recovery rate was a meager 6 percent.

In the absence of a robust SWM infrastructure, citizens often resorted to open dumping and burning.⁶ In response, one-third of municipalities used information campaigns to promote better SWM practices. However, MSW service quality was not optimal. For instance, since the municipalities lacked the infrastructure to separately collect, treat, and dispose of different streams of MSW, citizens were disinclined to segregate their waste.⁷ In tandem, citizens felt that SWM was the municipality's responsibility and little can be changed by the population. In this context, several municipalities in Nepal sought to overcome ingrained cultural norms and barriers to improve MSWM and community cleanliness. Their efforts are the focus of this case.

Decisions and actions

In 2013, the Nepalese municipalities of Ghorahi (population: 65,107)⁸, Dhankuta (population: 163,412)⁹, Lalitpur (population: 226,728)¹⁰, Pokhara (population: 264,991)¹¹, and Tansen (population: 31,161)¹² piloted a results-based financing scheme to improve SWM services.¹³ The World Bank's Global Partnership for Output-Based Aid (GPOBA) program financially supported the initiative. Before upgrading their SWM systems, participating municipalities were required to submit details of baseline service delivery, evidence of a landfill, and financial management plans to the GPOBA. All



participating municipalities were also expected to develop a short-term action plan called the Solid Waste Management Service Improvement Plan.

The project cost USD 4.3 million, of which 70 percent was allocated for subsidies to improve SWM services. These subsidies were gradually phased out to foster a financially sustainable model for MSWM operations. The Town Development Fund (TDF), the Solid Waste Management Technical Support Centre (SWMTSC), and local municipalities jointly facilitated SWM activities.¹⁴ Accountability underpinned the project, where SWM services were verified by the TDF before funds were disbursed to municipalities. The SWMTSC supported knowledge sharing among stakeholders and provided technical support throughout the initiative. They also identified and mobilized community groups with which municipalities could collaborate to engage the public.¹⁵



REFERENCE CASE STUDY

Using behavioral insights to improve MSWM

Interventions to improve MSWM across Nepal have increased in frequency in recent years. In 2017, researchers in the Nepalese city of Bharatpur assessed the influence of low-cost infrastructure and behavioral tools on waste disposal practices. The study implemented a randomized controlled trial, where 75 communities received 1,500 strategically located 20 L street waste bins and information on waste disposal (pamphlets, posters, workshops). A control group of 75 communities did not receive the intervention. Over six months, the provision of waste bins and information increased neighborhood cleanliness by 34 percent and proper waste disposal by 13 percent relative to the baseline.¹⁶

The design

The initiative jointly sought to change the behavior of municipal authorities and waste generators. With respect to the former, the project incentivized better SWM among municipalities through a results-based payment scheme. Authorities established context-specific service delivery models for their respective municipality to bridge gaps in the provision of waste services. Their progress was assessed quarterly by an independent auditor. Audits involved a two-step process to assess the municipality's technical and financial capacity. An independent auditor from the TDF visually assessed municipal cleanliness. Municipalities' prospective quarterly subsidies were tied to their performance on these audits. This mechanism underpinned the project's accountability framework. Indirectly, the results-based payment modality increased the visibility of each municipality's SWM activities. Municipalities could therefore compare their progress and receipt of funds among their peers through word of mouth. This mode of social comparison helped fuel MSWM improvements.

External funds helped municipalities improve service delivery, which had previously been a limiting factor in residents' willingness to pay. Over time, municipalities gradually increased waste collection fees to bolster revenues and cover an increasingly greater share of waste-related costs. In tandem, subsidies from the results-based financing modality were phased out.

Complementarily, the initiative sought to improve household SWM behavior. This aspect of the initiative targeted willingness to pay for services, household source segregation, and composting. First, households and businesses were expected to pay a monthly fee for waste collection services. Four municipalities incorporated waste fees into annual property taxes, while Pokhara collected fees directly from households. Annual property tax assessments included a separate item for SWM where residents could see how much they were paying. The incremental rise in SWM fees allowed residents to acclimate to the revised system and observe tangible improvements that resulted from their payments. As residents could see their communities improve, they were increasingly willing to pay for services. Second,



households were expected to segregate their wet and dry waste. The municipalities of Lalitpur, Tansen, and Dhankuta distributed 1,000, 300, and 400 home composting bins to households, respectively.¹⁷ Lalitpur and Dhankuta also provided source segregation bins to 10,000 and 1,500 households, respectively. The provision of bins made it easier for households to engage in the desired behaviors. Complementarily, municipalities provided residents with instructions. Tole Lane Organizations (TOLs)¹⁸ and women's groups helped instill proper SWM techniques.

The government complemented core infrastructure improvements with communications activities. These initiatives targeted both government officials and municipal residents. TLO members, municipal staff, social mobilizers, women's groups, and students in respective municipalities were trained on outreach and communication activities.¹⁹ Communications campaigns encouraged proper disposal, timely waste payments, home composting, and source segregation. Municipalities distributed hats, t-shirts, and jackets with SWM-related messaging to campaigners and key stakeholders.²⁰ Information was also disseminated through leaflets and billboards.

Results

The results-based payment scheme successfully bridged the gap between available funds and waste collection operating costs. The initiative—which benefited 800,000 residents—improved service quality, increased residents' willingness to pay for waste services, and led to higher waste collection revenues.²⁵ Revenue increased by 193 percent across four participating municipalities.²⁶ As a co-benefit, participating municipalities also increased waste collection service to an average of approximately 70 percent and decreased open dumping and burning (Table 3).²⁷ Smaller municipalities were more successful in engaging and increasing residents' participation in waste-related activities. As of 2018, all municipalities practiced source segregation, and most were expanding collection coverage.²⁸

What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Creating accountability: Results-based payment schemes have been used successfully in a range of environmental programs, including SWM.²¹ However, these programs must be carefully designed to promote long-term behavior change.²² These modalities revolve around an accountability scheme. The current case study used independent agents to verify municipal SWM operations. Funds were dispersed only after the municipal passed an audit.

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: Decreasing hassles associated with service payments can increase uptake.²³ Similarly, the design of waste management programs can influence their uptake.²⁴ In the present case study, authorities incorporated waste fees into annual property taxes, simplifying payments. Further, several municipalities distributed home composting and source segregation bins to households, which increased the ease of executing the desired behaviors.



TABLE 3

Municipal-level SWM progress after the results-based payment scheme

Municipality	Waste collection rate pre-intervention (%)	Waste collection rate post-intervention (%)	Other improvements
Pokhara	60	>90	Developed a complaint redress mechanism
Ghorahi	30	52	15 percent composting rate
Lalitpur	81	>90	Collaborated with private SWM operators
Tansen	Only urban wards	40	About 80 percent households of served area are practicing source segregation and about 10 percent households were practicing household bin composting. ²⁹
Dhankuta	10	60	Developed a Material Recovery Facility 50 percent composting rate

Beyond the intervention's success within local municipalities, MSWM improvements gained national recognition. In 2017, Dhankuta was awarded the title of 'Cleanest municipality in Nepal' by the SWMTSC.³⁰ The city has established a garden over its landfill site and has opened it for paid visits from residents and government authorities, which acts as an additional source of revenue.³¹



Complementary actions to consider

- » Traditional awareness-raising campaigns can have a limited impact on changing behavior. Practitioners may consider using other behavior change approaches in tandem or integrating behavioral elements—such as leveraging positive emotions and promoting the desirable social norm—in communications materials.
- » Practitioners may consider conducting surveys or focus groups to understand barriers and motivators to waste practices like source segregation, composting, and recycling. The results from these activities could fuel future interventions and meaningfully support behavior change initiatives.



Want to know more?

[Town Development Fund, Nepal: OBA in SWM](#)



Endnotes

- ¹ Central Bureau of Statistics (2012). National Population and Housing Census 2011 (National Report). Vol. 1 NPHC 2011. National Planning Commission Secretariat, Government of Nepal.
Population in 2021: 29,192,480. Source: Central Bureau of Statistics. (2021). *National census 2078 preliminary results*. National Statistics Office, Government of Nepal.
- ² Saito, N. (2013). Solid waste management in Nepal: *Current status and policy recommendations*. Asian Development Bank. Retrieved from <https://www.adb.org/sites/default/files/publication/30366/solid-waste-management-nepal.pdf>
- ³ Act no. 4 of 2068 B.S. Solid Waste Management Act, 2068 (2011). Nepal Law Commission, Kathmandu.
- ⁴ Water Aid. (2008). *Solid waste management in Nepal*. WASH Matters, Water Aid.
- ⁵ Lypiridis, C., & Khan, I. A. (2022). *Output-based aid for solid waste management in Nepal: RBF case studies – A GPRBA retrospective*. The Global Partnership for Results-Based Approaches (GPRBA), World Bank, Washington, DC.
- ⁶ Saito, N. (2013). *Solid waste management in Nepal: Current status and policy recommendations*. Asian Development Bank. Retrieved from <https://www.adb.org/sites/default/files/publication/30366/solid-waste-management-nepal.pdf>
- ⁷ Water Aid. (2008). *Solid waste management in Nepal*. WASH Matters, Water Aid.
- ⁸ Population in 2021: 201,079. Source: Central Bureau of Statistics. (2021). *National census 2078 preliminary results*. National Statistics Office, Government of Nepal.
- ⁹ Population in 2021: 149,984. Source: Ibid.
- ¹⁰ Population in 2021: 548,401. Source: Ibid.
- ¹¹ Population in 2021: 518,452. Source: Central Bureau of Statistics. (2022). *Nepal Statistical Year Book 2021*. National Planning Commission, Nepal.
- ¹² Population in 2021: 51,470. Source: Ibid.
- ¹³ Municipality population data is from the year 2011, sourced from: Central Bureau of Statistics. (2013). *Statistical Year Book of Nepal 2013*. National Planning Commission, Nepal.
- ¹⁴ The TDF and Solid Waste Management Technical Support Centre were part of the central government. They helped implement the interventions and provided technical and capacity-building support to municipalities. The TDF also acted as a financial intermediary.
- ¹⁵ Lypiridis, C., & Khan, I. A. (2022). *Output-based aid for solid waste management in Nepal: RBF case studies – A GPRBA retrospective*. The Global Partnership for Results-Based Approaches (GPRBA), World Bank, Washington, DC.
- ¹⁶ Nepal, M., Karki Nepal, A., Khadayat, M. S., Rai, R. K., Shyamsundar, P., & Somanathan, E. (2022). Low-cost strategies to improve municipal solid waste management in developing countries: Experimental evidence from Nepal. *Environmental and Resource Economics*, 1–24. doi: 10.1007/s10640-021-00640-3
- ¹⁷ Based on information received from Upendra Khanal, Head, Environment Section, Dhankuta Municipality (February 2023).
- ¹⁸ TLOs are CBOs that operate at the neighbourhood level.
- ¹⁹ Town Development Fund. (2017). *Technical Scorecard, ITVA report of Lalitpur MPC*. TDF, Nepal.
- ²⁰ OBA Project Management Team. (2017). *Final quarterly report (April–June 2017) of OBA project municipalities submitted by Project Management Team to SWMTSC*. GPRBA.
- ²¹ World Bank. (2014). *Results-based financing for municipal solid waste*. Urban development series; Knowledge papers no. 20. World Bank, Washington, DC. Retrieved from <https://openknowledge.worldbank.org/handle/10986/20792>
- ²² Burton, R. J., Schwarz, G. (2013). Result-oriented agri-environmental schemes in Europe and their potential for promoting behavioural change. *Land Use Policy*, 30(1), 628–641. doi: 10.1016/j.landusepol.2012.05.002
- ²³ Sunstein, C.R. (2013). *Simpler: The future of government*. Simon & Schuster, New York.
- ²⁴ Johansson, K. (2016). Understanding recycling behavior: A study of motivational factors behind waste recycling. *WIT Transactions on Ecology and the Environment*, 202, 401–414.
- ²⁵ The World Bank—Brief: Solid Waste Management. Retrieved from <https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management>
- ²⁶ Lypiridis, C., & Khan, I. A. (2022). *Output-based aid for solid waste management in Nepal: RBF case studies – A GPRBA retrospective*. The Global Partnership for Results-Based Approaches (GPRBA), World Bank, Washington, DC.
- ²⁷ TDF. (2017). *Technical scorecard, ITVA report of Lalitpur MPC*. TDF, Nepal.
- ²⁸ GPOBA. (2018). *Output-based aid for municipal solid waste management in Nepal. Lessons Learned Note 15*. GPOBA (now GPRBA), World Bank, Washington, DC. Retrieved from https://www.gprba.org/sites/gpoba/files/publication/downloads/2018-06/LL15_Nepal-SolidWasteManagement.pdf
- ²⁹ OBA Project Management Team. (2017). *Final quarterly report (April–June 2017) of OBA project municipalities submitted by Project Management Team to SWMTSC*. GPRBA.
- ³⁰ Pokhrel, B. (2017). *Dhankuta dazzles with its cleanliness drive*. World Bank. Retrieved from <https://www.worldbank.org/en/news/feature/2017/11/02/dhankuta-dazzles-with-its-cleanliness-drive>
- ³¹ Bohara, S. (2020). *Waste management challenges and opportunity: Case of Dhankuta Municipality*. Ritsumeikan Asia Pacific University, Japan.



Getting people to use waste services and be more sustainable with their waste in Tanzania

Main objective: Increase willingness to pay

Other objectives: Empower people to increase accountability



Case summary

Following similar actions throughout Tanzania, the municipality of Moshi decentralized SWM operations to the ward level. This gave local authorities more autonomy to tailor operations to their needs. Moshi collaborated with community-based organizations to facilitate waste collection. Residents paid monthly fees for such services, revenues from which were channeled back into local SWM initiatives. To further engage residents, the municipality used incentives, competitions, and accountability measures. These complementary actions galvanized public participation in SWM. It also increased residents' willingness to pay for SWM services. Ultimately, decentralization led to a 90 percent collection rate and an 85 percent fee recovery rate. Moshi has since earned a reputation for being one of Tanzania's cleanest cities.

Challenge statement

In contrast to other areas of Tanzania, in the early 2000s, the municipality of Moshi relied on a centralized SWM system. The local government had underdeveloped capacities and limited resources to support MSWM operations. Moshi struggled to address the rising volumes of solid waste caused by rapid urbanization. Low collection rates increased open dumping and littering.

Context and description of challenges

Moshi (2002 population: 144,336¹) is the smallest municipality in northeastern Tanzania. The municipality is situated on the slopes of Mt. Kilimanjaro and has traditionally been the region's commerce and tourism hub. The municipality is administratively divided into two divisions. Its 21 wards are subdivided into 60 'mtaa' (cluster of streets). In 1998, the Tanzanian government introduced the Local Government Reform Policy, transferring responsibilities to local authorities.² Under this system, local authorities had more independence over financial and resource management and could implement policy reforms through bylaws.³ In the same year, Moshi established Vikosi Kazi (community-based working groups) to increase community engagement in litter management.⁴ Although other municipalities had restructured their local operations, Moshi had yet to decentralize its SWM system. With limited finances, the municipality struggled to keep up with its expanding urban population and increased waste generation. This affected the quality of public services like waste



collection rates, which historically hovered at 51 percent.⁵ Even commercial areas that generated large quantities of waste often went unmanaged.

Given the low collection rates and insufficient infrastructure for waste storage, many households—especially in lower-income areas—resorted to open dumping and burning. SWM also suffered from insufficient community participation. Residents were disinclined to participate in or take ownership of waste-related activities, as they believed SWM was exclusively the public authorities' responsibility. Residents also felt that paying taxes absolved their responsibility.⁶

The SWM system underwent significant changes after the municipality implemented the Sustainable Cities program between 2001 and 2006. The program donated trucks to support secondary waste collection. It also invested in a functioning waste collection system. The program improved the municipality's capacity to collect and treat MSW.⁷ In 2006, the average daily per capita waste generation rate was approximately 0.7 kg and was expected to grow alongside urbanization.⁸ As SWM was one of the foremost challenges facing the municipality, the council recognized the need to mobilize the community to improve it. Moshi saw decentralization as an opportunity to improve MSWM and empower residents to undertake greater SWM responsibilities.

Decisions and actions

In 2006, the Moshi Municipal Council enacted an environmental bylaw to formally decentralize the SWM system to the ward level.⁹ In 2005–2006, the municipal council conducted consultation meetings with the main stakeholders, including the general public. Through these meetings, waste management gained greater support and public buy-in.¹⁰ The bylaw carefully laid out stakeholders' roles in improving waste management, placing equal emphasis on residents to appropriately dispose of their waste and on the council to manage waste. The bylaw introduced waste collection charges for households, business units, and institutions. A network of ward officers, environmental and health authorities, and local leaders monitored the SWM system at ward and mtaa levels.¹¹

The design

Following the bylaw's introduction, Moshi officially decentralized the SWM system to the ward level. Wards were responsible for litter management, basic road maintenance, and household solid waste collection.¹² This tailored system was designed to foster a sense of community ownership. As ward-level SWM services were closest to waste generators, residents could better relate to the services relative to the previous centralized system. Moshi used both curbside waste collections and communal collection points. The municipality collaborated with community-based organizations (CBOs) to collect waste in low-income areas.¹³ Residents' willingness to participate increased once they saw the cleanliness of public areas improve.¹⁴

Introduced regulations defined waste generators' responsibilities. Through the decentralized system, households paid a monthly fee of up to TZS 1,000 (approximately USD 0.47) for waste collection services. Hotels, businesses, and markets paid between TZS 3,000 and 65,000 per month depending on the institution.¹⁵ Ward environmental committees collected fees and fined litterers. They consisted of political figures, ward health officers, and non-staff community members. Wards spent most revenues locally and transferred 3 to 5 percent to the municipality for vehicle maintenance.¹⁶ Wards channeled accrued fees into local initiatives (for example, monthly cleanups) and toward service provision (for example, equipment, fuel, and labor costs). Revenues also contributed to landfilling costs (TZS 5,000, or approximately USD 2.4, per trip). This system ultimately gave wards greater control over how they managed their resources.¹⁷ Additionally, residents could see how their payments improved the SWM services they used. Members of the municipal waste management department monitored ward activities daily, which they reported to a centralized committee.¹⁸ Following these upgrades, ward-level authorities set up a mechanism to address citizen grievances.¹⁹ Their responsiveness encouraged households to pay into the system.

The municipality used rewards, accountability, and negative incentives to promote compliance with the bylaw. The municipality empowered residents to report and fine



other citizens for littering (up to TZS 50,000 or approximately USD 21). Citizens subsequently submitted the fine to the local council, which individuals who were fined could appeal with the local council.²⁰ Influential figures (for example, ward-level and mtaa political leaders) actively encouraged residents to comply with ongoing cleanliness campaigns.²¹ Additionally, local Chaga and Pare ethnic groups advocated for cleanliness standards throughout Moshi.²² To further deter littering around commercial and public areas, Moshi created an extensive network of waste bins and well-located drop-off facilities (near markets and bus stations).²³ This network made waste disposal more accessible.

In the early 2000s, Moshi began participating in the National Health and Environmental Sanitation competition alongside other Municipal Councils. This competition aimed to increase commitment, responsibility, and community participation in conservation activities. It assessed each municipality's infrastructure and service provision (for example, water and sanitation services). It also measured compliance with and rewarded creativity in implementing the bylaw.²⁴ The competition ranked councils against one another based on administrative status, which encouraged them to prioritize environmental cleanliness. The competition awarded winners with money, equipment (for example, trucks), and a certificate from the Vice President's office. This national competition also acted as a catalyst for Moshi to create cleanliness competitions at the ward and mtaa levels. In some cases, these competitions gave

Aerial view of the city of Moshi, Tanzania. © Moiz Husein Storyteller, shutterstock.com



monetary and material prizes to winners (TZS 300,000 or USD 128 for first place, TZS 200,000 or USD 85 for second place, TZS 150,000 or USD 64 for third place). The competition also issued certificates of recognition to mtaa, citizens, and wards for exceptional performance.²⁵

The municipality accompanied the measures with environmental education initiatives, mass media campaigns, cleanup days, and educational signs. For instance, the council used radio programs and artistic posters to highlight proper waste behaviors.²⁶ In conjunction with the private sector, the municipality ran awareness campaigns illustrating the environmental impacts of improper waste disposal. The municipality similarly worked with schools to instill proper waste-sorting and composting behavior in primary students.²⁷



Moshi Municipal Council waste collection bin. © ICLEI – Local Governments for Sustainability

What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Creating accountability: Accountability mechanisms—particularly those that co-opt citizens—can help enforce environmental regulations.²⁸ In the present case study, the municipality encouraged citizens to hold each other accountable. Citizens who witnessed littering could issue fines to the perpetrator. Each ward had an environmental committee and a police unit. The environmental police rewarded anyone who caught a polluter with 50 percent of the fine. This mechanism encouraged residents to comply with relevant bylaws. However, this tactic may not work well in every community, may generate social tension, and may clash with public safety agencies and responsibilities. Governments should consider local cultures, habits, and laws before implementing a similar initiative.



Social comparison: Research suggests that comparisons among peers, such as competitions, can promote sustainable behaviors.²⁹ In Moshi, national and area competitions encouraged residents to prioritize community cleanliness. The national competition assessed bylaw compliance, SWM technology, and each municipality's strategies for environmental protection. It then ranked municipalities. Similarly, local competitions ranked participating 21 wards and 60 mtaa. The municipality used local competitions to prepare the region for the national competition.

SYSTEM DESIGN MECHANISMS



Accessible services: The literature suggests that littering decreases as opportunities for waste disposal increase.³⁰ In the present case study, Moshi Municipal Council increased the availability of waste collection infrastructure and conveniently located drop-off facilities. In doing so, the municipality made it easier for residents to engage in proper waste disposal.



Results

Decentralization led to more participatory approaches in waste management. Collaborations between CBOs, ward authorities, and the municipality increased cleanliness and developed trust among citizens. This increased the waste collection rate to approximately 90 percent (2016).³¹ In turn, residents were more willing to pay waste service fees which increased the recovery rate to approximately 85 percent.³² Residents also felt increasingly responsible for maintaining residential and public areas. Proper waste disposal streamlined waste collection and alleviated the strain on the municipal council. Due to the municipality's concerted efforts, Moshi received Tanzania's cleanest city honor in the National Health and Environmental Sanitation competition on 12 occasions.³³

Several factors challenged Moshi's SWM system in recent years. First, rural-urban migration increased littering, as new residents were unaccustomed to the municipality's norms and environmental regulations. Additionally, new unofficial housing developments for immigrants undermined the council's ability to perform SWM collections.³⁴ Moshi's attempts to decrease waste generation rates also faced challenges. Despite a legal mandate to reduce waste generation at source, such rates have yet to decline.³⁵

Moshi's commitment to accountability, education, and waste collection made the municipality an example of effective waste management. Its success mobilized municipal authorities in Mwanza³⁶ and Morogoro to replicate this model.³⁷



Complementary actions to consider

- » Moshi Municipal Council primarily used awareness raising to precipitate reductions in landfilled waste. However, this can have a limited influence on behavior change. If implementing a similar intervention, practitioners could test the efficacy of various behavioral approaches such as messengers to teach residents skills like composting or reusing waste.
- » The frequency of littering increased following an influx of newcomers to the region. Social norms can be powerful drivers in waste management and littering.³⁸ Governments facing similar issues to proper waste disposal could test the relative effectiveness of various social norms messaging to deter littering among newcomers, highlighting that it is socially discouraged.



Want to know more?

[Cleansing and Environment Department, Moshi Municipal Council Sanitation and Environment By-law](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Mhina, A., Contamin, B., Milanese, J., Palela, E., & Morel A L'Hussier, A. (2003). *The improvement of the sanitation services in Moshi (Tanzania): Demand analysis and sector regulations*. Sustainable Management of Urban Waste and Waste Water Research Program, French Foreign office (Paris). Retrieved from https://hal.archives-ouvertes.fr/hal-00494012/file/Research_report_-_The_improvement_of_sanitation_services_in_Moshi.pdf
Population in 2021: 233,016; Source: US Census Bureau. (n.d.) *Tanzania annual five-year age group population estimates by sex for 2015 to 2030: National, and First- and Second-Order Administrative Divisions*. Retrieved from <https://www2.census.gov/programs-surveys/international-programs/tables/time-series/pepfar/tanzania.xlsx>
- ² Liyala, C. M. (2011). Modernising solid waste management at municipal level—Institutional arrangements in urban centres of East Africa. *Environmental Policy*, 3. ISBN: 978-90-8686-189-7.
- ³ President's Office Regional Administration and Local Government. (n.d.) *Local government reform in Tanzania. United Republic of Tanzania*. Retrieved from <https://kongwadc.go.tz/storage/app/uploads/public/590/a3d/df6/590a3ddf6eed8686200693.pdf>
- ⁴ Based on information received from Vaine Kombe, Head of Environment and Sanitation Department, Moshi Municipal Council (December 7, 2022).
- ⁵ Mhina, A., Contamin, B., Milanese, J., Palela, E., & Morel A L'Hussier, A. (2003). *The improvement of the sanitation services in Moshi (Tanzania): Demand analysis and sector regulations*. Sustainable Management of Urban Waste and Waste Water Research Program, French Foreign office (Paris). Retrieved from https://hal.archives-ouvertes.fr/hal-00494012/file/Research_report_-_The_improvement_of_sanitation_services_in_Moshi.pdf
- ⁶ Kalwani, J. D. S. (2001). The effect of rapid urbanization on the environment: A case study of Moshi Municipality, Tanzania. *Tanzania Journal of Population Studies and Development*, 8(1), 11–26.
- ⁷ DANIDA. (2010). *Evaluation of programmatic approaches to support for the environment in Africa 1996–2009*. Annex 4: Tanzania case study. Ministry of Foreign Affairs of Denmark.
- ⁸ Mhina, A., Contamin, B., Milanese, J., Palela, E., & Morel A L'Hussier, A. (2003). *The improvement of the sanitation services in Moshi (Tanzania): Demand analysis and sector regulations*. Sustainable Management of Urban Waste and Waste Water Research Program, French Foreign office (Paris). Retrieved from https://hal.archives-ouvertes.fr/hal-00494012/file/Research_report_-_The_improvement_of_sanitation_services_in_Moshi.pdf
- ⁹ Sheria Ndogo Za Halmashauri Ya Manispaa Ya Moshi (Ada Na Ushuru) Za Mwaka (2006). Tangazo La Serikali Namba 25 La Tarehe 10/03/2006 Sheria Za Serikali Za Mitaa 1982 Namba 9 Ya Mwaka 1982. (*By-laws of Moshi Municipal Council-(Fees and Taxes) for the Year 2006*). Government Announcement Number 25 Dated 10/03/2006. LOCAL GOVERNMENT ACT 1982—Number 9 of the Year 1982.
- ¹⁰ Based on information received from Vaine Kombe, Head of Environment and Sanitation Department, Moshi Municipal Council (December 7, 2022).
- ¹¹ Yhdego, M., and Kingu, A. (2016). Solid waste management in urban centers of Tanzania: Leapfrogging towards a circular economy. Research Report Number 1. *Waste Management and Research Journal*.
- ¹² Based on information received from Hidaya Mwamtemi, Ward Executive officer, Bondeni ward (December 7, 2022).
- ¹³ Yhdego, M., & Kingu, A. (2016). Solid waste management in urban centers of Tanzania: Leapfrogging towards a circular economy. Research Report Number 1. *Waste Management and Research Journal*.
- ¹⁴ Based on information received from Hawa Idi, Fruit vendor/resident—Mbuyuni market (December 7, 2022).
- ¹⁵ Khamis, A. A. (2016). *Effectiveness of solid waste management systems in local government authorities in Tanzania: The case of Moshi Municipal Council*. Mzumbe University, Tanzania. Sheria Ndogo Za Halmashauri Ya Manispaa Ya Moshi (Ada Na Ushuru) Za Mwaka (2006). Tangazo La Serikali Namba 25 La Tarehe 10/03/2006 Sheria Za Serikali Za Mitaa 1982 Namba 9 Ya Mwaka 1982. (*By-laws of Moshi Municipal Council-(Fees and Taxes) for the Year 2006*). Government Announcement Number 25 Dated 10/03/2006. LOCAL GOVERNMENT ACT 1982—Number 9 of the Year 1982.
- ¹⁶ Based on information received from David Kimario, Environmental Officer, Moshi Municipal Council (December 7, 2022). Based on information received from David Kimario, Environmental Officer, Moshi Municipal Council (December 7, 2022).
- ¹⁷ Based on information received from Hidaya Mwamtemi, Ward Executive officer, Bondeni ward (December 7, 2022).
- ¹⁸ Yhdego, M., & Kingu, A. (2016). Solid waste management in urban centers of Tanzania: Leapfrogging towards a circular economy. Research Report Number 1. *Waste Management and Research Journal*.
- ¹⁹ Omar, H. (2020). Implication of refuse collection charges practices on waste collection service in selected urban areas in tanzania. *GSJ*, 8(3).
- ²⁰ Majoe, N., & Currie, P. (2021). *Environmental cleanliness in Moshi, Tanzania. Lessons for waste collection, service delivery and revenue generation*. INTERACT-Bio project. ICLEI. Retrieved from <https://interactbio.iclei.org/resource/moshi-environmental-cleanliness-and-waste-2/>
- ²¹ Based on information received from Vaine Kombe, Head of Environment and Sanitation Department, Moshi Municipal Council (December 7, 2022) and Paulo Chageme, Health Officer, Bondeni ward Moshi (December 7, 2022).
- ²² Based on information received from Sifaeli Tuluwene Kulanga, Acting Municipal Director-Moshi Municipal Council (December 7, 2022).
- ²³ Majoe, N., & Currie, P. (2021). *Environmental cleanliness in Moshi, Tanzania. Lessons for waste collection, service delivery and revenue generation*. INTERACT-Bio project. ICLEI. Retrieved from <https://interactbio.iclei.org/resource/moshi-environmental-cleanliness-and-waste-2/>
- ²⁴ Office of the Vice President. (2021). Mwongozo wa Tuzo Ya Taifa Ya Hifadhi na Usimamizi Wa Mazingira. *Guidelines for the National Conservation and Environmental Management Award*. United Republic of Tanzania.



- ²⁵ Based on information received from Vaine Kombe, Head of Environment and Sanitation Department, Moshi Municipal Council (December 7, 2022).
- Khamis, A. A. (2016). *Effectiveness of solid waste management systems in local government authorities in Tanzania: The case of Moshi Municipal Council*. Mzumbe University, Tanzania.
- Majoe, N., & Currie, P. (2021). *Environmental cleanliness in Moshi, Tanzania. Lessons for waste collection, service delivery and revenue generation*. INTERACT-Bio project. ICLEI. Retrieved from <https://interactbio.iclei.org/resource/moshi-environmental-cleanliness-and-waste-2/>
- ²⁶ Based on information received from Paulo Chageme, Health Officer, Bondeni ward (December 7, 2022).
- ²⁷ Based on information received from Vaine Kombe, Head of Environment and Sanitation Department, Moshi Municipal Council (December 7, 2022).
- ²⁸ Roberts, E., Dobbins, J., & Bowman, M. (1992). *The role of the citizen in environmental enforcement*. Second International Conference on Environment Compliance and Enforcement. 22–25.
- ²⁹ Van Horen, F., van der Wal, A., & Grinstein, A. (2018). Green, greener, greenest: Can competition increase sustainable behavior? *Journal of Environmental Psychology*, 59, 16–25.
- ³⁰ Schultz, P. W., Bator, R. J., Large, L. B., Bruni, C. M., & Tabanico, J. J. (2013). Littering in context: Personal and environmental predictors of littering behavior. *Environment and Behavior*, 45(1), 35–59.
- ³¹ Yhdego, M. & Kingu, A. (2016). Solid waste management in urban centers of Tanzania. Leap-frogging towards a circular economy. Research Report Number 1. *Waste Management and Research Journal*. doi: 10.13140/RG.2.2.15647.15520
- ³² Omar, H., & Bullu, S. (2021). National Journal of Environmental Law analysing the compliance of the national solid waste management related legislations in selected local government authorities in Tanzania. *Journal of Environmental Law and Litigation*, 4. doi:10.37591/NJEL
- ³³ Based on information received from Vaine Kombe, Head of Environment and Sanitation Department, Moshi Municipal Council (December 7, 2022).
- ³⁴ Khamis, A. A. (2016). *Effectiveness of solid waste management systems in local government authorities in Tanzania: The case of Moshi Municipal Council*. Mzumbe University, Tanzania.
- ³⁵ Omar, H., & Bullu, S. (2021). National Journal of Environmental Law analysing the compliance of the national solid waste management related legislations in selected local government authorities in Tanzania. *Journal of Environmental Law and Litigation*, 4. 10.37591/NJEL.
- ³⁶ Moshi Municipal Council. (2018). *Halmashauri zajifunza siri ya mafanikio ya usafi (Councils learn the secret of success in cleaning)*. President's Office Regional Administration and Local Government, The United Republic of Tanzania. Retrieved from <https://moshimc.go.tz/new/halmashauri-za-jifunza-siri-ya-mafanikio-ya-usafi>
- ³⁷ Mboya, A., Mponeja, F., Masembejo, M. L., Donge, L. N., & Kinawiro, N. T. (1999). *Environmental profile of Moshi Municipality*.
- ³⁸ Perry, M., Juhlin, O., & Normark, D. (2010). Laying waste together: The shared creation and disposal of refuse in a social context. *Space and Culture*, 13(1), 75–94.



2.1.2 Empower people to improve accountability



RETURN TO CASE
SELECTION

Getting people to use waste services in Mali

Objective: Empower people to improve accountability



Case summary

Bamako launched a series of interrelated activities to reform MSWM through grassroots governance. To meet this objective, neighborhoods formed grassroots neighborhood SWM associations to encourage residents to better manage their waste. Complementarily, trainings, influential figures, and accountability tactics were used to encourage uptake. Owing to the consistent efforts of stakeholders, community participation in waste management and residents' SWM subscriptions to private operators increased. These activities led to cleaner neighborhoods and reduced the incidence of sanitation-related diseases. Over the past 30 years, neighborhood SWM associations and community-based private sector operators (Groupement d'Intérêt Economique, GIEs) have continued to provide MSW support despite recurring conflict in the region. Residents' positive waste disposal habits have also persisted. These early activities paved the groundwork for the city's SWM improvements planned currently.



The Boulevard du Peuple in Bamako, Mali. © Anne Czichos istock.com



Challenge statement

Bamako struggled with social, technical, and financial aspects of SWM. Limited resources, insufficient infrastructure, and inadequate communication constrained SWM operations. Additionally, many households were unwilling to pay for or could not afford SWM services. Without sufficient revenue, private operators were unable to provide adequate waste collections. The political economy was also complicated due to reoccurring conflict and fragility.

Context and description of challenges

Bamako, Mali's capital city, is divided into six municipalities (also known as communes), each of which is subdivided into neighborhoods. In the decades preceding the intervention, Bamako struggled to keep pace with population expansion that resulted from urbanization and a high birth rate.¹ Before the 1990s, the city used communal waste collection bins serviced by the municipalities. The number of communal bins was insufficient and the bins were located far apart, which meant that open dumping throughout the city was prevalent. In the 1990s, Bamako transitioned to a door-to-door model intended to increase public use of waste collection services and reduce dumping. The model relied on community-based private enterprises (*Groupement d'Intérêt Economique*, GIEs) that performed door-to-door collections against monthly paid subscriptions (CFAF 750 or USD 1.25 per month).² The GIEs deposited the waste at temporary storage sites/transfer stations. The municipality collected the waste from the transfer stations and deposited it in designated final disposal areas or sometimes farmers' fields, who used the organic fraction as fertilizer.³

As the process of decentralization in Mali intensified, civil society began to play a much greater role in local affairs. Neighborhood groups, committees, and associations were rooted in West African tradition. They became active in a variety of areas including sanitation, health, and education. These were voluntary groups that, unlike GIEs, did not earn a profit. Over time, these groups proliferated throughout Bamako and many benefited from donor support. Some of these were small-scale waste

management groups⁴ in which women were quite active and recognized as social representatives of cleanliness.⁵ The groups both assisted and monitored the work of GIEs. This oversight provided a useful function in the absence of more traditional engagement by the municipality with GIEs' activities.

One of Bamako's municipalities, Commune IV (1997 population: 221,494 inhabitants⁶), was especially eager to create more participatory approaches in waste management and better integrate GIEs as partners including through the involvement of *neighborhood waste management associations*.⁷ This case study uses Commune IV to highlight Bamako's embrace of bottom-up waste management approaches.

Decisions and actions

Several activities took place in succession to increase grassroots SWM participation. First, the municipal government in Commune IV created an initiative called the *Urban Development Program in Commune IV* (PDUC.IV) to provide financial support, training, and monitoring for waste management activities to GIEs.⁸ At the same time, Bamako introduced a new law to increase coordination between municipalities and GIEs⁹ which led to the formation of the *Coordination of Partners in Waste and Environmental Management in Commune IV* (CPAC) committee. The committee coordinated primary waste collection activities in Commune IV, facilitated PDUC.IV stakeholder interactions, managed conflicts, and provided technical SWM advice.¹⁰ These early activities provided a strong basis for collaborative top-down and bottom-up MSWM.

Second, to increase citizen engagement in MSWM, the municipality introduced an intervention alongside CPAC and PDUC.IV, which was funded by a Netherlands-based NGO called WASTE.¹¹ Its goal was to increase grassroots involvement in MSWM, improve neighborhood cleanliness, and strengthen coordination among relevant actors (households, the municipality, and GIEs). The intervention built on the existing GIE door-to-door MSW collection model.



As part of the latter initiative, an SWM audit was initially conducted for each neighborhood to inform its design and implementation. Thereafter, stakeholders (PDUC, IV, CPAC, the municipality, GIEs, UWEP, and neighborhood chiefs) established annual work plans to improve MSWM. To catalyze better community-led waste management and shift residents' habits, neighborhoods created grassroots *neighborhood SWM associations*. These associations complemented Commune IV's existing small-scale waste groups. All stakeholders evaluated and reported their progress, which was compared against annual work plans. Evaluation reports were presented at workshops to improve waste management operations.¹² All activities were co-designed and implemented by residents across social groups, including women and the population's more disadvantaged members. This intervention provided the basis for better SWM behaviors among residents.

In 2003, the government introduced new SWM regulations and oversight of GIEs, including the requirement for formal contracts between the GIEs and municipalities and requirements for GIEs to organize in a single commune cooperative. Only one commune (Commune V) had such a contract with GIEs in its territory. GIE service provision was also affected by the fact that in 2013, the central government entered into a contract with a private company from the sub-region to collect waste from households and transport it to the disposal site. Between 2013 and December 2022, when this contract ended, the role of GIEs somewhat decreased, although, in most cases they continued to provide services and collect waste from households for a fee parallel to activities by the sub-regional operator.¹³ As of early 2023, GIEs continue to perform door-to-door waste collections and transport waste to temporary sites (nine such sites in Bamako). However, secondary collection from temporary sites to final disposal is currently minimal.

The design

The intervention bridged the gap in citizen engagement in SWM as it adhered to local norms, values, and cultural practices which helped build trust with the community and increase residents' receptivity to project activities.

At the outset, stakeholders spent six months understanding waste management practices in each neighborhood. The audit accounted for Commune IV's history, social structure, culture, and current issues impeding progress. This process provided an opportunity for residents to voice their concerns and priorities. Separate meetings were held with women, men, and youth to give all residents an equal opportunity to speak.¹⁴ The audit's results were discussed in a municipality-wide meeting. Feedback informed the intervention's scope and activities, which established community buy-in. For instance, residents prioritized functional over structural changes (for example, organization and training) to the waste management system. For that reason, capacity-building activities followed, in which *neighborhood SWM associations* were trained on communication techniques, environmental awareness, and project management skills. Residents were similarly taught about their individual and collective waste management responsibilities.¹⁵

As one of the core intervention activities, neighborhoods formed *grassroots SWM associations* (20,000–50,000 individuals) formally called Associations for Waste Management and Protection of the Environment. These associations complemented Commune IV's rich network of preexisting community groups and drew on residents' strong community ties. Each *neighborhood SWM association* contained several subcommittees, which helped coordinate operations. Similar to neighborhood associations elsewhere in Bamako, these were democratically run and collectively established a vision for waste management. Most neighborhoods elected a woman as their association's president, given their importance in household waste-related activities and worked with the municipality to increase the effectiveness of MSWM.¹⁶

Local relationships and grassroots support were critical to boosting MSWM. *Neighborhood SWM associations* monitored SWM practices, conducted sensitization activities, reprimanded improper waste activities, and encouraged residents to subscribe to and pay for GIE waste collection services. Their oversight and close relationships with residents ensured that residents were held accountable for their actions. To improve community cleanliness, these *neighborhood SWM associations* organized monthly cleanup campaigns and conducted events to disseminate messages about waste management. Community members with high social standing



(for example, neighborhood chiefs) were preferentially used to increase the community's uptake of better SWM practices. These individuals—commonly referred to as Sanya Tigi—supported waste management operations, conducted outreach, sat on subcommittees, and monitored breaches in waste management guidelines. Sanya Tigi also mediated conflicts among citizens and with the public and private sectors. The interactions between influential community members and residents were paramount to increasing residents' willingness to pay for waste services and practice proper waste disposal. Additionally, residents slowly started seeing the tangible benefits of the intervention, which encouraged their participation.¹⁷

Local laws provided more formal oversight of and dictated SWM responsibilities. *Neighborhood SWM associations* supplemented rules and regulations prescribed by the government with a bespoke set of waste-based social norms. Norms were sensitive to residents' socioeconomic conditions and revolved around residents' desires for a clean environment. For example, residents were expected to properly dispose of residual waste and segregate waste at source and could not cultivate tall crops. These prescriptive norms further reinforced the shift toward bottom-up community-based MSWM.

Throughout the intervention, residents placed waste in metal waste bins in front of their house for collections. GIEs worked with the communities to collect and transport waste to transfer stations using donkey-pulled carts. Gradually, both within and beyond Commune IV, *neighborhood SWM associations* started to shift residents' behaviors from open dumping to proper waste collection. Because of *neighborhood SWM associations*, residents citywide also started to increase their engagement with GIEs and pay for waste services. Thereafter, GIEs became engrained into Bamako's local culture and society.

Following the initial intervention, GIEs provided continuity for local MSWM services throughout Bamako during the 2000s and early 2010s. GIEs continued to provide services—either formally or informally—during the subsequent period between 2013 and 2022 when a private operator was in place. They performed primary door-to-door waste collections using animal-drawn or human-powered carts and tractors. During this time, residents continued to engage with and pay GIEs.¹⁸ Women similarly continued to play a significant role in waste management, forming a significant part of the GIE workforce and made up the majority of informal workers. Today, GIEs continue to collect waste from residents and bring it to temporary storage sites.

Unlike the constant presence of GIEs, the role of other civil society actors lessened after 2000 coinciding with the increase in government responsibility. Despite their diminished role, *neighborhood SWM associations*, health committees, women, and neighborhood chiefs continued to conduct periodic SWM outreach and coordinated cleanup campaigns. Outreach activities primarily targeted women, who bore the majority of waste-related responsibilities. Grassroots activities also persisted on a smaller scale. For instance, grassroots sanitation committees were established in each commune to monitor waste collection services by GIEs and conduct monthly public cleanup days.¹⁹ Women's groups and GIEs also disseminated door-to-door sensitization activities around proper SWM.²⁰ Complementarily, communal platforms—which acted as intermediaries between the associations and the municipality—supported household outreach and engagement. Notably, Commune IV established the Commune Urban Waste Steering Committee to establish synergies among actors and the Waste Management and Valorization Committee (COGEVAD) in Commune VI organized outreach and trainings sessions for GIEs, health committees, women's groups, and the government.



What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Messengers: Research suggests the identity of the person delivering a message can affect whether individuals are receptive and how they ultimately behave.²¹ In Commune IV, members with high credibility ('Sanya Tigi') ensured residents' adherence to established norms on waste management. Elsewhere in Bamako, civic groups hosted sessions every Sunday at socio-collective centers (for example, schools and places of worship) to teach people the importance of registering for waste collection services.²² *Neighborhood SWM associations* and women's groups further disseminated messages on proper SWM behaviors.



Social norms: Social norms can be a powerful tool to promote pro-environmental behavior.²³ One category of social norms—prescriptive norms—describes what people ought to do. Prescriptive norms are a more traditional tool, relative to descriptive norms or dynamic social norms, used in policy to promote behavior change. In Commune IV's neighborhoods, community members collectively drafted and agreed to a set of prescriptive norms on cleanliness and waste management in public meetings. Both rural and urban neighborhoods established separate norms for their respective communities which were sensitive to socioeconomic constraints.²⁴



Creating accountability: People are drawn to show their best image to maintain their social status. In Bamako, the pilot leveraged several mechanisms to foster accountability among residents. For example, *neighborhood SWM associations* oversaw the cleanliness of public places, monitored citizen behavior, and discouraged incorrect waste disposal. As associations and influential figures consistently oversaw and interacted with citizens, citizens sought to present their best self by improving their SWM behaviors.



Feedback: In certain contexts, feedback can be an effective tool to promote positive waste management behaviors.²⁵ At the outset of the intervention, feedback informed its scope and activities. Throughout the intervention, feedback took place between and among relevant actors (private sector, municipality, NGOs, and citizens) which helped continually improve waste management operations.



Preconditions and challenges

- » In Commune IV, residents had strong community ties and existing community associations. Women were also actively involved in community waste management activities. These factors provided a strong foundation on which municipality-wide waste management initiatives could build. Neighborhood SWM associations continue to exist in Bamako and provide SWM support to residents.
- » Notwithstanding the formation of neighborhood SWM associations, commune improvements were largely subject to financial constraints. Many residents had limited disposable income, which affected the extent to which they could facilitate and engage with waste management associations' activities.
- » The government had limited human, financial, and technical resources to support SWM operations across communes. Despite the ambition of a better SWM system, these factors constrained waste collection infrastructure, equipment, and services.
- » Ongoing shocks and stressors within Mali have had reverberating effects on all aspects of the country, including its SWM services. While the initial intervention provided an enabling environment for better MSWM, such factors have limited the sector's further progress. Nonetheless, GIEs and other grassroots SWM efforts have persisted to the present day. GIEs have been a constant both before and after the intervention; their consistency has underpinned SWM operations throughout Bamako.



Results

This case study is an example of how grassroots waste management initiatives can exist in parallel with and complement formal SWM services. It is also emblematic that such initiatives can thrive in regions despite political turmoil. In Commune IV, interventions changed the way that residents disposed of waste by reducing waste burning and dumping and increasing household SWM subscriptions and waste collection. These activities led to cleaner neighborhoods, which reduced the incidence of sanitation-related diseases (for example, diarrhea and malaria).²⁶ The intervention also empowered residents to become more involved in environmental decision-making. Since this early intervention, grassroots *neighborhood SWM associations* now exist throughout the nation.²⁷ Other municipalities also used the intervention activities in Commune IV as a model for their waste management projects.²⁸ Within Bamako, the positive SWM practices that *neighborhood SWM associations* instilled in residents have been sustained to present day.

Remarkably, both *neighborhood SWM associations* and GIEs have maintained a presence throughout the region despite ongoing political instability and conflict. While the role of *neighborhood SWM associations* has diminished since the early 2000, GIEs survived over the past 30 years even with changes in the SWM operating model, government regulations, and the presence of other contractors. As of 2021, approximately 126 GIEs throughout Bamako provided thrice weekly pre-collection waste services to 36.5 percent of households (CFAF 2,500–3,000 or approximately USD 4.05–4.85 per month). The fee recovery rate varies between 30 and 50 percent.²⁹ GIE activities are currently assisted technically and financially by a network of NGOs and international development organizations. *Neighborhood SWM associations* and women's groups continue to support household and neighborhood-level outreach activities to reinforce positive waste management behaviors.

Bamako is starting to implement a multiyear urban resilience project to improve access to SWM services and strengthen its urban management capacity. Activities include rehabilitating and expanding SWM infrastructure—such as landfills and

recycling and sorting facilities—and improving waste collection, transfer, and treatment. Complementarily, the project will build government capacity to manage solid waste and establish strategic private sector partnerships.³⁰



Complementary actions to consider

- » The SWM sector often contains a myriad of formal and informal SWM actors. Without a way to regulate and coordinate actors, the quality of public services may suffer. Governments could consider using intermediary bodies to help facilitate dialogue between and among relevant parties. An intermediary body could also help avoid duplication of efforts.
- » In the absence of agreed service standards, performance metrics, and monitoring by municipalities, service providers are likely to service better-off households and customers willing and able to pay, leaving behind slum and low-income areas (that is, so-called cherry-picking). Municipalities that use similar delivery models should explore ways to promote service expansion while in parallel increasing provider accountability. Behaviorally informed incentives or social comparisons may prove fruitful.



Want to know more?

[UWEP Report \(2001\)](#)

[Bamako Urban Resilience Project](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Keita, M. (2001). *Building partnerships for urban waste management in Bamako*. Making Decentralisation Work (MDW), IIED, Ouagadougou, Burkina Faso.
- ² Grant Thornton (2023). *Projet de résilience urbaine de Bamako (PRUBA). Diagnostic et facteurs limitants de la gestion des déchets dans le district de Bamako*. Rapport provisoire révisé. Ministère des Affaires Foncières, de l'Urbanisme et de l'Habitat
- ³ Muller, M. S., Iyer, A., Keita, M., Sacko, B., & Traore, D. (2002). Differing interpretations of community participation in waste management in Bamako and Bangalore: Some methodological considerations. *Environment and Urbanization*, 14(2), 241–258.
Keita, M. (2001). *Building partnerships for urban waste management in Bamako*. Making Decentralisation Work (MDW), IIED, Ouagadougou, Burkina Faso.
- ⁴ ALPHALOG. (1999). *Etude sur la dynamique associative dans le District de Bamako (Study on the dynamics of associations in the District of Bamako): Rapport de mission*. ALPHALOG, Mali.
- ⁵ Traoré, D., Keita, M., Sacko, B., & Muller, M. (2000). *Citizen involvement in clean-up activities in Bamako - Lessons from an action research project in Commune IV: UWEP Working Document 13*. WASTE, Netherlands.
- ⁶ Traoré, D., Keita, M., Sacko, M., & Muller, M. (2003). *Citizen involvement in clean-up activities in Bamako: Lessons from an action research project in Commune IV - UWEP Working Document 13* (translated and condensed from French version). WASTE, Netherlands. Retrieved from <https://www.ircwash.org/sites/default/files/Traore-2003-Citizen.pdf>.
Population in 2018: 407,074, Source: Dembélé, M. (2021). Étude épidémiologique et clinique du paludisme chez les femmes enceintes au centre de référence de la commune IV du district de Bamako. Université des Sciences, Faculté de Médecine et d'Odontologie Techniques et des Technologies stomatologie (FMOS) de Bamako (USTTB), Bamako.
- ⁷ Ibid.
- ⁸ Muller, M. S., Iyer, A., Keita, M., Sacko, B., & Traore, D. (2002). Differing interpretations of community participation in waste management in Bamako and Bangalore: some methodological considerations. *Environment and Urbanization*, 14(2), 241–258.
Keita, M. (2001). *Building partnerships for urban waste management in Bamako*. Making Decentralisation work (MDW). IIED, Ouagadougou, Burkina Faso.
- ⁹ La lettre circulaire N° 0010/DB-GD du 9 Mars 1993 relative à la réglementation des interventions des organisations de ramassage dans le District de Bamako (Circular letter N° 0010/DB-GD of March 9, 1993 relating to the regulation of the interventions of collection organizations in the District of Bamako).
- ¹⁰ Kéita, A. (1999). *Approche Processus en milieu urbain – Capitalisation des expériences*. ALPHALOG-SNV, Bamako, Mali.
Traoré, D., Keita, M., & Sacko, B. (2001). *Implication des populations défavorisées dans les actions d'assainissement dans le district de Bamako (Involvement of disadvantaged populations in sanitation actions in the district of Bamako): UWEP Working Document 13*. WASTE, Netherlands.
- ¹¹ Muller, M. S., Iyer, A., Keita, M., Sacko, B., & Traore, D. (2002). Differing interpretations of community participation in waste management in Bamako and Bangalore: Some methodological considerations. *Environment and Urbanization*, 14(2), 241–258.
- ¹² Traoré, D., Keita, M., & Sacko, B. (2001). *Implication des populations défavorisées dans les actions d'assainissement dans le district de Bamako (Involvement of disadvantaged populations in sanitation actions in the district of Bamako): UWEP Working Document 13*. WASTE, Netherlands.
- ¹³ EnvJustice Project. (2020). *Waste collection dispute in Bamako, Mali*. Retrieved from <https://www.ejatlantia.org/print/privatization-of-waste-management-and-displacement-of-informal-recyclers-in-bamako-mali>
- ¹⁴ Traoré, D., Keita, M., Sacko, B. & Muller, M. (2000). *Citizen involvement in clean-up activities in Bamako - Lessons from an action research project in Commune IV: UWEP Working Document 13*. WASTE, Netherlands.
- ¹⁵ Keita, A., Maïga, R. (2000). Pré-enquête pour un Projet de Recherche sur la Faisabilité d'un Centre de Formation (Pre-survey for a Research Project on the Feasibility of a Training Center). CEK-Kala Saba, Bamako, Mali.
- ¹⁶ B.E.R.E Consulting. (2018). *Rapport Final De Étude Diagnostique Sur Les Goulots D'etranquement Des Grands Collecteurs Et L'acheminement Des Déchets Des Depots De Transit Au Depot Final A Bamako (Final report of the diagnostic study on the bottlenecks of major collectors and the transport of waste from transit depots to the final depot in Bamako. Advice and Support for Basic Education). Conseils et Appui pour l'Éducation à la Base (CABE), Bamako, Mali.*
- ¹⁷ Muller, M. S., Iyer, A., Keita, M., Sacko, B., & Traore, D. (2002). Differing interpretations of community participation in waste management in Bamako and Bangalore: Some methodological considerations. *Environment and Urbanization*, 14(2), 241–258.
- ¹⁸ I-SEPT, TPE. (2022). *Cartographie Des Activités De Pré-collecte Et De Collecte De Déchets Solides Dans Le District De Bamako Mapping of Pre-collection and Data Collection Activities: Solid Waste in the District of Bamako*. Ministry Of Urban Planning, Housing, Areas, Development of the Territory and Population, Republic of Mali.
- ¹⁹ Grant Thornton. (2023). *Projet de résilience urbaine de Bamako (PRUBA). Diagnostic et facteurs limitants de la gestion des déchets dans le district de Bamako*. Rapport provisoire révisé. Ministère des Affaires Foncières, de l'Urbanisme et de l'Habitat.
- ²⁰ Based on information received from Lassane Diakite, GIE GASE-Mali (February 9, 2023).
- ²¹ Byerly, H., Balmford, A., Ferraro, P. J., Hammond, W. C., Palchak, E., Polasky, S., Ricketts, T. H., Schwartz, A. J., & Fisher, B. (2018). Nudging pro-environmental behavior: Evidence and opportunities. *Frontiers in Ecology and the Environment*, 16(3), 159–168. doi: 10.1002/fee.1777
- ²² Based on information received from Mallaye Sidibe, GIE Action Ville Propre (February 9, 2023).



- ²³ Huber, J., Viscusi, W. K., & Bell, J. (2020). Dynamic relationships between social norms and pro-environmental behavior: Evidence from household recycling. *Behavioural Public Policy*, 4(1), 1–25. doi: 10.1017/bpp.2017.13
- ²⁴ Traoré, D., Keita, M., Sacko, B., & Muller, M. (2000). *Citizen involvement in clean-up activities in Bamako - Lessons from an action research project in Commune IV: UWEP Working Document 13*. WASTE, Netherlands.
- ²⁵ Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic and Applied Social Psychology*, 21(1), 25–36. doi: 10.1207/s15324834basp2101_3
- ²⁶ Traoré, D., Keita, M., Sacko, B., & Muller, M. (2000). *Citizen involvement in clean-up activities in Bamako - Lessons from an action research project in Commune IV: UWEP Working Document 13*. WASTE, Netherlands.
- ²⁷ Based on information received from Mallaye Sidibe, GIE Action Ville Propre (February 9, 2023).
- ²⁸ Muller, M. S., Iyer, A., Keita, M., Sacko, B., & Traore, D. (2002). Differing interpretations of community participation in waste management in Bamako and Bangalore: some methodological considerations. *Environment and Urbanization*, 14(2), 241–258.
- ²⁹ Grant Thornton. (2023). *Projet de résilience urbaine de Bamako (PRUBA). Diagnostic et facteurs limitants de la gestion des déchets dans le district de Bamako*. Rapport provisoire révisé. Ministère des Affaires Foncières, de L'urbanisme et de L'habitat.
- ³⁰ World Bank. (2022). *Mali - Bamako Urban Resilience Project (English)*. Washington, DC: World Bank Group. Retrieved from <http://documents.worldbank.org/curated/en/099145011102233804/BOSIB0f4409d1e0f708a69098ce3968fef4>



Getting people to use waste services in Morocco

Objective: Empower people to improve accountability



Case summary

The government of Morocco introduced the National Municipal Solid Waste Management Program (Programme National des Déchets Ménagers, PNDM) in 2008 to reform the SWM sector. The reform targeted sector governance, financial sustainability, and social inclusion. The government worked with the private and informal sectors to improve MSW collection and disposal practices. To improve accountability, the reform expanded residents' access to information and sought citizen feedback on private sector service delivery. The extensive public engagement process contributed to the PNDM's success. The comprehensive program improved service delivery and citizen participation in MSWM. As of 2022, more than 90 percent of the MSW was collected and more than 62 percent was disposed at controlled landfills.



Plastic bags polluting desert plateau on the outskirts of Boumalne Dades, Morocco. © Liz Leyden istock.com



Challenge statement

In the early 2000s, Morocco's MSW sector faced significant challenges and a growing environmental footprint. Waste collection and sanitary disposal were low. Complementarily, waste loads were increasing due to a growing population and the emergence of a consumerist lifestyle. Increasing loads of poorly managed waste threatened the tourism sector and environmental and public health.

Context and description of challenges

Rapid urbanization, changing consumption patterns, and tourism increased waste generation in Morocco. With approximately 29.7 million inhabitants (2004),¹ the country generated approximately 0.6 kg of MSW per capita per day.² Only 45 percent of urban areas received waste collections and the services focused on cleanliness rather than treatment and disposal.³ Municipal departments also dealt with limited financial

and human resources, such as the necessary skills, clear responsibilities, and monitoring systems.⁴ Increasing waste volumes strained the country's limited MSW services, leading to widespread illegal dumping and the use of uncontrolled disposal sites.⁵

Some regions ineffectively tried to pilot source segregation programs to improve MSWM. In the years preceding the PNDM, behavior change initiatives focused primarily on raising awareness about the links between environmental degradation and waste management.⁶ Communication campaigns lacked stakeholder engagement, precluding the adoption of environmentally sound waste management practices. To broaden its outreach initiatives, Morocco established a school-based environmental education network in 2002 which encouraged cleanup activities, waste reuse, and source segregation.⁷ Sector performance nevertheless remained low.

By 2006, waste management had become a national priority. Morocco introduced a Solid Waste Law which mandated municipalities to modernize their MSW systems.⁸ This law provided a strong foundation on which the country could develop a more robust MSWM framework.

Decisions and actions

In 2008, the national government introduced the 15-year PNDM as an important cornerstone of Morocco's sustainable development plan. Its goal was to reform the SWM system's governance, finance, and social aspects. The government secured a total contribution of approximately DH 40 billion (USD 4 billion) over 15 years (2008 to 2022). World Bank Development Policy Loans supported implementation costs. The PNDM included a 90 percent collection coverage target by 2021 and a 20 percent recycling target by 2020.⁹

The PNDM was implemented in three phases. The first phase (2008–2012) developed MSW infrastructure and strengthened the sector's regulatory framework and governance. These activities established an enabling environment for later phases. The second phase (2013–2017) focused on MSW service delivery. It sought to improve

Garbage container with solar panel in Morocco. © Vera Tikhonova, istock.com



MSWM institutional and financial sustainability, access to and quality of household waste management, and recycling value chains. The government launched the Citizens Report Card (CRC) initiative, which allowed residents to provide feedback on private sector MSW collection services. To boost uptake, the government incorporated social and environmental considerations into MSW operations and implementation. The final phase (2018–2022) sought to complete regional plans launched during the two earlier phases, including the construction of disposal infrastructure and the development of MSW master plans.¹⁰

The reform benefited from multistakeholder collaboration among service providers, residents, waste pickers, and municipal officials. Government departments, such as the Environment, Finance, and Interior Ministries, similarly worked in concert to implement the PNDM. The PNDM assisted municipalities in financing the cost of SWM services and developing MSW systems.

The design

Under the PNDM's first phase, Morocco addressed gaps in the legal, regulatory, and institutional infrastructure which governed the country's SWM systems.¹¹ Key to this aim was the establishment of the National Commission of Solid Waste Management with support from the World Bank. The commission coordinated different SWM sectoral policies and government schemes.¹²

The key actions that followed included outsourcing SWM services to private operators. Private sector contracts included key performance indicators linked to payment. The development of municipal SWM plans—which focused on improving the infrastructure and services related to waste treatment—was also prioritized. Finances to rehabilitate and expand infrastructure were dispersed to eligible municipalities. This funding was conditional on the development of MSW plans and further compliance with a provincial plan. The process was led by the Ministry of Interior through the Directorate of Water and Sanitation, which also provided technical assistance and support to engage the private sector. To receive funds, municipalities had to fulfill certain prerequisites. A dedicated unit at the directorate assessed applications across

predefined criteria. This requirement provided a strong incentive for municipalities to comply with the main policy objectives related to planning and service operating models. Additional eligibility requirements were subsequently added to cover inter-municipal cooperation and the informal worker inclusion. On meeting these criteria, a municipal or intermunicipal entity could have up to 60 percent of its waste management costs subsidized (capped at 30 percent over five years).

Under the PNDM's second phase, Morocco created several accountability frameworks. These included parallel initiatives which contributed to increased public participation and scrutiny in MSW service provision. First, the government published information on its MSWM program online. Beginning in 2011, it created 14 observatories to collect and publish information on specific environmental indicators (reduced to 12 in 2015). Environmental data—including 20 indicators related to MSW—were collected and published to enhance accountability and increase ownership. Ten indicators applied to all regions and broadly accounted for waste generation, waste collection, disposal, recovery, and landfill status (see Box 2).

BOX
2

Primary environmental indicators published by observatories

Quantity of waste generated
Waste collection rate
Proportion of waste sent to controlled landfills
Burial rate of waste in controlled landfills
Recycling rate
Number and location of controlled landfills for waste
Number and location of rehabilitated landfills
Number and location of planned controlled landfills
Proportion of medical and pharmaceutical waste treated as household waste
Provincial Household Waste Management Plans

Source: Regional Information System for the Environment and Sustainable Development (Système d'Information Régional de l'Environnement et du Développement Durable, SIREDD).¹³



Second, MSW contracts with the private sector were published online to increase transparency about the spending of public funds. This mechanism indirectly promoted competition within the private sector since entities could benchmark their performance relative to other operators. Citizens on the other hand could relate the quality of service received with what was planned and expected as per signed contracts.

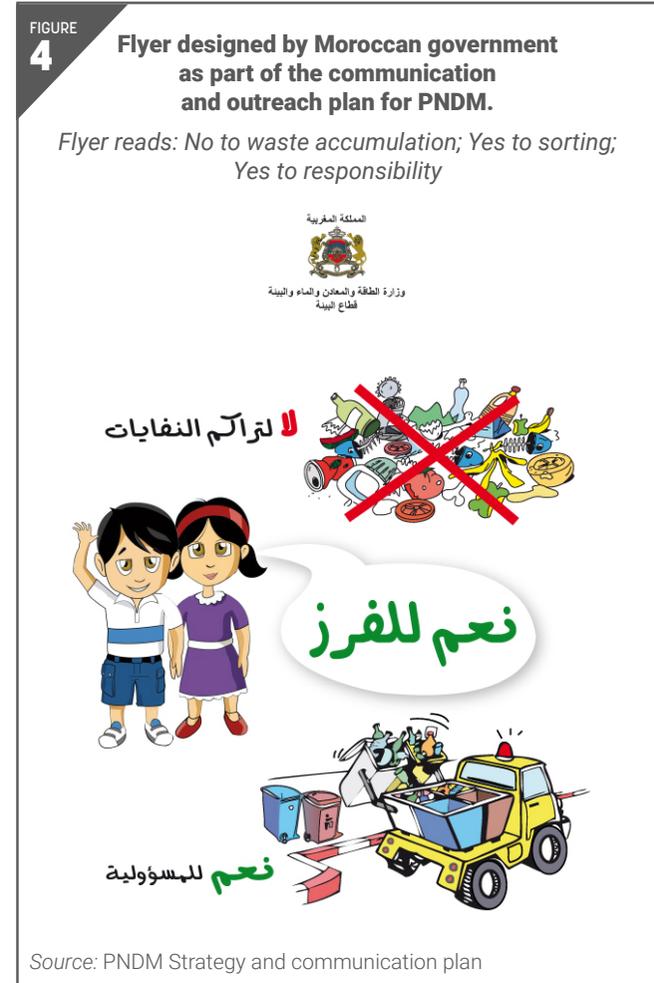
Third, the government created the CRC feedback mechanism to increase accountability and citizen engagement. Report cards allowed residents to provide information on and hold the private sector accountable for MSW service delivery. The municipality of Témara piloted the CRC scheme in 2012. It was later introduced to four more municipalities nationwide (Rabat, Mohammedia, Tangiers, and Agadir) to cover 25 percent of Morocco's urban population. The process unfolded across two phases. First, households filled out paper surveys to report on MSW service coverage and quality. The survey contained sociodemographic questions as well as questions on the importance and quality of public health services, neighborhood cleanliness, waste collection services, household waste practices, and residents' opinions on citizen responsibilities relating to waste management.¹⁴ The survey findings were aggregated locally and nationally. The findings informed town hall discussions among residents, private sector operators, and municipal governments. The report cards ultimately helped identify weaknesses in the system. In tandem, it provided an opportunity for multistakeholder decision-making to identify ways that each actor could improve the system.¹⁵

Forth, the government initiated a mechanism to aid waste recycling activities under the PNDM's second phase. Since 2014, Morocco instated an eco-tax on plastic packaging, funds from which were paid into the National Environmental Fund. Revenues were then allocated to municipalities to fund sorting centers. Waste-sorting initiatives integrated informal waste pickers into the MSW sector. Historically, the informal sector handled the bulk of waste sorting, recycling, and disposal in uncontrolled landfills.¹⁶ Under the second phase of the PNDM, public authorities required private operators to include waste pickers in landfill operations and waste sorting. The government helped establish waste picker cooperatives to manage MSW sorting facilities

located at landfills. These initiatives provided a more stable income and a status change for the informal sector, whose roles in waste management became more recognized. The process also helped combat negative social stigmas and overcome the lack of organized support networks associated with waste picking.¹⁷

Lastly, the government employed traditional outreach methods. In 2011, an outreach and communication program was launched to increase community ownership of and involvement in the process. It involved a variety of communication channels, including TV, radio, leaflets, films, and websites, to disseminate information on waste reduction, reuse, and recycling (Figure 4).¹⁸

Communication products followed a social marketing-based strategy to promote changes in waste management practices.¹⁹ Authorities also conducted workshops across the country to disseminate information on citizens' legal rights and responsibilities.²⁰



What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Creating accountability: Research suggests that accountability mechanisms can lead to positive decision-making and behavior.²¹ Morocco developed accountability frameworks within its government and for private sector entities to increase public trust. For example, Morocco improved public access to information, such as environmental monitoring data, and increased transparency on the use of public funds for contracted MSW services. In doing so, residents could hold the government accountable for its actions.



Feedback: In certain contexts, feedback can be an effective tool to promote positive waste management behaviors.²² Moroccan residents assessed and provided feedback on the performance of private sector MSW operations through the CRC initiative. Citizens provided feedback on household waste collection activities, waste collection service quality, and the importance of waste separation and recycling. The government used the findings to improve MSW service delivery. Private sector entities' performance on the CRC was also tied to their subsequent MSW contracts.



Social comparison: Evidence indicates that individuals compare themselves to a reference group. These comparisons can drive competitive behavior.²³ Municipalities published MSW contract information for private operators on the local government web platform (Bulletin Officiel des Collectivités Territoriales). The platform included information on contracts assigned for collection, street cleaning, and landfilling. While published contracts increased the government's transparency with citizens, private sector entities could also benchmark their performance relative to other operators. This increased competition within the private sector. As of 2023, the platform was still active and contained the name and quality of contractors.²⁴

SYSTEM DESIGN MECHANISMS



Salience: Since the environment is full of stimuli, only the most salient elements will grab an individual's attention.²⁵ Morocco used a comprehensive communications plan to increase engagement. The government used several mediums to publish information (TV, radio, film, and leaflets). Outreach products targeted common waste management behaviors such as segregation and recycling.²⁶ Materials targeted different subsets of the public such as youth and commercial entities.



Preconditions and challenges

- » The PNDM benefited from strong government support and leadership. SWM improvements take time and may not materialize as quickly as desired. The national government committed to a long-term vision of SWM, without which the results would not have been possible.
- » Morocco faced challenges in seeing the PNDM through to completion. The government has completed 17 out of 67 regional plans for SWM formalization.²⁷ As work continues, a new PNDM is being contemplated.
- » Despite the reform's considerable successes, landfills are still the country's primary mode of waste disposal. Consequently, Morocco has been unable to meet its stated recycling target. As of 2016, the recycling rate stood at 10 percent, largely due to the work of waste collectors at end-of-life landfill facilities.²⁸ A limited focus on changing recycling and source separation practices contributed to this low rate.²⁹
- » The country's communications plan relied only on awareness raising and information dissemination, which limited the potential for household behavior change. Data collected from the CRC initiative suggest that residents are willing to segregate their waste but do not do so presently.³⁰ These data provide an opportunity for future government programming.
- » The PNDM incorporated limited capacity-building activities for local governments. In turn, local governments still face issues operating and expanding the PNDM due to limited knowledge and technical expertise.³¹ As Morocco continues to develop its MSW sector, these areas provide opportunities for future work.



Results

Morocco's holistic approach to solid waste reform significantly improved MSWM nationwide. The reform improved access to environmentally safe waste disposal methods whereby 22 sanitary landfills were operational throughout the country as of 2016.³² Morocco also increased waste disposal in controlled landfills and recovery centers from 10 percent (pre-2008) to 62.6 percent in 2022.³³

Private sector involvement improved service delivery and led to more equitable MSWM coverage across socioeconomic groups. This led to a rise in the urban waste collection rate from 45 percent (2007) to 82 percent (2016).³⁴ CRCs further improved private sector service delivery quality and resident satisfaction. In Agadir and Rabat, the CRCs reported that 75 and 80 percent of residents were satisfied with MSW service delivery, respectively (2014).³⁵ Beyond residents' involvement in MSWM, CRCs successfully facilitated an evidence-based dialogue among residents, municipal officials, and the private sector. They also showcased the government's receptivity to citizen feedback and their commitment to service improvements. Furthermore, citizens could see the tangible improvements in MSW service delivery, which reinforced their willingness to cooperate.³⁶ Moving forward, the government has mandated that private companies must provide a digital feedback platform for citizen inquiries and claims.

As a co-benefit, the reform improved the livelihoods of the informal sector. Eco-tax revenues (USD 40 million in 2016) created 18 recycling projects and provided job opportunities for approximately 1,050 waste pickers.³⁷ More broadly, the reform involved 34,000 waste pickers in waste collection, sorting, and recycling.³⁸ As of the end of 2020, eco-tax revenues financed sorting centers, pilot actions for segregated waste collection, actions to eliminate black plastic bags, and a plastic recycling unit. New regulations for EPR schemes are expected to replace the eco-tax to avoid double taxation. Practitioners looking to undertake comprehensive SWM reforms can refer to this case study to learn from its approach and outreach.



Complementary actions to consider

- » While waste collection is important, governments could augment end-of-life MSWM efforts (collection and disposal) by targeting behavior change efforts toward waste reduction and/or segregation. These campaigns would necessarily need to extend beyond communications campaigns to be impactful. Effective programs would significantly ease the MSW burden on landfills.



Want to know more?

[Programme National des Déchets Ménagers \(PNDM\)](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ High Commission for Planning (HCP). (2004). *Population census (RGPH) 2004*. Kingdom of Morocco. Retrieved from https://www.hcp.ma/Recensement-population-RGPH-2004_a2942.html

Population in 2021: 36,313,000. Source: High Commission for Planning. (2022). *Key figures 2022*. Kingdom of Morocco. Retrieved from <https://www.hcp.ma/downloads/?tag=Chif-fres+cl%C3%A9s>
- ² Lahbabi, A. (2009). *Support for programmatic CDM development for the National Program for Municipal Solid Waste in Morocco*. MNA Region Carbon Finance Assist Program, World Bank Group, Washington, DC. Retrieved from <https://documents1.worldbank.org/curated/pt/209381468120549900/pdf/694450ESW0P0680PUBLIC00final0report.pdf>
- ³ Sarraf, M. (2016). *Implementation Completion and Results Report on a Series Programmatic Loans to the Kingdom of Morocco for Municipal Solid Waste Sector Development Policy Loans (3 and 4)*. Report no. ICR3729. World Bank, Washington, DC. Retrieved from <https://documents1.worldbank.org/curated/fr/563061482164575195/pdf/ICR-Main-Documen-t-P127955-2016-12-12-16-29-12142016.pdf>
- ⁴ Nunes, A., Rott, O., Hirvonen, J., Georgiadis, G., Mosanu, V., Sochirca, A., (2014). *Morocco environmental performance reviews*. United Nations Economic Commission for Europe, United Nations Economic Commission for Africa.

Fraile, I., Mantovani, P. F. (2004). *Kingdom of Morocco recent economic developments in infrastructure: Water supply and sanitation sector*. Report No: 29634-MOR. World Bank, Washington, DC.
- ⁵ Zhongming, Z., Linong, L., Xiaona, Y., Wangqiang, Z., & Wei, L. (2014). *Horizon 2020 Mediterranean report*. Annex 4: Morocco. European Environment Agency, Copenhagen, Denmark.
- ⁶ Department of Environment. (2013). *PNDM strategy and plan on communication: Mission 1: Diagnosis and evaluation of communication and awareness in the field of household waste management*. Ministry of Energy, Mines, and Environment, Kingdom of Morocco. Retrieved from <https://pndm.environnement.gov.ma/?q=node/27>
- ⁷ United Nations Economic Commission for Europe (UNECE) & United Nations Economic Commission for Africa (ECA). (2014). *Morocco environmental performance reviews*. UNECE, Switzerland.

Monitoring and Evaluating Climate Communication and Education Projects. (n.d.) *Morocco: Climate change communication and education*. UNESCO. Retrieved from <https://education-profiles.org/northern-africa-and-western-asia/morocco/~climate-change-communication-and-education>
- ⁸ Sarraf, M. (2016). *Implementation Completion and Results Report on a Series of Programmatic Loans to the Kingdom of Morocco for Municipal Solid Waste Sector Development Policy Loans (3 and 4)*. Report no. ICR3729. World Bank, Washington, DC. Retrieved from <https://documents1.worldbank.org/curated/fr/563061482164575195/pdf/ICR-Main-Doc-ument-P127955-2016-12-12-16-29-12142016.pdf>
- ⁹ Ibid.
- ¹⁰ Department of Environment. (n.d.) *Programme National des Déchets Ménagers [National Municipal Solid Waste Programme]*. Minister of Energy Transition and Sustainable Development, Kingdom of Morocco. Retrieved from http://www.environnement.gov.ma/images/Programmes-et-Projets/PNDM_Fr.pdf
- ¹¹ World Bank. (2022). *Morocco—Municipal Solid Waste Sector Development Policy Loans 1–4*. Independent Evaluation Group, Project Performance Assessment Report 165279. World Bank, Washington, DC.
- ¹² Hoel, A. (2013). *Morocco: Improving municipal solid waste management through development policy operations*. World Bank. Retrieved from <https://www.worldbank.org/en/results/2013/05/22/morocco-improving-municipal-solid-waste-management-through-development-policy-operations>
- ¹³ Ministère de la Transition Énergétique et du Développement Durable—Système d'Information Régional de l'Environnement et du Développement Durable (Regional Information System for the Environment and Sustainable Development). Retrieved from <https://siredd.environnement.gov.ma/>
- ¹⁴ Department of Environment. (2014). *Étude relative à l'évaluation citoyenne sur la gestion des déchets ménagers de la ville d'Agadir* [Study on the citizen assessment on the management of household waste in the city of Agadir]. Ministry Of Energy, Mines, Water and Environment, Kingdom of Morocco.
- ¹⁵ Sarraf, M. (2016). *Implementation Completion and Results Report on a Series of Programmatic Loans to the Kingdom of Morocco for Municipal Solid Waste Sector Development Policy Loans (3 and 4)*. Report no. ICR3729. World Bank, Washington, DC. Retrieved from <https://documents1.worldbank.org/curated/fr/563061482164575195/pdf/ICR-Main-Doc-ument-P127955-2016-12-12-16-29-12142016.pdf>
- ¹⁶ Perkins, N., Ajir, A., & El Ouazzani, L. (2014). *Country report on the solid waste management in Morocco*. German Corporation for International Cooperation [Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)] and Regional Solid Waste Exchange of Information and Expertise Network in Mashreq and Maghreb Countries (SWEEP-Net).
- ¹⁷ Scheinberg, A., & Savain, R. (2015). *Valuing informal integration: Inclusive recycling in North Africa and the Middle East*. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Germany. Retrieved from <http://wiego.org/publications/valuing-informal-integration-inclusive-recycling-north-africa-and-middle-east>
- ¹⁸ Perkins, N., Ajir, A., & El Ouazzani, L. (2014). *Country report on the solid waste management in Morocco*. German Corporation for International Cooperation [Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)] and Regional Solid Waste Exchange of Information and Expertise Network in Mashreq and Maghreb Countries (SWEEP-Net).
- ¹⁹ Department of Environment. (2013). *PNDM strategy and plan on communication. Mission 3: Animation of the validation workshop of the communication and awareness program*. Ministry of Energy, Mines and Environment, Kingdom of Morocco. Retrieved from https://pndm.environnement.gov.ma/sites/default/files/RAP_M3.pdf



- ²⁰ Department of Environment. (2013). *PNDM strategy and plan on communication: Mission 1: Diagnosis and evaluation of communication and awareness in the field of household waste management*. Ministry of Energy, Mines, and Environment, Kingdom of Morocco. Retrieved from <https://pndm.environnement.gov.ma/?q=node/27>
- El Maguiri, A., Souabi, S., El Fels, L., El Asli, A., & Hafidi, M. (2017). Progress in establishing an ambitious domestic waste management scheme in Morocco: A model for developing countries. In N. Tzortzakis, *Municipal solid waste: Management strategies, challenges and future directions*, 225–247. Nova Science Publishers.
- ²¹ Aleksovska, M. (2021). Accountable for what? The effect of accountability standard specification on decision-making behavior in the public sector. *Public Performance & Management Review*, 44(4), 707–734. doi: 10.1080/15309576.2021.1900880
- ²² Schultz, P.W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic and Applied Social Psychology*, 21(1), 25–36. doi: 10.1207/15324839951036533
- ²³ Garcia, S. M., Tor, A., & Schiff, T. M. (2013). The psychology of competition: A social comparison perspective. *Perspectives on psychological science*, 8(6), 634–650. doi: 10.1177/1745691613504114
- ²⁴ All published official bulletins (in Arabic) can be found at: <https://www.collectivites-territoriales.gov.ma/fr/bulletin-officiel-des-cts>
- ²⁵ Kahneman, D., Slovic, S. P., Slovic, P., & Tversky, A. (Eds.). (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge university press. 192.
- ²⁶ *Gestion des déchets ménagers au Maroc - Approche alternative et inventive* (Household waste management in Morocco - Alternative and inventive approach). The Association of Teachers of Life and Earth Sciences of Morocco (AESVT). Retrieved from <https://www.aesvtmaroc.org/wp-content/uploads/2019/02/Guide-final-VF-def.pdf>
- ²⁷ The Climate Chance Observatory Team. (2022). Moroccan society's uneven response to the proliferation of waste. Climate Chance - Global Observatory on Non-state Climate Action. Retrieved from https://www.climate-chance.org/wp-content/uploads/2020/03/cp-waste_morocco_english.pdf
- ²⁸ Ouigmane, A., Boudouch, O., Hasib, A., & Berkani, M. (2018). Management of municipal solid waste in Morocco: The size effect in the distribution of explosive components and evaluation of the fuel fractions. In C. Hussain, *Handbook of Environmental Materials Management*. Springer Nature.
- ²⁹ World Bank. (2022). *Morocco—Municipal Solid Waste Sector Development Policy Loans 1–4*. Independent Evaluation Group, Project Performance Assessment Report 165279. World Bank, Washington, DC.
- ³⁰ Department of Environment. (2014). *Étude relative à l'évaluation citoyenne sur la gestion des déchets ménagers de la ville de Rabat* [Study on the citizen assessment on the management of household waste in the city of Rabat]. Ministry Of Energy, Mines, Water and Environment, Kingdom of Morocco.
- ³¹ United Nations Economic Commission for Europe (UNECE) & United Nations Economic Commission for Africa (ECA). (2014). *Morocco environmental performance reviews*. UNECE, Switzerland.
- ³² Sarraf, M. (2016). *Implementation Completion and Results Report on a Series of Programmatic Loans to the Kingdom of Morocco for Municipal Solid Waste Sector Development Policy Loans (3 and 4)*. Report no. ICR3729. World Bank, Washington, DC. Retrieved from <https://documents1.worldbank.org/curated/fr/563061482164575195/pdf/ICR-Main-Doc-ument-P127955-2016-12-12-16-29-12142016.pdf>
- ³³ Moutawakil, A. (2022). Recyclage des déchets: Un gisement d'opportunités à saisir (Waste recycling: A source of opportunities to be seized). L'opinion. Morocco. Retrieved from https://www.lopinion.ma/Recyclage-des-dechets-Un-gisement-d-opportunites-a-saisir_a29196.html
- ³⁴ Sarraf, M. (2016). *Implementation Completion and Results Report on a Series of Programmatic Loans to the Kingdom of Morocco for Municipal Solid Waste Sector Development Policy Loans (3 and 4)*. Report no. ICR3729. World Bank, Washington, DC. Retrieved from <https://documents1.worldbank.org/curated/fr/563061482164575195/pdf/ICR-Main-Doc-ument-P127955-2016-12-12-16-29-12142016.pdf>
- ³⁵ Department of Environment. (2014). *Étude relative à l'évaluation citoyenne sur la gestion des déchets ménagers de la ville de Rabat* [Study on the citizen assessment on the management of household waste in the city of Rabat]. Ministry Of Energy, Mines, Water and Environment, Kingdom of Morocco.
- ³⁶ International Bank for Reconstruction and Development. (2015). *Program Document for a Proposed Loan in the Amount of Euro 104.3 Million (US\$130 Million Equivalent) to the Kingdom of Morocco for a Fourth Municipal Solid Waste Sector Development Policy Loan*. Report No. 91846-Ma. World Bank, Washington, Dc.
- ³⁷ Sarraf, M. (2016). *Implementation Completion and Results Report on a Series of Programmatic Loans to the Kingdom of Morocco for Municipal Solid Waste Sector Development Policy Loans (3 and 4)*. Report no. ICR3729. World Bank, Washington, DC. Retrieved from <https://documents1.worldbank.org/curated/fr/563061482164575195/pdf/ICR-Main-Doc-ument-P127955-2016-12-12-16-29-12142016.pdf>
- ³⁸ World Bank. (2022). *Morocco—Municipal Solid Waste Sector Development Policy Loans 1–4*. Independent Evaluation Group, Project Performance Assessment Report 165279. World Bank, Washington, DC.



Getting people to use waste services in India

Objective: Empower people to improve accountability



Case summary

In 2016, India initiated an annual nationwide cleanliness survey (Swachh Survekshan) through its Clean India Mission (Swachh Bharat Abhiyan) campaign. The survey assessed and ranked all cities on sanitation and SWM infrastructure. The highest-ranking cities received public recognition and designated titles. In tandem, the survey was a tool to generate SWM awareness, increase municipal accountability, and engage citizens. The survey fostered healthy competition among cities and incentivized citizens to participate in municipal operations. As a result, 1,161 and 1,493 urban local bodies (ULBs) established door-to-door waste collection systems and source segregation programs, respectively.

Women pushing a cart containing segregated garbage in Bangalore, India. © VasukiRao | istock.com



Challenge statement

Indian municipalities faced many issues related to open defecation and water and environmental pollution, including the collection, treatment, and management of solid waste.

Context and description of challenges

In 2011, India had a population of approximately 1.2 billion, with over 377 million living in urban centers.¹ On average, waste generation rates hovered at 0.57 kg per capita per day² with higher generation rates in urban areas. Historically, low levels of

awareness³ and social taboos around SWM impeded large-scale action. Prevailing norms surrounding waste handling—including refraining from touching waste after bathing⁴—contributed to waste-related issues, such as a dearth of source segregation and rampant littering. These cultural norms conflicted with citizens' aspirations for clean neighborhoods, which was symptomatic of the larger culture of the 'Not in My Backyard' (NIMBY) phenomenon.⁵

The absence of robust infrastructure and systems to collect and treat waste in cities disincentivized more effective SWM practices. These factors led to widespread littering and dumping. Additionally, government data suggest that—before the Clean

Clean India Programme by Ramakrishna Mission, Baranagar, Kolkata in July 2016. © Belur Math



India Mission—few measures were undertaken to promote citizen engagement and action on solid waste.

Decisions and actions

In 2014, the national government launched the Clean India Mission campaign to eradicate the practice of open defecation and improve national cleanliness standards. Through the mission, the government's targets included constructing toilets, strengthening SWM systems, and engaging the public. Decentralized action by urban local bodies' (ULBs)⁶ was key to achieving these targets. Consequently, in 2016 the government devised a ranking system for ULBs to ensure their active participation and continued involvement in the Clean India Mission campaign.

The national government ranked ULBs following an annual nationwide cleanliness survey (Swachh Survekshan). Through this survey, the government sought participation from several stakeholders to catalyze a 'janandolan' (people's movement). The government conducted the initial survey in 73 cities. It assessed the status of door-to-door waste collection, waste treatment, and toilet availability (household, community and public). Cities were then graded based on (a) service-level status, (b) independent observation, and (c) citizen feedback. The survey has since been conducted annually, with its coverage expanding to 4,320 cities as of 2021.

The federal government displayed a strong commitment to achieving the mission's goals. It allocated funds to the program, which were transferred annually to states and subsequently to ULBs. This system freed local governments from the financial constraints associated with the survey. The federal government also allocated separate funds to organize information, education, and communication (IEC) activities around best practices in waste disposal.

The design

The cleanliness survey measured ULBs' progress in municipal service delivery and waste management. In tandem, it also assessed the social, economic, and

environmental sustainability of SWM systems. ULBs were required to provide updated data on the status of door-to-door waste collection, the source segregation rate, the modes of waste treatment, the status of public and community toilets, and the status of sewage management, among other parameters. Data were subsequently certified by a third party appointed by the national government. The government conducted the survey over 28 days and facilitated it through a network of ground-level assessors and a robust digital mapping infrastructure. This system fostered accountability among ULBs.

ULBs could receive a maximum of 7,500 points on the survey. The survey awarded points across the following three broad categories:⁷

- The survey assessed Service-Level Progress using 25 indicators related to segregated waste collection, waste processing and disposal, and safe sanitation. ULBs that had successfully introduced at least one (reuse, reduce, and recycle) 3R⁸ initiative in 75 percent of the city/town received extra points. This category also measured the influence of IEC activities on citizens' awareness and behavior. To gauge citizen behavior, assessors randomly selected and questioned a group of citizens about their familiarity with IEC campaigns.
- The survey allocated points for Certification based on ULBs' sanitation and cleanliness certifications. Certifications included 'Garbage-Free Cities (GFC)', 'Open Defecation Free (ODF/ODF+/ODF++)', and 'Water+'. ULBs received a certification if they verifiably eradicated open defecation, established sewage management systems, and created a robust SWM system.

The survey assessed Citizen's Voice on five components: (a) Citizen Feedback; (b) Citizen Engagement; (c) Citizen Experience; (d) Swachhata (Cleanliness) App; and (e) Innovations and Best Practices. The survey collected feedback across six channels (for example, apps and helplines). ULBs received additional points if they worked with a local ambassador (teacher, doctor, entertainer, and so on) to conduct outreach.



ULBs were ranked nationally, statewide, and zonewise and categorized based on population. ULBs received the following titles based on their performance in each respective category:⁹

- (a) Cleanest City: Awarded to each population category and zone
- (b) Fastest Mover: Awarded to ULBs displaying fast growth relative to the previous year
- (c) Self-Sustainable City: Awarded to ULBs certified as Garbage Free, Open Defecation Free, or demonstrating fast service-level progress
- (d) Best Innovation and Best Practices Award: Awarded to ULBs that ranked highest in citizen feedback and use of innovative solution
- (e) Best Citizen Feedback: Awarded to ULBs that received the best feedback through the Citizen Feedback app and on-ground validation
- (f) Maximum Citizen Feedback: Awarded to ULBs that received the maximum amount of feedback submissions from citizens
- (g) Best Citizen-Led initiatives: Awarded to citizens who undertook special activities.

Community feedback during the survey period strongly influenced each ULB's final rank. The survey collaborated with celebrities who acted as brand ambassadors and behavior change messengers for crucial campaigns like Har Din Do Bin (Two Bins Everyday) and Compost Banao, Compost Apnao (Make Compost, Use Compost).

Due to the COVID-19 pandemic, an online public engagement campaign accompanied the recent survey cycle. The first phase (run before the survey) consisted of raising awareness on cleanliness and sustainability. The second phase (launched during the survey period) featured online campaigns like 'SwachhataHero (Cleanliness Hero)' 'CompostingSahiHai (Composting is Best)', and 'SurvekshanQuiz (Cleanliness Quiz)'. The third phase thanked citizens for their participation and declared results. These attractive campaigns increased the visibility of the relevant issues.

What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Social comparison: Academic literature suggests that social comparison tools such as rankings can lead to behavior change. When an organization or community is ranked highly relative to others, they tend to adjust their behaviors to maintain their social status.¹⁰ Rankings may also be motivational when they highlight the desirable social norm.¹¹ Through the Clean India Mission's survey, ULBs were ranked relative to one another based on their waste management activities. ULBs such as Indore benefited immensely from the positive reinforcements provided by the ranking system.



Social norms: Research suggests that societal expectations about how others will behave can increase pro-environmental behaviors.¹² The Swachh Survekshan was designed to increase the visibility of both the ULBs involved and each ULB's results to the rest of the country. The survey created a new social norm around waste management. ULBs' participation became a statement of their willingness to adhere to the initiative and its desired behaviors.



Nonmaterial rewards: Some studies show that symbolic incentives can facilitate changes in waste management behavior.¹³ This initiative used symbolic incentives to reward positive behaviors, and titles were awarded to top-performing ULBs and top citizen-led initiatives.

Results

As of 2022, the Clean India Mission program involved roughly 4,320 ULBs. Each committed to strengthening local waste management systems. Over the past six years, 43 million citizens provided feedback,¹⁴ 1,161 ULBs established door-to-door waste collection systems, and 1,493 ULBs initiated waste separation at source schemes.¹⁵ Positive reinforcements from the ranking system prompted ULBs such as Indore to establish door-to-door waste collection and waste segregation systems.¹⁶ In five



years, the city effectively mobilized the public and received a ranking as the cleanest city.¹⁷

The survey led to several co-benefits. In the Mahoba District of Maharashtra, the local government appointed a transwoman as a brand ambassador to promote citizen participation in the survey. Similarly, Ujjain—ranked as the cleanest city in its population category¹⁸—collaborated with a transgender community to conduct a door-to-door awareness campaign.¹⁹

Despite significant progress, the program leaves room for further improvement. For instance, underdeveloped SWM services continue to frustrate residents.²⁰ Moreover, while 61 percent of ULBs initiated source segregation programs, 69 percent of ULBs have yet to receive a single-star rating under the ‘Garbage-Free City’ certification. These areas serve as learning opportunities as the program moves forward.



Complementary actions to consider

- » Practitioners looking to implement a likeminded intervention may consider using an experimental design to test different behavioral tools. This information could guide decision-makers in what works best for different populations. Further, testing different combinations of solutions could help scale options with the greatest impacts.
- » To encourage the adoption of new sanitation practices, it is helpful to understand citizens’ existing attitudes, belief systems, and habits. To collect this information, governments could administer surveys to understand the aforementioned factors and their relative roles in residents’ waste management practices.



Want to know more?

[Swachh Survekshan India](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Census of India. (2011). Office of the Registrar General and Census Commissioner, New Delhi.
Population in 2021: 1.3 billion. Source: Ministry of Statistics and Programme Implementation. (2022). *Annual report 2021–2022*. Ministry of Statistics and Programme Implementation, Government of India. Retrieved from <https://mospi.gov.in/documents/213904/1885585/Printed+Annual+Report+2021-22+%28Eng.%29.pdf>
- ² Kaza, S., Yao, L., Bhada-Tata, P., & Woerden, F. V. (2018). *What a Waste 2.0: A global snapshot of solid waste management to 2050*. Urban Development Series. World Bank, Washington, DC. doi:10.1596/978-1-4648-1329-0
Ahlwalia, I. J., & Patel, U. (2018). *Solid waste management in India an assessment of resource recovery and environmental impact* (Working Paper No. 356). Indian Council for Research on International Economic Relations (Issue 356). Retrieved from https://icrier.org/pdf/Working_Paper_356.pdf
- ³ Planning Commission. (2014). *Report of the task force on waste to energy (Volume II)*. Government of India.
- ⁴ Sarmishtha, U. (2021). *Challenges of solid waste management: The case of Patna City*. Ideas for India. Retrieved from <https://www.ideasforindia.in/topics/urbanisation/challenges-of-solid-waste-management-the-case-of-patna-city.html>
- ⁵ Pol, E., Di Masso, A., Castrechini, A., Bonet, M., & Vidal, T. (2006). Psychological parameters to understand and manage the NIMBY effect. *European review of applied psychology*, 56(1), 43–51.
- ⁶ ULB refers to the local governing authority for cities in India.
- ⁷ MoHUA. (2022). *Swachh Survekshan 2022 Survey toolkit*. Government of India. Retrieved from http://ss-cf.sbmurban.org/assets/pdf/SS2022%20Toolkit_11th%20February%202022_.pdf
- ⁸ 3R = Reuse, reduce, and recycle.
- ⁹ MoHUA. (2021). *Swachh Survekshan 2021 report*. Government of India.
- ¹⁰ Sauder, M., & Lancaster, R. (2006). Do rankings matter? The effects of US News & World Report rankings on the admissions process of law schools. *Law & Society Review*, 40(1), 105–134.
- ¹¹ Kelman, H. C. (1958). Compliance, identification, and internalization: Three processes of attitude change. *Journal of Conflict Resolution*, 2(1), 51–60.
- ¹² Perry, G. L., Richardson, S. J., Harré, N., Hodges, D., Lyver, P. O. B., Maseyk, F. J., & Brower, A. (2021). Evaluating the role of social norms in fostering pro-environmental behaviors. *Frontiers in Environmental Science*, 9, 160.
- ¹³ Department for Food and Rural Affairs (2017). *Single-use plastic carrier bags charge: Data in England for 2016 to 2017*. Retrieved from <https://www.gov.uk/government/publications/carrier-bag-charge-summary-of-data-in-england/single-use-plastic-carrier-bags-charge-data-in-england-for-2016-to-2017>
- ¹⁴ Swachh Survekshan. (2022). *SBM urban*. Government of India. Retrieved from <https://ss2022.sbmurban.org/#/home>
- ¹⁵ Ibid.
- ¹⁶ Smart City Indore. Indore Municipal Corporation. Retrieved from <https://www.smartcityindore.org/solid-waste/>
- ¹⁷ Khaitan, S. (2019). How Indore became India's cleanest city (and how others can follow). *Indiaspend*. Retrieved from <https://www.indiaspend.com/how-indore-became-indias-cleanest-city-and-how-others-can-follow/>
- ¹⁸ Press Information Bureau. (2019). *President Presents Swachh Survekshan 2019 Awards*. Ministry of Housing and Urban Poverty Alleviation. Government of India. Retrieved from <https://pib.gov.in/newsite/PrintRelease.aspx?relid=189231>
- ¹⁹ Mathur, B. (2020). Swachh Bharat Mission: Transgender community of Ujjain becomes a changemaker as it leads the cleanliness awareness initiative. *NDTV*. Retrieved from <https://swachhindia.ndtv.com/swachh-bharat-mission-transgender-community-of-ujjain-becomes-a-changemaker-as-it-leads-the-way-to-cleaner-lifestyle-41095/>
- ²⁰ Tyagi, T. (2021). Despite improvement in Swachh Survekshan ranking, Doon residents continue to face poor waste management issues, piles of garbage in several spots in city. *The Times of India*. Retrieved from <https://timesofindia.indiatimes.com/city/dehradun/despite-improvement-in-swachh-survekshan-ranking-doon-residents-continue-to-face-poor-waste-management-issue-piles-of-garbage-at-several-spots-in-city/articleshow/87855867.cms>



Getting people to use waste services in Jamaica

Objective: Empower people to improve accountability



Case summary

The Government of Jamaica introduced several interventions to increase waste collection and community cleanliness in vulnerable communities across seven parishes. The initiative simultaneously targeted service providers and residents. To foster accountability, it used a results-based incentive scheme that rewarded adequate waste services and proper waste disposal. Complementary efforts included public outreach, school-based programs, and conveniently located waste bins. These tactics improved service provision, community cleanliness, and community involvement in waste management. The improvements persisted after incentives ceased.



Challenge statement

Jamaica's SWM authority had limited funds to deal with rising waste generation rates. This affected their capacity to deliver services. Service coverage to inner-city communities—characterized by higher poverty levels—was particularly low.

Context and description of challenges

Jamaica is an island in the western Caribbean. Its solid waste generation rate doubled between 1996 and 2006, alongside a population increase.¹ By 2013, per capita waste generation was approximately 1.01 kg per day (2014 population: 2,715,657).² At the time, roughly one-fifth of Jamaicans lived in informal settlements.³ These dense communities had limited waste storage and road access which challenged SWM collection. The country lacked adequate infrastructure and waste collection equipment, which further affected collection rates. Residents often burned and dumped their waste, especially in areas with low SWM coverage. This clogged storm drains and the island's watersheds, which flooded streets and damaged coastlines, leading to the proliferation of disease vectors.⁴

Government agencies and NGOs conducted environmental education and awareness activities seeking to promote better waste management. Over time, Jamaica improved its community services and SWM infrastructure with the support of external agencies. However, these efforts were insufficient to galvanize citizen participation.⁵ With deficits in SWM and community participation, Jamaica needed to find new approaches to improve services, particularly in inner-city communities.

Decisions and actions

The national government launched the Integrated Community Development Project to, among other things, improve both waste collection and community participation in waste management. The World Bank and Jamaica Social Investment Fund funded and implemented this project, respectively. SWM activities revolved around

infrastructure provision, enforcement, public education, and a results-based incentive scheme. The results-based incentive scheme provided payment conditional on the attainment of predefined SWM targets, which applied to both the waste collection service provider and local communities. It was used to incentivize waste collection and litter management activities. The initiative also created school-based environmental clubs, composting, and recycling initiatives.

These SWM activities worked in concert with additional interventions to improve public safety, rehabilitate public infrastructure, promote alternative livelihoods, and foster capacity building. The government conducted activities in half of Jamaica's 14 parishes (a total of 18 communities) over seven years (2014–2021).⁶

The design

The initiative worked in parallel to improve SWM practices among the National Solid Waste Management Authority (NSWMA) service provider and the broader community. The NSWMA received three solid waste trucks to overcome its waste collection vehicle shortage. Of these, the NSWMA received two trucks unconditionally. Under the results-based financing mechanism, an independent agent conducted weekly evaluations to assess the NSWMA's waste collection efficiency. The NSWMA received the third waste collection truck after it met a predetermined level of waste collection services (Figure 5).⁷



Source: Ministry of Local Government and Rural Development⁸



To encourage better waste practices among residents, the intervention set up an array of approximately 5,000 residual waste bins, 55 dumpsters, 30 recycling enclosures, and 30 composting bins. Enclosures were installed around the aforementioned bins.⁹ Signs installed nearby provided timely reminders by indicating the type of waste that went into each bin.¹⁰ To facilitate accountability, the NSWMA introduced an online app that allowed citizens to report improper disposal.¹¹

To increase community cleanliness, a roster of 165 environmental wardens from affected communities were hired and trained. Wardens worked with CBOs and acted as behavior change messengers. They were authorized to act on behalf of the NSWMA and oversaw, enforced, and assisted with waste management activities. For example, wardens and CBOs encouraged residents to stop littering, maintained waste bins and community areas, and coordinated cleanup activities. Through the initiative's accountability mechanism, an independent agent randomly assessed the cleanliness of community areas. Environmental wardens and CBOs received financial bonuses quarterly and biannually, respectively, if the community met qualitative cleanliness targets. Environmental wardens were eligible for a fixed 10 percent salary bonus if they met the minimum criteria. CBOs were eligible for a variable bonus of USD 1,200–2,400, which increased relative to their performance.¹² This mechanism incentivized wardens and CBOs to comply with set cleanliness targets. Clean communities subsequently created a positive social norm, in which proper waste disposal was expected. Complementarily, residents could see tangible benefits of the intervention, reinforcing their willingness to participate.¹³

What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Creating accountability: Research suggests that holding individuals responsible for and evaluating their actions can have a powerful influence on behavior.¹⁴ In Jamaica, monitoring ensured that all parties met a certain standard. For instance, an independent agent assessed the adequacy of the NSWMA's waste collection services. Agents also evaluated whether environmental wardens and CBOs maintained clean communities. Further, citizens could hold one another accountable by reporting illegal dumping via an app.

FINANCIAL MECHANISMS



Material rewards: Economic incentives like monetary rewards can increase positive waste management behaviors in certain circumstances.¹⁵ The present case study applied this tool in a traditional way. In Jamaica, the initiative allocated performance bonuses to environmental wardens and CBOs. These financial rewards provided trained agents with an external motivation to engage residents and facilitate community-led waste management activities. The initiative also provided an in-kind incentive (that is, a waste collection truck) to the NSWMA to reward the authority for its satisfactory service delivery.

SYSTEM DESIGN MECHANISMS



Accessible services: The literature suggests making services more convenient and accessible can increase waste-related behaviors.¹⁶ In Jamaica, authorities installed an extensive network of residual waste, composting, and recycling bins throughout its parishes. These bins increased the convenience of public waste disposal. In tandem, the NSWMA provided regular and convenient waste collection services to residents.



Results

The intervention dramatically changed community perceptions of solid waste. Before the intervention, community members did not see waste as an issue. Following the initiative, residents' involvement and interest in SWM activities significantly increased.¹⁷ The results-based incentive scheme was also successful. About 95 percent of participating communities achieved their targets, and wardens and CBOs earned USD 12,000 in monetary bonuses.¹⁸ By 2021, 89,000 urban residents received regular waste collection (relative to irregular services at baseline).¹⁹ Subsequently, residents' sense of entitlement to regular services increased, and residents would call the NSWMA if pickups did not occur or to report vandalized bins. Complementarily, installed waste bins and regular SWM collections significantly decreased littering.²⁰ In late 2022, the NSWMA received an additional 50 waste collection trucks which allowed the authority to increase collection frequency (weekly) and efficiency in 90 percent of communities. The NSWMA retained eight of these trucks to alleviate waste collection backlogs. As of 2023, the NSWMA continued to visit communities monthly to ensure that they continue to adhere to good SWM practices.

Environmental wardens fostered long-term impacts on residents' waste management practices. One year after incentive payments ended, residents continued to maintain their communities without oversight. A portion of environmental wardens also continued to clean communities and gutters and collect plastic to reduce marine waste leakage through 2022.²¹

School-based initiatives led to particularly noticeable changes in waste management behaviors. Primary schools replaced SUP utensils and dinnerware with reusable alternatives. Schools also incorporated SWM topics into school curricula.²² The Ministry of Education subsequently rolled out analogous environmental initiatives in other schools.²³

Following the initiative's success, the NSWMA replicated the model in other communities on the island. Other government entities also adopted elements of the

intervention.²⁴ For example, the government used environmental wardens to address public health challenges during seasons prone to Zika, Chikungunya, or Dengue outbreaks.²⁵ The intervention's success led to a follow-on initiative called the Integrated Community Development Project II. It began in 2021 and intends to increase access to basic infrastructure and social services across four parishes.²⁶ Activities align with the initial intervention. For instance, the NSWMA will deploy drums to strategic locations to collect waste.²⁷



Complementary actions to consider

- » While material incentives can be effective, they can have limited long-term effects on behavior. Practitioners considering incentives could test the impact of other behavioral methods as well. For instance, they could assess the benefit of performance-based non-material awards that are publicly recognized. Recognition and certificates of appreciation target an individual's *internal motivation*, which is when someone engages in an activity because it is fulfilling or they receive personal satisfaction. Material rewards provide external motivation, which is when an individual engages in an activity to get rewarded.



Want to know more?

[National Solid Waste Management Authority](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Sustainable Development and Regional Planning Division. (2007). *Management of hazardous & solid wastes in Jamaica*. Planning Institute of Jamaica, Government of Jamaica.
- ² Planning & Research Department. (2013). *Waste characterization and per capita generation rate report 2013: The Metropolitan wasteshed*. National Solid Waste Management Authority. Retrieved from <http://www.nswma.gov.jm/wp-content/uploads/2019/10/WASTEGENERATIONANDCOMPOSITIONSURVEYREPORT2013.pdf>
Population Statistics - Statistical Institute of Jamaica. Retrieved from https://statinja.gov.jm/Demo_SocialStats/PopulationStats.aspx
- ³ Ministry of Housing. (2008). *Rapid assessment of the problem of squatting in Jamaica*. Government of Jamaica.
- ⁴ Pan American Health Organization. (2003). *Regional evaluation municipal solid waste management services*. Country Analytical Report, Jamaica/ Evaluation 2002. Retrieved from https://iris.paho.org/bitstream/handle/10665.2/55767/jamaica_solid_waste_eng.pdf?sequence=1&isAllowed=y
National Environment and Planning Agency. (2013). *The State of the Environment Report 2013 Jamaica*. Ministry of Economic Growth and Job Creation, Government of Jamaica. Retrieved from https://www.nepa.gov.jm/sites/default/files/2019-12/SoE_Jamaica_2013.pdf
- ⁵ Banna, F. M., Bhada-Tata, P., Ho, R., Kaza, S., & Lee, M. (2014). *Results-based financing for municipal solid waste*. Main Report (English) in Urban Development Series Knowledge, 1–84. Global Urban and DRM Unit. World Bank.
- ⁶ Ibid.
- ⁷ Ibid.
- ⁸ LocalGov.Ja. (2020, September 23). *The Jamaica Social Investment Fund (JSIF) handed over another new compactor truck to the @nswma. The truck is gifted to the NSWMA through the JSIF's Integrated Community Development Project (ICDP)*. Twitter. Retrieved from <https://twitter.com/localgovja/status/1308811043955789825>
- ⁹ Monteiro, E. (2016). *Jamaica - Jamaica Integrated Community Development Project: P146460 - Implementation Status Results Report: Sequence 05 (English)*. World Bank Group, Washington, DC. Retrieved from <https://documents.worldbank.org/curated/en/897101482711862882/Jamaica-Jamaica-Integrated-Community-Development-Project-P146460-Implementation-Status-Results-Report-Sequence-05>
Wei, F., Monteiro, E., & Kaza, S. (2021). *Jamaica - Integrated Community Development Project (English)*. World Bank Group, Washington, DC. Retrieved from <http://documents.worldbank.org/curated/en/310851636577362412/Jamaica-Integrated-Community-Development-Project>
- ¹⁰ Development Options Limited. (2018). *Final report: Midterm evaluation of the Jamaica Integrated Community Development Project*. Kingston, Jamaica.
- ¹¹ NSWMA Mobile App (<http://www.nswma.gov.jm/>)
- ¹² Wei, F., Monteiro, E., & Kaza, S. (2021). *Jamaica - Integrated Community Development Project (English)*. World Bank Group, Washington, DC. Retrieved from <http://documents.worldbank.org/curated/en/310851636577362412/Jamaica-Integrated-Community-Development-Project>
- ¹³ Ibid.
- ¹⁴ Lerner, J. S., & Tetlock, P. E. (1999). Accounting for the effects of accountability. *Psychological Bulletin*, 23(2), 255–75.
Perry, M., Juhlin, O., & Normark, D. (2010). Laying waste together: The shared creation and disposal of refuse in a social context. *Space and Culture*, 13(1), 75–94.
- ¹⁵ Ferrara, I., & Missios, P. (2012). A cross-country study of household waste prevention and recycling: Assessing the effectiveness of policy instruments. *Land Economics*, 88(4): 710–744.
- ¹⁶ Geiger, J. L., Steg, L., van der Werff, E., & Ünal, A. B. (2019). A meta-analysis of factors related to recycling. *Journal of environmental psychology*, 64, 78–97.
- ¹⁷ Based on information received from Phillip Morgan, Investigator, National SWM Authority (February 15, 2023).
- ¹⁸ Based on information received from Dr. Milton Clarke, Environmental Specialist at Jamaica Social Investment Fund (October 31, 2022).
- ¹⁹ Wei, F., Monteiro, E., & Kaza, S. (2021). *Jamaica - Integrated Community Development Project (English)*. World Bank Group, Washington, DC. Retrieved from <http://documents.worldbank.org/curated/en/310851636577362412/Jamaica-Integrated-Community-Development-Project>
- ²⁰ Based on information received from Dr. Milton Clarke, Environmental Specialist at Jamaica Social Investment Fund (October 31, 2022).
- ²¹ Based on information received from Phillip Morgan, Investigator, National SWM Authority (February 15, 2023) and Edson Carr, Project and Planning Manager at National SWM Authority (February 15, 2023).
- ²² Nunez-Ollero, C. (2022). *Jamaica - JM - Integrated Comm. Devl. Proj. (English)*. IEG Review Team, World Bank Group, Washington, DC. Retrieved from <http://documents.worldbank.org/curated/en/099905003312278414/P146460062e741098092cd08f052d41d9cc>
- ²³ Based on information received from Dr. Milton Clarke, Environmental Specialist at Jamaica Social Investment Fund (October 31, 2022).
- ²⁴ Ibid.
- ²⁵ Wei, F., Monteiro, E., & Kaza, S. (2021). *Jamaica - Integrated Community Development Project (English)*. World Bank Group, Washington, DC. Retrieved from <http://documents.worldbank.org/curated/en/310851636577362412/Jamaica-Integrated-Community-Development-Project>
- ²⁶ Jamaica Social Investment Fund—Integrated Community Development Project (ICDP II). Retrieved from <https://www.jsif.org/content/integrated-community-development-project-icdp-ii>
- ²⁷ Based on information received from Phillip Morgan, Investigator, National SWM Authority (February 15, 2023).



Getting people to use waste services in Pakistan

Objective: Empower people to improve accountability



Case summary

Pakistan launched the Clean Green Pakistan Movement (CGPM) to address environmental degradation. The CGPM centered around five pillars: water, sanitation, hygiene, SWM, and tree planting. The movement established several interrelated programs to promote individual (youth and adult) and collective (neighborhood and city) action. The programs used competitions, change agents, education, and accountability to galvanize environmental stewardship. The CGPM's participatory approaches successfully increased public participation in SWM. Its success has inspired similar movements in other countries.



The Clean and Green Pakistan Movement. © Mines and Minerals, Government of the Punjab



Challenge statement

Pakistan struggled with increased MSW volumes due to limited funds, regulations, trained personnel, and equipment. Residents consequently openly dumped their waste, which led to flooding, blocked sewers, and disease outbreaks.

Context and description of challenges

Pakistan (2017 population: 207,684,626)¹ is among the world's most vulnerable countries. It has dealt with numerous environmental issues—including SWM—over the past few decades. Municipal authorities managed water, sanitation, and hygiene-related services in their respective regions. Decentralization empowered municipal authorities to develop province-specific regulations and take on increased responsibilities for service provision. However, urbanization and economic growth placed undue pressure on local governments. Pakistan's waste generation rate (0.28 to 0.61 kg per capita per day [2015]), albeit below global averages, strained limited municipal resources.² In turn, the national waste collection rate remained at 51–69 percent.³ Regions outside major cities (for example, Karachi and Lahore) had scarce landfill sites and comparatively lower collection rates. Residents in these regions therefore often resorted to open dumping and burning.⁴ Uncollected waste created public health and environmental challenges. The general public remained unfamiliar with SWM regulations, including their own responsibilities, and did not engage with municipal operations.⁵ The 2018 federal election reinvigorated talk about the environment. The ministerial incumbent ran a campaign to make Pakistan 'clean and green'.⁶ Their flagship initiative is the subject of the present case study.

Decisions and actions

In 2018, the national government introduced the Clean Green Pakistan Movement (CGPM) to address climate change, pollution, and SWM. Its overarching goal was to develop a framework for municipal service delivery. The government implemented

the CGPM in three phases: (a) a pilot phase (N = 20 cities); (b) a scaling-up phase (N = 93 cities, launched in 2021); and (c) a sustainability phase.⁷

The CGPM brought together government, private sector, and civil society actors. It centered around five pillars: water, sanitation, hygiene and liquid waste management, SWM, and tree planting. The government introduced several programs to fulfill the CGPM's overarching objectives and galvanize public involvement. They included (a) Clean Green Champions Program, (b) Clean Green Pakistan Index, and (c) Clean Green School Program. Programs focused on empowering individual citizens, cities, and educational institutions, respectively.

The design

The government launched the Clean Green Champions Program as the first major component of the CGPM. The program intended to foster grassroots action on environmental issues. Interested citizens registered and logged activities via the program's website or mobile app. Clean Green Champions acted as change agents and supported awareness-raising efforts. They collected, segregated, and disposed of MSW at formal disposal sites; organized talks on MSWM; and relayed citizens' complaints on SWM to local government.⁸ The government established a team to monitor, verify, and approve submitted activities. Citizens received a set number of points for different activities. For instance, they received one point for talking with peers and five points for distributing a SWM brochure.⁹ The CGPM placed volunteers in several tiers depending on the quantity of points accrued. Volunteers were placed in one of five tiers: (a) basic (<499 points), (b) silver (500–1,499 points), (c) gold (1,500–2,999 points), (d) platinum (3,000–4,999), and (e) diamond (>5,000 points). The program publicly recognized champions and published their scores in biannual newsletters.¹⁰ This public recognition acted as a nonmaterial reward. Individuals who reached the top two tiers received two rewards. They met government officials and participated in official CGPM functions.¹¹ The point system injected a game-like quality to the program. The CGPM website displayed the number of participants and the number



of completed activities (Figure 6). These data attempted to create a positive social norm around volunteering.



The involvement of Pakistani cities was crucial to the CGPM's success. The government introduced the Clean Green Pakistan Index to foster competition among cities and neighborhoods. The competition assessed five broad criteria—water, sanitation, hygiene, SWM, and plantation—and 58 sub-indicators over six months. All parameters had equal weighting. The index assessed SWM municipal service delivery through (a) waste collection service coverage, (b) the availability of waste disposal and treatment facilities, and (c) household solid waste segregation and disposal.¹³ City administrators uploaded data on each criterion to a designated website. Each city supplied photographic evidence (before/after) to validate the results. The Monitoring and Evaluation Committee visited cities monthly to foster accountability. After six months, the government assessed neighborhood and city progress and used the results to establish relative rankings. Top-ranked cities received awards and funds during the 'Encouragement Award Ceremony'.¹⁴

The Clean Green School Program targeted children and youth across 423 schools and colleges.¹⁵ The program integrated climate literacy and environmental education

into school curricula. Specifically, it taught youth environmentally friendly behaviors and skills. In tandem, schools created environmental clubs, established interschool competitions, introduced source segregation, and facilitated awareness campaigns. Clean Green Clubs recruited students to act as champions. These champions coordinated activities and disseminated information to 1,000 households. Each school submitted an annual report to the district. The district cell of the CGPM assessed each school's progress. The CGPM issued certificates of appreciation to the three top-performing schools.¹⁶

Several actors supported the CGPM's implementation. Civil society organizations fostered better SWM behaviors by distributing reusable bags, organizing training sessions, and establishing a network of recyclable and organic waste bins. Influential figures such as the religious clergy disseminated messages on pro-environmental behaviors during sermons.¹⁷



Plastic bag ban awareness activity at a school in Islamabad. © Clean Green Pakistan

What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Social comparison: Research suggests that the relative standing of individuals among their peers can influence MSW practices.¹⁸ The CGPM fostered competition among cities and educational institutions through the Clean Green Pakistan Index and Clean Green School Program, respectively.

These programs ranked participants relative to their compatriots based on their performance fulfilling activities under the CGPM.



Creating accountability: Research suggests that holding individuals responsible for their actions can have a powerful influence on their behavior.¹⁹ In the CGPM, municipal authorities uploaded relevant data to a provincial (and subsequently national) dashboard. The dashboard allowed local authorities

and the public to track the progress of different cities across parameters. The CGPM similarly required educational institutions to submit progress reports. These reporting mechanisms held entities liable for their actions.



Messengers: Research suggests that individual actors can help programs initiate, manage, or implement change.²⁰ In the context of waste management, change agents can help model and instill positive waste behaviors.²¹

The current case study encouraged grassroots action through change agents. Through the Clean Green Champions Program and the Clean Green School Program's Clean Green Clubs, citizens could help foster pro-environmental behaviors among their peers. More broadly, religious figures, celebrities, and social media influencers promoted the CGPM and encouraged residents to participate in environmental activities.

Results

The CGPM increased engagement with municipal services. As of 2020, 119,284 citizens registered as Clean Green Champions who completed 200,217 activities, of which 94,685 focused on SWM.²² Under the Clean Green Pakistan Index, the government recognized several top-performing cities in the provinces of Punjab (Attock, Bahawalpur, Lahore, Gujrat, Rawalpindi, and Khyber) and Pakhtunkhwa (Bannu, Kohat, and Peshawar) in October 2020. The CGPM inspired neighboring countries such as Saudi Arabia to create likeminded programs.²³ Despite positive results, limited adaptive capacity, financial capacity, and local policies constrained the CGPM's implementation.²⁴ Following a change in government, the CGPM paused some activities (for example, sanitation-related programming) in 2022. Tree planting activities remain active throughout Pakistan.



Complementary actions to consider

- » Behavior change interventions can complement but not replace the core SWM system. Practitioners interested in deploying a similar intervention may find it useful to first improve the basic SWM infrastructure and the quality of SWM services. Behavior change interventions should build on this enabling environment.
- » Continuity is important for behavior change initiatives, the effects of which can take time to materialize. Other governments looking to replicate this initiative could consider proceeding with the program uninhibited for several years before drawing conclusions on its efficacy.



Want to know more?

[Clean Green Pakistan Movement](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Pakistan Bureau of Statistics. (2017). *Final results of census 2017*. Ministry of Statistics, Islamabad, Islamic Republic of Pakistan.

Population in 2022: 247 million. Source: United States Census Bureau—U.S. and World Population Clock: Pakistan. United States Government. Retrieved from <https://www.census.gov/popclock/world/pk>
- ² Economic Adviser's Wing. (2016). *Pakistan Economic Survey 2015–2016*. Finance Division, Government of Pakistan.

Javed, N., & Hobson, M. (2022). *Solid waste management sector in Pakistan: A reform road map for policy makers*. Asian Development Bank. doi: 10.22617/TCS220086-2
- ³ Climate and Clean Air Coalition. (n.d.) *Brief on solid waste management in Pakistan*. Retrieved from <https://www.waste.ccacoalition.org/sites/default/files/files/brief-swm-pak.pdf>
- ⁴ Javed, N., & Hobson, M. (2022). *Solid waste management sector in Pakistan: A reform road map for policy makers*. Asian Development Bank. doi: 10.22617/TCS220086-2

Ghuri, W. U. (2018). *Expert group meeting on sustainable application of waste-to-energy in Asian region - Waste to energy potential in Pakistan*. United Nations Office for Sustainable Development. Retrieved from <https://sustainabledevelopment.un.org/content/unosd/documents/37697.Waste%20to%20Energy%20Potential%20in%20Pakistan.pdf>
- ⁵ Bhatti, J. A., & Mohmand, I. (2014). *Solid Waste Management Strategy for Tehsil Municipal Administration Barikot*. (GIZ) GmbH. Retrieved from <http://lgkp.gov.pk/wp-content/uploads/2015/08/Solid-Waste-Management-Strategy-Barikot.pdf>
- ⁶ Bangash, F. (2018). Imran gives 11-point election manifesto, *The News International*. Retrieved from <https://www.thenews.com.pk/print/310733-imran-gives-11-point-election-manifesto>
- ⁷ Economic Adviser's Wing. (2021). *Pakistan Economic Survey 2020–21*. Finance Division, Government of Pakistan. Retrieved from https://www.finance.gov.pk/survey/chapter_22/Economic%20Survey%202021-22.pdf
- ⁸ Syed, F. Z., Awan, M. W., Mushtaq, A. Q., & Kiran, I. (2022). Fighting climate change: A critical analysis of Clean Green Pakistan Initiative of Pakistan Tehreek-e-Insaf (PTI). *Journal of the Research Society of Pakistan*, 59(1), 230.

Clean Green Pakistan—Clean Green Champion Program. Government of Pakistan. Retrieved from <https://cleangreen.gov.pk/eng/clean-green-champion-program>
- ⁹ Clean Green Pakistan—Points Reward Details. Government of Pakistan. Retrieved from <https://cleangreen.gov.pk/eng/clean-green-champion-program#points-reward-details>
- ¹⁰ Clean Green Pakistan. (2020). *Newsletter*. Ministry of Climate Change, Government of Pakistan. Retrieved from: <https://cleangreen.gov.pk/eng/news-letters>
- ¹¹ Syed, F. Z., Awan, M. W., Mushtaq, A. Q., & Kiran, I. (2022). Fighting climate change: A critical analysis of Clean Green Pakistan Initiative of Pakistan Tehreek-e-Insaf (PTI). *Journal of the Research Society of Pakistan*, 59(1), 230.
- ¹² Clean Green Pakistan (<https://cleangreen.gov.pk/eng>).
- ¹³ Ministry of Climate Change. (2021). *National Climate Change Policy*. Government of Pakistan. Retrieved from <https://www.mocc.gov.pk/Sitelimage/Policy/NCCP%20Report.pdf>
- ¹⁴ Yearbook 2020–21. Ministry of Climate Change, Government of Pakistan, Islamabad.

Clean Green Pakistan. (2020). *Bi-annual newsletter*. First edition: Jan-Jun 2020. Ministry of Climate Change, Government of Pakistan. Retrieved from <https://cleangreen.gov.pk/eng/news-letters>

The News International. (2019). Launch of Clean Green Pakistan Index on 30th. *The News International*. Retrieved from <https://www.thenews.com.pk/print/547231-launch-of-clean-green-pakistan-index-on-30th>
- ¹⁵ Dawn News. (2019). Clean Green School Program launched at FDE institutions. *Dawn News*. Retrieved from <https://www.dawn.com/news/1516747>
- ¹⁶ Clean Green Pakistan—Schools. Government of Pakistan. Retrieved from <https://clean-green.gov.pk/eng/clean-green-champion-program/schools>

WaterAid—Clean Green School Program. Retrieved from <https://www.wateraid.org/pk/clean-green-school-programme>
- ¹⁷ Mumtaz, M. (2021). Role of civil society organizations for promoting green and blue infrastructure to adapting climate change: Evidence from Islamabad city, Pakistan. *Journal of Cleaner Production*, 309, 127296.
- ¹⁸ Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic Appl. Soc. Psychol.*, 21, 25–36. doi: 10.1207/s15324834basps2101_3
- ¹⁹ Lerner, J. S., & Tetlock, P. E. (1999). Accounting for the effects of accountability. *Psychological Bulletin*, 23(2), 255–275.
- ²⁰ Van Poeck, K., Læssøe, J., & Block, T. (2017). An exploration of sustainability change agents as facilitators of nonformal learning: Mapping a moving and intertwined landscape. *Ecology and Society*, 22(2).
- ²¹ Burn, S. (2006). Social psychology and the stimulation of recycling behaviors: The block leader approach. *Journal of Applied Social Psychology*, 21, 611–629. doi: 10.1111/j.1559-1816.1991.tb00539.x
- ²² Clean Green Pakistan. (2020). *Bi-annual newsletter*. First edition: Jan–Jun 2020. Ministry of Climate Change, Government of Pakistan. Retrieved from <https://cleangreen.gov.pk/eng/news-letters>
- ²³ The News International. (2021). Saudi Arabia wants to replicate Pakistan's green initiatives. *The News International*. Retrieved from <https://www.thenews.com.pk/print/814027-saudi-arabia-wants-to-replicate-pakistan-s-green-initiatives>
- ²⁴ Mumtaz, M. (2021). Role of civil society organizations for promoting green and blue infrastructure to adapting climate change: Evidence from Islamabad city, Pakistan. *Journal of Cleaner Production*, 309, 127296.

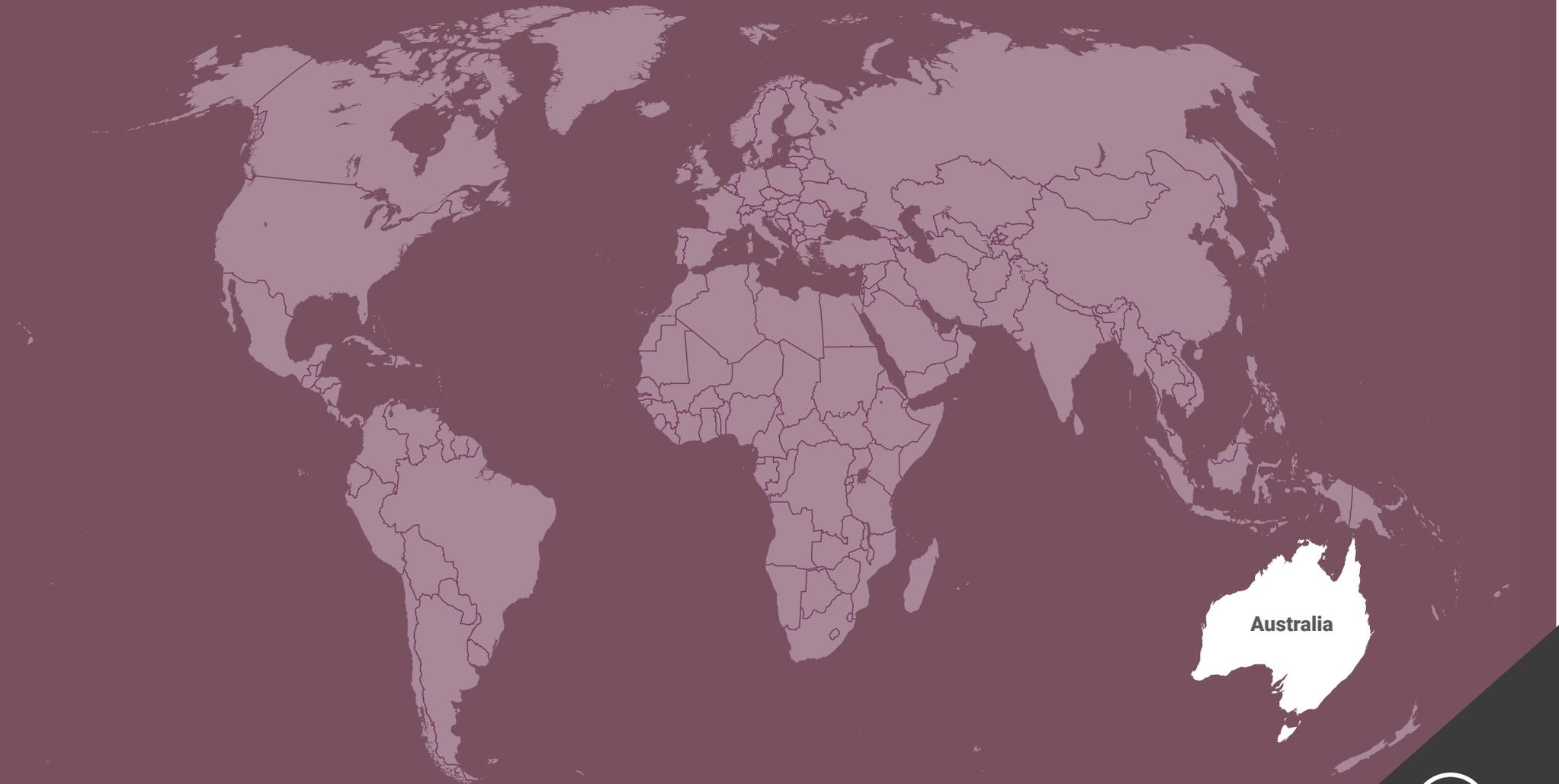




2.2 Getting people to be more sustainable with their waste disposal



2.2.1 Decrease littering (cigarette butts)



Australia



RETURN TO CASE
SELECTION

Getting people to be more sustainable with their waste disposal in Australia

Objective: Increase proper disposal of cigarette butts



Case summary

The New South Wales Environment Protection Authority partnered with 16 local councils to decrease cigarette butt littering. Councils quantified the impact of four interventions on cigarette butt disposal: designing pathways to bins, creating ownership, using social norms, and deploying enforcement. Councils assessed the impact of each strategy on proper cigarette butt disposal rates over several months. These interventions successfully raised the rate of cigarette butt disposal in designated bins by an average of 53 percent. All interventions but the enforcement condition led to sustained changes after the trial. This study led to the Butt Litter Prevention Program. Additionally, the Environment Protection Authority used the trial's results to create statewide litter prevention guidelines and practical tools.



Challenge statement

Despite declining smoking rates¹ and the presence of local laws, cigarette butt litter in New South Wales (NSW) posed a persistent problem for local authorities.

Context and description of challenges

NSW is a southeastern Australian state (2016 population: 7,480,228).² The state had a long history of combatting cigarette butt litter. NSW historically relied on traditional policy instruments such as fines (AUD 60–375 or USD 41–260)³ to discourage littering.⁴ However, such laws were difficult to enforce. Fines were only issued in the presence of a designated officer or otherwise depended on a citizen willing to report the offense.⁵ In turn, cigarette butt litter continued to mount across NSW. In 2013, cigarette butts were the most littered item in the state (43 percent of litter).⁶ In the capital of Sydney, city cleaners collected 15,000 cigarette butts daily (5.5 million annually).⁷ Littered cigarette butts also created environmental issues. The plastic butts contain thousands of chemicals which leached into the environment.⁸ Littered butts also ignited thousands of fires in the state annually.⁹

In 2013, the NSW Environmental Protection Authority (EPA) launched the Litter Prevention Program to reduce littering by 40 percent. The program's hallmark campaign, 'Don't Be a Tosser!', focused on increasing awareness of litter-induced environmental damage. Given its prevalence, the EPA started to conduct dedicated research on cigarette butt litter in 2017. The EPA commissioned a study on cigarette butt littering to understand the contextual factors that drove the behavior. The research found that over half of smokers in public places littered their cigarette butts. They also found that the butt-littering rate varied with environmental context such as the presence of existing litter.¹⁰ Smokers felt that cigarette butts were an innocuous type of litter and often littered without thinking about the consequences. Smokers were also more likely to litter if an area lacked accessible or clean bins.¹¹ This research formed the foundation for the NSW EPA's future cigarette butt litter initiatives, which are the focus of the present case study.

Decisions and actions

In 2018, the NSW EPA collaborated with 16 local councils to determine the most effective anti-littering strategy. This collaboration built on the EPA's previous research on smokers' cigarette butt disposal behavior, attitudes, and knowledge.¹² All councils actively contributed to the development of interventions as well as their delivery, management, and assessment.¹³

The initiative assessed the effectiveness of several interventions on disposal behavior: (a) creating pathways to garbage bins (N = 14 locations), (b) establishing pride and ownership (N = 7 locations), (c) leveraging social norms (N = 11 locations), and (d) implementing enforcement (N = 6 locations). Councils also used control sites (N = 6 locations) to assess residents' cigarette butt disposal behavior in the absence of any intervention. Across interventions, councils compiled location-based information on smoker behavior and the surrounding context. This information helped contextualize the effects of various factors on disposal behavior.

Local councils conducted trials between March and June 2018. Councils self-selected the types of interventions and respective locations for trials. Councils piloted interventions in parks, shopping areas, transportation sites, and offices. The project assessed disposal behavior at the baseline, during the delivery of each intervention, and three months post-intervention. In each location, councils assessed litter prevalence using direct observation and through standardized 48 m² areas.¹⁴





REFERENCE CASE STUDY

Reduce littering in the United Kingdom

Cigarette butts are among the most common form of litter in the world, with an estimated 4.5 trillion thrown away annually. In 2015, the company Hubbub¹⁵ created the Ballot Bin to decrease litter on a busy London street. The Ballot Bin became a voting ashtray, which nudged smokers to use their cigarettes to 'vote' on a question and correctly dispose of them. There are currently over 4,300 Ballot Bins in 42 countries. They collectively prevent an estimated 11 million cigarette butts from being littered annually. In some circumstances, the Ballot Bin has reduced cigarette litter by 73 percent.¹⁶

FIGURE

7

A Ballot Bin in London to collect cigarette butts



The design

All interventions designated a separate space for smoking. Councils demarcated the areas. Across interventions, individuals from each council actively observed smokers' disposal behavior weekly. They also initiated structured conversations with smokers to understand their views on changes to each location.

In the first intervention, councils installed new butt bins and used floor stencils to create a clear path to the designated bins. In conjunction, councils installed and placed signs directly on cigarette butt bins for easy identification. This intervention lasted seven weeks.

In the second intervention, the EPA appealed to smokers' pride and ownership. This intervention relied on a continuous and open dialogue between smokers and councils. The councils first surveyed smokers about their preferences for smoking areas. Following this, councils cleaned and demarcated smoking areas. Where possible, they also installed new butt bins and seating. The councils then re-questioned smokers about the upgraded sites. The councils included smoker's sentiments on signage throughout the designated areas. By cleaning the sites, councils also set a standard, as individuals are less inclined to litter in a clean versus dirty environment.¹⁷ This intervention lasted eight weeks.

In the third intervention, social norms were used to deter littering. This intervention sought to redefine norms, shifting from one where cigarette butt littering was acceptable to a new norm that revolved around proper disposal. Councils first cleaned intervention locations. Signage highlighted the goal of properly disposing of all cigarette butts and recognized progress toward achieving it. Additional bin signage thanked smokers for using the provided bins. Lastly, council staff passed out cards to prompt smokers to properly bin their cigarettes and encourage discussions with other smokers. This intervention lasted seven weeks.

In the fourth intervention, enforcement was used to deter littering. The intervention used floor stencils to increase smokers' awareness of littering fines (AUD 80 or USD 53). Additionally, councils increased enforcement officer patrols in the area (approximately six hours per week) and highlighted their presence through signage. The enforcement officers acted as an accountability mechanism. These officers increased smokers' awareness of the potential for fines and the need to properly dispose of their cigarette butts. This intervention lasted between four and six weeks.¹⁸



What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Emotional appeals: Emotions can be key determinants of behavior. Past literature indicates that persuasive messaging that uses emotional appeals can promote pro-environmental actions.¹⁹ In NSW, local councils created welcoming environments and captured smokers' positive sentiments about the designated smoking areas. Councils placed these messages prominently in smoking areas to inspire pride and ownership of the spaces.



Social Norms: Research suggests that an individual's perception of what is socially appropriate can influence his/her behavior. In the context of waste management, the absence of cigarette butt litter communicates a norm about the unacceptability of littering.²⁰ In NSW, local councils used positive social norms messaging to set an expectation for smokers to dispose of their cigarette butts in provided bins.

SYSTEM DESIGN MECHANISMS

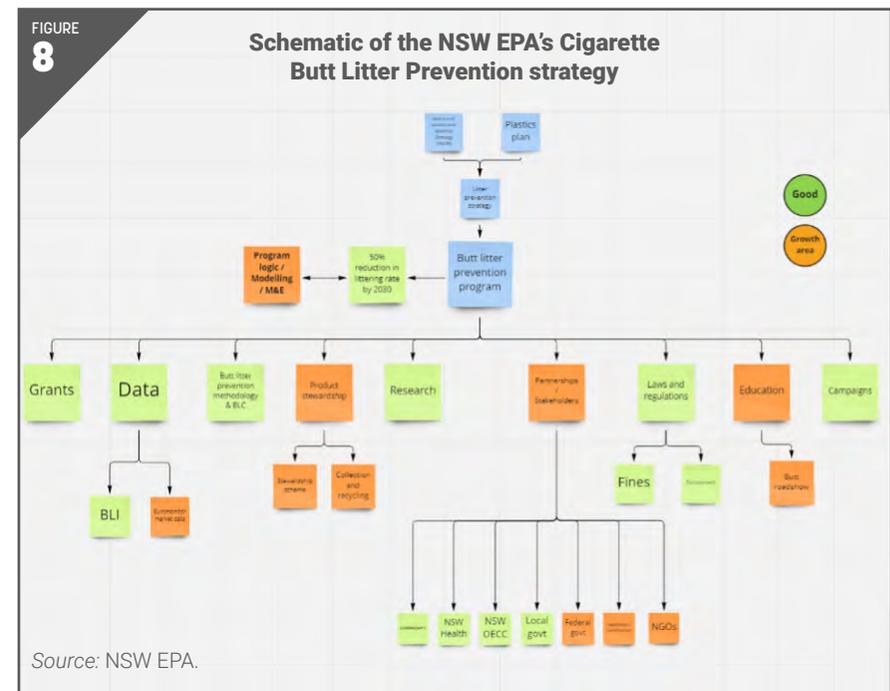


Physical cues: Aspects of the surrounding environment can draw attention to waste disposal infrastructure, which encourages its usage and deters littering.²¹ In the present case study, councils used floor stencils to guide smokers to nearby disposal bins.

Results

This study demonstrates the value of simple, practical interventions to decrease cigarette butt litter. Across interventions, the average butt-binning rate increased from 38 to 58 percent (a 53 percent improvement relative to baseline). All tested interventions increased the proper disposal of cigarette butts. The pride intervention was the most effective, leading to a 64 percent binning rate. The enforcement, pathways, and social norms interventions led to butt-binning rates of 62, 53, and 58 percent, respectively. Littering stayed constant in control conditions.

Three months after the trial, binning rates remained stable in all but the negative incentive intervention. Smokers reported feeling increased responsibility to conform to proper disposal behavior given expectations implied by designated smoking areas. Engagement with smokers was critical to behavior change. Engagement allowed land managers to tailor smoking areas²² to the individuals whose behavior they were trying to change. The interaction between land managers and smokers built a 'social compact'. As part of this unwritten agreement, smokers did their part to maintain the smoking areas that land managers established.²³



This trial led to the development of statewide anti-littering guidelines. The guidelines included a 13-step process to help local councils, communities, and business owners understand why smokers litter and develop evidence-based interventions to prevent butt litter.²⁴ This trial also supported the development of a practical tool called the Butt Litter Check. The tool qualitatively and quantitatively assessed butt disposal behavior in an area. Land managers could use the collected data to investigate the



relationship between smokers, the smoking area, and litter. Managers could then create tailored interventions.²⁵

The trial led to the creation of the Cigarette Butt Litter Prevention Program in 2020. Its goal is to reduce butt litter by 50 percent by 2030. This program is part of the NSW EPA's broader Litter Prevention Program (Figure 8). The Cigarette Butt Litter Prevention Program contributes to NSW's Plastics Action Plan to reduce plastic generation and waste. It also supports litter reduction targets under the NSW Waste and Sustainable Materials Strategy (Figure 9).²⁶ In 2020, the NSW EPA completed a Butt Litter Index to track the statewide cigarette butt littering rate. The Index indicated a

64 percent littering rate. This rate will act as a baseline against which to compare the Cigarette Butt Litter Prevention Program's performance.²⁷

In 2020, the NSW EPA commenced its cigarette butt litter prevention grants program. The grants program supports the Cigarette Butt Litter Prevention Program's 50 percent butt litter reduction target. Local councils, regional waste groups, community groups, businesses, and other government agencies can apply for funding to reduce litter.²⁹ Between 2020 and 2022, the EPA distributed approximately USD 611,000 to 25 stakeholders to deliver local cigarette butt litter prevention projects. To date, litter prevention projects that have integrated pride and ownership in their approach have been most successful in decreasing cigarette butt litter.³⁰ These results reinforce the 2018 trial's findings that engagement and a social compact are paramount to behavior change. Beyond its effectiveness on littering, the grant program ensured that the wider community supported the butt litter prevention infrastructure and activities.³¹ Other countries could learn from and tailor these interventions and initiatives to local contexts.

FIGURE
9

The NSW EPA's Waste and Sustainable Materials Strategy, which informs the Cigarette Butt Litter Prevention Program²⁸

✓ Our targets

Under the NSW Waste and Sustainable Materials Strategy: Stage 1 2021–2027, NSW has adopted several targets. The actions outlined in this plan will help us to meet these targets, including to:

- phase out problematic and unnecessary plastics by 2025
- reduce the total waste generated in Australia by 10% per person by 2030
- achieve an average 80% recovery rate of resources from all waste streams by 2030
- significantly increase the use of recycled content by government and industry
- reduce plastic litter items by 30% by 2025
- reduce the overall litter by 60% by 2030
- triple the plastics recycling rate by 2030.

We are working towards national waste targets including:

- phase out problematic and unnecessary plastics by 2025
- ban the export of waste plastic, paper, glass and tyres, starting in 2021
- reduce the total waste generated in Australia by 10% per person by 2030
- recover an average 80% of resources from all waste streams by 2030
- significantly increase the use of recycled content by government and industry.

The Plan presents a package of actions supported by analysis of the economic and technical feasibility, costs and benefits.

The proposed actions will allow NSW to become a leader in managing plastics; eliminating harmful plastics, cleaning up plastic pollution and using our knowledge to get the most value out of our plastic resources.

Broader actions in the NSW Waste and Sustainable Materials Strategy 2041 will contribute to achieving our targets.



Complementary actions to consider

- » Data suggest that smokers' littering tendencies change when they were alone relative to when they were with others.³² Practitioners deploying anti-littering strategies may consider investigating group dynamics of littering as well as individual littering behavior.



Want to know more?

[EPA work to prevent littering](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

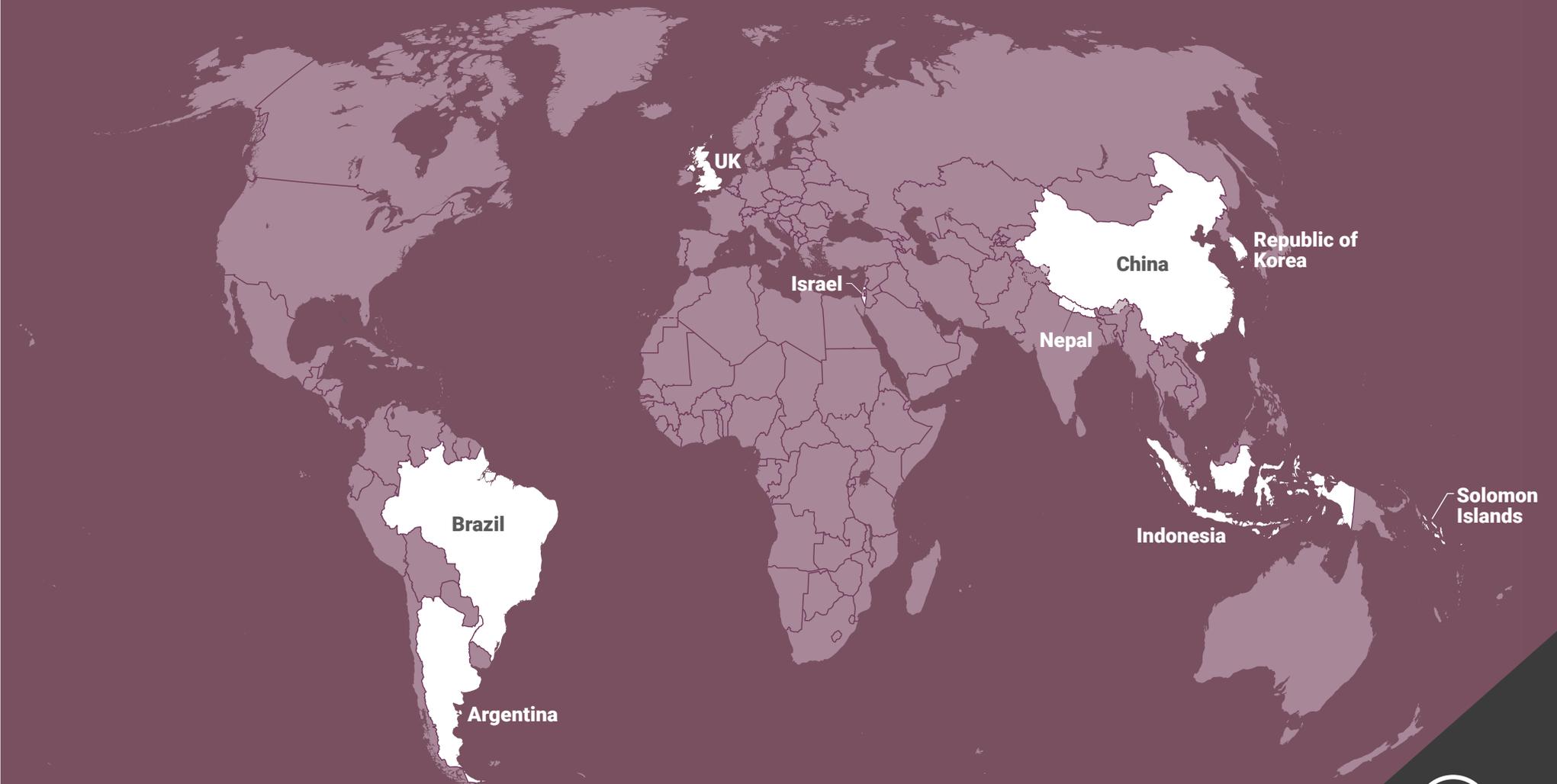
- ¹ Department of Health. (2017). *Tobacco control: Key facts and figures*. Australian Government. Retrieved from <https://www.health.gov.au/sites/default/files/tobacco-control-key-facts-and-figures.pdf>
- ² Australian Bureau of Statistics—New South Wales: 2016 Census. Retrieved from <https://www.abs.gov.au/census/find-census-data/quickstats/2016/1>
Population in 2021: 8.1 million. Source: Australian Bureau Statistics. (2022). *Snapshot of New South Wales*. Government of Australia. Retrieved from [https://www.abs.gov.au/articles/snapshot-nsw-2021#:~:text=In%20the%202021%20Census%2C%20the,Greater%20Sydney%20\(5.2%20million\)](https://www.abs.gov.au/articles/snapshot-nsw-2021#:~:text=In%20the%202021%20Census%2C%20the,Greater%20Sydney%20(5.2%20million))
- ³ Fines varied depending on several factors, including if residents disposed of cigarette butts from a car or during forest fire season.
- ⁴ Protection of The Environment Operations Act 1997 - Sect 145: Littering generally. NSW Government.
Protection of the Environment Operations (Penalty Notices) Regulation 2004 under the Protection of the Environment Operations Act 1997. Minister for the Environment, NSW Government.
- ⁵ Service NSW—How to report littering from a vehicle. NSW Government. Retrieved from <https://www.service.nsw.gov.au/transaction/report-littering-from-a-vehicle#:~:text=Have%20your%20mobile%20phone%20with,days%20of%20witnessing%20the%20littering>
- ⁶ State of NSW and Environment Protection Authority. (2013). *NSW Litter Prevention Kit: Things you should know about litter and litterers*. EPA, Sydney. ISBN 978 1 74359 332 5. Retrieved from <https://www.epa.nsw.gov.au/~media/EPA/Corporate%20Site/resources/litter/130800-lpk-things-know.ashx>
- ⁷ Wallbank, L. A., MacKenzie, R., & Beggs, P. J. (2016). *Environmental impacts of tobacco product waste: International and Australian policy responses*. *Ambio*, 46(3), 361–370. doi:10.1007/s13280-016-0851-0
- ⁸ Slaughter, E., Gersberg, R. M., Watanabe, K., Rudolph, J., Stransky, C., & Novotny, T. E. (2011). Toxicity of cigarette butts, and their chemical components, to marine and freshwater fish. *Tobacco control*, 20 (Suppl 1), i25–i29. doi: 10.1136/tc.2010.040170
- ⁹ State of NSW and Environment Protection Authority. (2013). *NSW Litter Prevention Kit: Things you should know about litter and litterers*. EPA, Sydney. ISBN 978 1 74359 332 5. Retrieved from <https://www.epa.nsw.gov.au/~media/EPA/Corporate%20Site/resources/litter/130800-lpk-things-know.ashx>
- ¹⁰ Curnow, R., & Spehr, K. (2017). *Butt-littering behaviour in context. The butt litter check: A foundation for the NSW EPA cigarette butt litter reduction program*. NSW Environment Protection Authority. Retrieved from <https://www.epa.nsw.gov.au/~media/epa/corporate-site/resources/litter/cigarette-butt-littering-behaviour-in-nsw-quantitative-research-and-base-line-report-community-change.pdf?la=en&hash=29E1703A1F364B2C8A336BB0D-6B4061A97E1C288>
- ¹¹ Falsone, C., & Spence, B. (2017). *Qualitative research of cigarette disposal behaviour: Full report of research finding*. Hall & Partners – Open Mind.
- ¹² Ibid.
- ¹³ State of New South Wales and the Environment Protection Authority. (2019). *Identifying effective strategies to reduce cigarette butt litter findings from the NSW EPA-led Cigarette Butt Litter Prevention Trial*. EPA, Sydney. ISBN 978 1 925987 04 1. Retrieved from <https://www.epa.nsw.gov.au/~media/epa/corporate-site/resources/litter/19p1840-butt-litter-trial-report.pdf>
- ¹⁴ Ibid.
- ¹⁵ Hubbub (hubbub.org.uk) is a creative charity seeking to inspire environmental action. Its experimental campaigns use behavioral insights, creative communication, and collaboration to change people's attitudes and behaviors.
- ¹⁶ Litter survey conducted by Ellipsis Earth in Bournemouth Christchurch & Poole, 2021: <https://www.ellipsis.earth/bcp>
Based on information received from Saskia Restorick, Director, Hubbub (January 27, 2023).
- ¹⁷ Cialdini, R. B., Raymond R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58(6), 1015–1026.
- ¹⁸ State of New South Wales and the Environment Protection Authority. (2019). *Identifying effective strategies to reduce cigarette butt litter findings from the NSW EPA-led Cigarette Butt Litter Prevention Trial*. EPA, Sydney. ISBN 978 1 925987 04 1. Retrieved from <https://www.epa.nsw.gov.au/~media/epa/corporate-site/resources/litter/19p1840-butt-litter-trial-report.pdf>
- ¹⁹ Rare Center for Behavior and the Environment. (n.d). *Project cane changer: Tapping into farmers' identities to protect the great barrier reef*. Retrieved from <https://behavior.rare.org/wp-content/uploads/2020/07/Emotional-Appeals.-Cane-Changer-7.8.pdf>
Bissing-Olson, M. J., Fielding, K. S., & Iyer, A. (2016). Experiences of pride, not guilt, predict pro-environmental behavior when pro-environmental descriptive norms are more positive. *Journal of Environmental Psychology*, 45, 145–153. doi: 10.1016/j.jenvp.2016.01.001
- ²⁰ Schultz, P. W., Bator, R. J., Large, L. B., Bruni, C. M., & Tabanico, J. J. (2013). Littering in context: Personal and environmental predictors of littering behavior. *Environment and Behavior*, 45(1), 35–59.
- ²¹ Jespersen, S.M. (2012). Green nudge: Nudging into the litter bin. *iNudgeyou*. Retrieved from <http://www.inudgeyou.com/green-nudge-nudging-litter-into-the-bin>
- ²² State of New South Wales and the Environment Protection Authority. (2019). *Identifying effective strategies to reduce cigarette butt litter findings from the NSW EPA-led Cigarette Butt Litter Prevention Trial*. EPA, Sydney. ISBN 978 1 925987 04 1. Retrieved from <https://www.epa.nsw.gov.au/~media/epa/corporate-site/resources/litter/19p1840-butt-litter-trial-report.pdf>
- ²³ Based on information received from Rupert Saville, Head, New South Wales Environment Protection Authority Litter Prevention Unit (February 9, 2023).



- ²⁴ State of NSW and Environment Protection Authority. (2021). *Guide to prevent cigarette butt littering*. EPA, Sydney. ISBN 978 1 925987 79 9. Retrieved from <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/litter/21p3281-guide-to-prevent-cigarette-butt-littering.pdf?la=en&hash=58B92F1DD0CBF5991312C9FFE6BA3FEC-B62A85BBE>
- ²⁵ State of NSW and Environment Protection Authority. (2021). *Butt Litter check guidelines*. EPA Litter Prevention Kit: Part 4. EPA, Sydney. ISBN 978 1 922447 67 8. Retrieved from <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/litter/21p3199-butt-litter-kit-part-4.pdf?la=en&hash=42DCF158A216A048C542219B425ACDD91DC346C8>
- ²⁶ Department of Planning and Environment—NSW Plastics Action Plan. NSW Government. Retrieved from <https://www.dpie.nsw.gov.au/our-work/environment-energy-and-science/plastics-action-plan>
- Department of Planning, Industry and Environment. (2021). *NSW Waste and Sustainable Materials Strategy 2041: Stage 1: 2021–2027*. NSW Government. Retrieved from https://www.dpie.nsw.gov.au/_data/assets/pdf_file/0006/385683/NSW-Waste-and-Sustainable-Materials-Strategy-2041.pdf
- ²⁷ Parker, J. (2021). *Butt Litter Index 2020: Research on cigarette disposal behaviour for the NSW Environment Protection Authority*. Taverner Research, Australia Retrieved from <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/litter/butt-litter-index-2020.pdf?la=en&hash=328BEFF81F750D7468CD289E243AB33333FCF9FE>
- ²⁸ Department of Planning, Industry and Environment. (2021). *NSW Waste and Sustainable Materials Strategy 2041: Stage 1: 2021–2027*. NSW Government. Retrieved from https://www.dpie.nsw.gov.au/_data/assets/pdf_file/0006/385683/NSW-Waste-and-Sustainable-Materials-Strategy-2041.pdf
- ²⁹ State of NSW and the Environment Protection Authority. (2021). *Cigarette Butt Litter Prevention Grant Program*. EPA, Sydney. Retrieved from <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/litter/21p3310-cigarette-butt-litter-round2.pdf?la=en&hash=4A-E86722C367D1812BA45778D25EE5CCAA353350>
- ³⁰ Based on information received from Chris Chung, Project Officer, New South Wales Environment Protection Authority Litter Prevention Unit (February 9, 2023).
- ³¹ Heartward Strategic. (2021). *Cigarette Butt Litter Prevention Program Community Impact Research Report*. NSW EPA Litter Prevention Unit. Retrieved from <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/litter/2021-but-litter-community-impact-survey.pdf?la=en&hash=6F39F8B12CA6D6AD6996331A1224DF5DD450A34A>
- ³² Parker, J. (2021). *Butt Litter Index 2020: Research on cigarette disposal behaviour for the NSW Environment Protection Authority*. Taverner Research, Australia Retrieved from <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/litter/butt-litter-index-2020.pdf?la=en&hash=328BEFF81F750D7468CD289E243AB33333FCF9FE>



2.2.2 Increase reusing and recycling



RETURN TO CASE
SELECTION

Getting people to be more sustainable with their waste disposal in Argentina

Main objective: Increase reusing and recycling

Other objectives: Increase source segregation of organic and other waste



Case summary

The Argentine Municipality of Trelew tested the impact of communications materials on waste disposal behavior. They assessed the relative impact of (a) simplified information, (b) social appeals, and (c) a magnetic calendar (in various combinations) on source segregation rates of 4,800 households and small businesses. Changes in these behaviors were quantified through waste collection. The interventions doubled household source segregation rates. The effects remained even after six months. The local government thereafter scaled up the trial to a wider portion of the municipality. The intervention informed subsequent community engagement strategies.



Separated waste recyclables. © Jorge Luis Castañeda



Challenge statement

Despite having the necessary institutional and physical SWM infrastructure, Trelew residents rarely segregated their waste. Consequently, most waste ended up in landfills. Low waste diversion rates hindered the municipality's plans to shift from disposal to more preferable treatment options.

Context and description of challenges

Trelew (2017 population: approximately 106,662)¹ is a mid-size city in the Chubut Province of Argentina. In 2010, the provincial MSW generation rate was 0.93 kg per capita per day.² Local regulations outlined the city's waste storage, collection, transportation, and treatment requirements.³ Residents in middle- and high-income areas were required to dispose of wet (residual and organic) and dry (recyclables) waste in separate bags.⁴ Municipal workers collected wet waste six days a week (Monday through Saturday) and dry waste weekly (Thursday). Unfortunately, residents frequently disposed of mixed waste. Mixed waste led to high contamination and created extra work for employees at the waste separation and transfer plant, tasked with separating recyclables.⁵ In light of these challenges, the city's recycling rate remained as low as 3 percent.⁶

The municipality attempted to establish better waste management behaviors through education and awareness raising. However, these activities alone failed to increase proper source segregation rates.⁷ The municipality recognized the need for complementary activities to galvanize behavior change.

Decisions and actions

The municipality of Trelew codesigned and tested a set of behaviorally informed interventions with support from the German Development Institute and the Mind, Behavior, and Development Unit of the World Bank. The interventions sought to improve residents' rates of source segregation (recyclable and residual waste) and

disposal. The German Development Institute funded the project, while the municipality and World Bank contributed in-kind resources.

In November 2018, the project team conducted a diagnostics survey to assess residents' barriers to source segregation. The survey found that many households did not know which day to place their dry waste out for collection, they could not properly classify materials as dry and wet waste, and they saw source segregation as a hassle. The survey results informed the subsequent suite of interventions. These included an assessment of waste separation behaviors in a randomized controlled trial (N = 4,800 participants across 400 street blocks, of which 90 percent were households and the remainder were small businesses) and a scale-up.

The design

The intervention was twofold and sought to encourage two linked behaviors: (a) proper separation of dry and wet waste and (b) disposal of dry waste on the correct day. To understand residents' knowledge of and barriers to proper waste handling, researchers conducted a door-to-door survey of 369 households. The survey assessed residents' knowledge and execution of proper source segregation. It also assessed their awareness of the dry waste collection schedule.

The intervention included five treatments: (a) a letter containing only simplified information; (b) a letter containing simplified information and social appeals; (c) a letter containing simplified information and a magnetic calendar; (d) a letter containing simplified information and social appeals as well as a magnetic calendar; and (e) a control group, which did not receive any intervention. The team assessed the impact of interventions by collecting household waste after two weeks (from 1,565 households) and six months (from 1,568 households).

In the first treatment, the project team sent a simplified letter to households. The letter told residents when to dispose of dry waste (Thursday) and included a table with relevant dry and wet waste items. This letter addressed residents' knowledge gaps—one of the key barriers to proper waste disposal.





Waste weighbridge. © Jorge Luis Castañeda

In the second treatment, the project team sent households the same letter containing simplified information as the first intervention. Additionally, the letter featured a descriptive social norm. It emphasized that the majority (60 percent) of neighbors supported recycling, based on the results from the diagnostic survey. Furthermore, the letter appealed to residents' prosocial behaviors and asked residents to engage in source segregation to help the waste plant workers.

In the third treatment, the team sent households the same letter containing simplified information and a magnetic fridge calendar, a popular method in Trelew for advertising. The calendar was a salient reminder to set dry waste out for collection on Thursdays. The calendar also demarcated each Thursday in a different color from the rest of the week and included a checkbox that residents could use to track their progress.

In the fourth treatment, the project team sent households a letter containing simplified information with social appeals and a magnetic fridge calendar.

To assess each treatment's impact, the project team collected dry waste from a subset of households on the designated collection day (Thursday). Researchers cataloged waste weight and volume, categorized recyclables, and noted whether the waste was commingled or segregated (exclusively recyclables). Waste bags were tagged with QR codes to link the waste data with the intervention to which households were assigned.⁸

What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Social norms: Knowledge of our peers' behaviors can influence our own, including recycling propensity.⁹ In the current case study, the project team included a descriptive social norm in informational letters, emphasizing that three out of five neighbors thought recycling was desirable.

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: Simplifying the presentation of information can significantly affect levels of compliance.¹⁰ In the present study, researchers sent households and businesses a letter containing concise and simplified information on recycling. The letters also provided checklists and grouped relevant information. Collectively, these changes made the guidance easier to follow.



Salience: Research suggests that individuals attend to features of their environment that stand out and such tools can help increase recycling behavior.¹¹ The current case study used a magnetic calendar that specified the dry waste collection schedule to remind households to set out dry waste on the correct weekday.



Results

The intervention significantly increased dry waste recycling among participating households. After two weeks, households that received the intervention had nearly double (31 percent) source segregation rates relative to the control group (17 percent). Additionally, the intervention was cost-effective at an average expenditure of USD 0.55 per participant.¹² Relative to the control group, the four treatments tested led to similarly high levels of source segregation. These effects persisted up to six months after the intervention. The behaviorally informed letter had one of the highest cost-benefit ratios. It also effectively addressed residents' knowledge gaps using clear and simple language. The letter was highly effective, such that adding a social appeal or reminder did not significantly increase source segregation rates. In response to the trial's significant effect, in November 2019, the municipality expanded the intervention to 20,000 new households.¹³ The time taken to understand residents' barriers and motivators to engaging with the waste system was essential to the intervention's design.

This case study depicts an easily scalable and highly transferable way to improve source segregation. The intervention informed the municipality's SWM operations and community engagement strategy. From the trial, officials learned the importance of connecting waste collectors with the community to humanize the service. The government thereafter selected representatives to speak with residents about and dispel common myths on waste management. Waste cooperatives also carried out surveys on residents' attitudes and beliefs.¹⁴ The trial laid the foundation to integrate environmental education into curricula. Complementarily, the municipality developed the RedES (Red de Escuelas Sustentables) Sustainable Schools Network to improve SWM outreach through guided visits to SWM processing facilities, workshops, and an experience exchange forum.



Complementary actions to consider

- » The present intervention used a magnetic calendar to remind households to place their recyclables curbside on a specific day. Practitioners undertaking like-minded interventions could assess the efficacy of other tools (for example, an automated text message reminder sent before collections) on SWM behaviors.
- » The intervention focused exclusively on middle- and high-income residents. Governments deploying similar interventions may consider tailoring their intervention to the socioeconomic status of residents. They may also consider tailoring this intervention to lower-income neighborhoods, whose residents may have unique barriers to engaging in source segregation but would reap outsized rewards.



Want to know more?

[Using Behavioral Science to Increase Recycling in Argentina](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Secretariat of Public Works and Services. (2017). *Trelew tiene 106.662 habitantes en la actualidad* [Trelew currently has 106,662 inhabitants]. Municipality of Trelew. Retrieved from <https://www.trelew.gov.ar/trelew-106-662-habitantes-la-actualidad/>
Population in 2022: approximately 111,000. Source: Chubut Editorial. (2022). *Madryn ya tendría 123 mil olítico, superando a Trelew que llegaría a 111 mil* [Madryn would already have 123,000 inhabitants, surpassing Trelew, which would reach 111,000]. El Chubut. Retrieved from <https://www.elchubut.com.ar/regionales/2022-9-10-23-30-0-madryn-ya-tendria-123-mil-habitantes-superando-a-trelew-que-llegaria-a-111-mil>
- ² Government of Argentina. (n.d.) *Provincia de Chubut*. Retrieved from https://www.argentina.gob.ar/sites/default/files/provincia_de_chubut.pdf
- ³ Residuos, Reglamenta Tratamiento - Ordenanza 4232/ 92 (Waste, Treatment Regulations – Ordinance 4232/92). City of Trelew.
- ⁴ Dirección de Gestión Ambiental. (2016). *Sistema Público Intermunicipal de Gestión de Residuos Sólidos Urbanos* [GIRSU; Intermunicipal Public Consortium for Urban Solid Waste Management]. Awareness raising presentation.
- ⁵ Pegels, A., Castañeda, J. L., Humphreys, C., Kötter, C., Negre, M., Weidner, C., & Kutzner, F. (2022). Aligning recycling behaviors and the recycling system—Towards a full cycle of materials and behavioral methods. *Waste Management, 138*, 1–7.
- ⁶ eMBeD. (2019). *Using Behavioral Science to Increase Recycling in Argentina (English)*. World Bank Group, Washington, DC. Retrieved from <https://www.idos-research.de/uploads/media/Using-Behavioral-Science-to-Increase-Recycling-in-Argentina.pdf>
- ⁷ Pegels, A., Castañeda, J. L., Humphreys, C., Kötter, C., Negre, M., Weidner, C., & Kutzner, F. (2022). Aligning recycling behaviors and the recycling system—Towards a full cycle of materials and behavioral methods. *Waste Management, 138*, 1–7.
- ⁸ Ibid.
- ⁹ Thomas, C., & Sharp, V. (2013). Understanding the normalisation of recycling behaviour and its implications for other pro-environmental behaviours: A review of social norms and recycling. *Resources, Conservation and Recycling, 79*, 11–20.
Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *J. Pers. Soc. Psychol., 58*(6), 1015–1026. doi:10.1037/0022-3514.58.6.1015
- ¹⁰ Sunstein, C.R. (2013). *Simpler: The future of government*. Simon & Schuster, New York.
- ¹¹ Montazeri, S., Gonzalez, R., Yoon, C., & Papalambros, P. Y. (2012). Color, cognition, and recycling: How the design of everyday objects prompt behavior change. *DS 70: Proceedings of DESIGN 2012* (1363–1368). The 12th International Design Conference, Dubrovnik, Croatia.
- ¹² eMBeD. (2019). *Using behavioral science to increase recycling in Argentina (English)*. World Bank Group, Washington, DC. Retrieved from <https://www.idos-research.de/uploads/media/Using-Behavioral-Science-to-Increase-Recycling-in-Argentina.pdf>
- ¹³ Pegels, A., Castañeda, J. L., Humphreys, C., Kötter, C., Negre, M., Weidner, C., & Kutzner, F. (2022). Aligning recycling behaviors and the recycling system—Towards a full cycle of materials and behavioral methods. *Waste Management, 138*, 1–7.
- ¹⁴ Based on information received from Oro Coria Lucas - Director, Environmental Management Department, Trelew (January 10, 2023).
Based on information received from Martinez Elgorriaga Luciana - Environmental Education Subprogram, Environmental Management Department, Trelew (January 10, 2023).
Based on information received from Davies Sandra - Technical Team, Environmental Management Department, Trelew (January 10, 2023).



Getting people to be more sustainable with and generate less waste in Brazil

Main objective: Increase reusing and recycling

Other objectives: Increase segregation of organic and other waste; change consumption and production behavior



Case summary

The Brazilian city of Curitiba introduced the Green Exchange Program to increase cleanliness across the city's low-income areas. The program involved the exchange of recyclable waste for fresh produce that the government purchased from local farmers. It subsequently established several dozen collection locations throughout the city where residents could exchange 4 kg of recyclables or 4 L oil for 1 kg of produce. Recyclable waste was then diverted to waste cooperatives for further processing and sale. The initiative was widely popularized through traditional media, school-based education, and mascots. The Green Exchange Program has benefited low-income residents for the past three decades. Between 1991 and 2022, it collected 96,850 tons of recyclables and distributed 27,693 tons of produce to 3,057,371 families. The program has also decreased littering and provided supplemental income to waste pickers and smallholder farmers.

Challenge statement

Curitiba's lower-income communities were largely beyond the reach of traditional waste collection programs, which led to improper waste disposal and public health issues.

Context and description of challenges

Curitiba is the capital city of Brazil's Paraná state. Its population grew from 1.4 million in 1989 to 1.96 million in 2021.¹ In the decades preceding the intervention, Curitiba's agricultural industry attracted an influx of immigrants, which led to significant population growth.² Population increases constrained access to basic services. Many newcomers resided in favelas (low-income, informal regions),³ which had underdeveloped roads inaccessible to formal SWM services.⁴ Without access to city services, favela residents openly dumped waste on roads and in water bodies,⁵ leading to blocked drains and public health issues.⁶

In response to burgeoning SWM issues, the city introduced a series of low-cost waste-related interventions to increase collective action. In 1989, Curitiba rolled out the *Garbage is not Garbage* initiative and the *Waste Purchase Program*. The former taught residents to segregate their inorganic and organic waste.⁷ The latter offered favela residents transport vouchers in exchange for collected waste.⁸ These



initiatives increased residents' receptivity to community solid waste programs and provided the foundation for the intervention described in the present case study.

Decisions and actions

In 1991, two government agencies (Secretaria Municipal do Meio Ambiente and Secretaria Municipal do Abastecimento) created the *Green Exchange Program* (Câmbio Verde). The program operated under the broader *Garbage is not Garbage* initiative and was designed to clean up the city's favelas.⁹ The concept was simple: citizens could exchange their recyclable waste for fresh produce, guaranteeing a market for farmers' surplus crops. The *Green Exchange Program* complemented other municipal-wide recycling programs and provided an avenue for lower-value recyclables which were less attractive to the informal sector. From 2007 onward, recyclables were diverted to member associations of ECOCIDADÃO, a program developed by the Municipal Secretariat for the Environment (SMMA). Its goal was to increase waste pickers' quality of life and income while increasing waste diversion rates.

The design

The *Green Exchange Program* supported the *Garbage is not Garbage* initiative's environmental education and outreach activities. The program simultaneously prevented excess produce from smallholder farmers becoming waste and instilled SWM habits in residents. The government established 53 municipal-wide mobile recycling exchange points to facilitate collections, which grew to 103 locations as of 2023. The ubiquity of collection points increased the accessibility of this service to interested residents. In parallel, the Federation of Producers of Paraná—which organized small- and medium-size producers in the Metropolitan Region of Curitiba—sold and delivered produce to the government at a discount.¹⁰ The government's arrangement with farmers changed the way in which the latter operated and how they dealt with excess produce.

The program did not require registration, which made it easier for residents to participate. Two trucks were present at the exchange points: one collected recyclables

from residents and the other transported produce to the exchange point. A collection crew parked the trucks at collection points for a few hours in the mornings and afternoons on Tuesdays and Fridays. Citizens received 1 kg of fruits and vegetables upon depositing 4 kg of recyclables or 4 L of used oil contained in 2 L PET bottles.¹¹ While the program accepted all recyclables, it primarily provided an avenue for low-value recyclables that were not acquired by waste pickers for supplemental income. By targeting lower-value recyclable waste, the *Green Exchange Program* diverted waste that otherwise could be littered.

After collection, recyclables from both the *Green Exchange Program* and municipal collections were forwarded to the ECOCIDADÃO program, comprising 40 associations and cooperatives of informal waste collectors. ECOCIDADÃO institutionalized waste pickers into the waste management system and provided them with better working conditions. The program aimed to improve the quality of life of collectors and strengthen the collection and separation network for recyclable and reusable materials.¹² Recycling recovery facilities were spread throughout Curitiba. Here, workers from associations and cooperatives received, sorted, and sold recyclables to industry. ECOCIDADÃO paid waste pickers to provide them with supplemental income. Workers received payment proportional to hours worked and recyclables sorted and were provided with personal protective gear and training. In May 2015, the city of Curitiba signed a service contract with collector associations and cooperatives to remunerate them for processing recyclable waste. Each association or cooperative received payments relative to the quantity of recyclables processed.

A variety of communications activities were used to publicize program activities. Notably, a Brazilian artist created the *Família Folhas*—cartoon characters that depicted a family of leaves—to serve as mascots for the *Garbage is not Garbage* initiative. They taught residents the importance of separating organic and recyclable waste and eventually became a symbol of a city that cared about its future and valued nature. In this way, the mascots attempted to generate a sense of identity and pride around good SWM practices. Educational activities targeted both adults and children. To engage the former, *Família Folhas* and messages on source segregation were widely publicized on social media, television, radio, and newspapers. Pictures



of the *Familia Folhas* were also emblazoned on subway stations, parks, bus doors, and other public spaces to remind residents of the importance of recycling. To connect with youth, mascots visited municipal schools and early childhood education centers to convey waste-related messaging. Students conducted classroom activities and created posters for source segregation. The municipality also incorporated these characters into educational comic books, in which the characters' adventure showed that it was important for all residents to segregate their waste to reduce landfilling. The intent of school-based programming was also for children to act as change agents and instill source segregation practices at home.



A tube station enveloped with the Folhas Family campaign characters in Curitiba, Brazil. © Hully Paiva/SMCS

What behavioral tools are present in this initiative?

FINANCIAL MECHANISMS



Material rewards: In select circumstances, monetary and material rewards can promote positive waste management behaviors like recycling.¹³ In the current case study, Curitiba's *Green Exchange Program* incentivized recycling in favelas. Residents could exchange recyclable waste used oil for produce. In this way, material rewards concurrently encouraged proper waste-related behaviors while reducing food insecurity. The rewards system used by the *Green Exchange Program* specifically targeted low-income households. Socioeconomic status may mediate program uptake if practitioners create a similar intervention elsewhere—that is, lower-income households may be more inclined to participate.

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: Past research indicates that even small hassles can hinder participation in public programs, especially among lower-income households.¹⁴ In the *Green Exchange Program*, the government lowered the barrier to entry by eliminating the need for registration. Interested residents could simply collect their recyclable waste and bring it to a nearby collection point. The *Familia Folhas* characters also communicated information on sustainability and proper source segregation using the social media platform WhatsApp. Residents could easily find composting tips, information on permissible recyclables, and collection days and times. This channel similarly made the desired behavior easier for residents to understand and execute.



Results

Curitiba's *Green Exchange Program* relied on resident participation and increased citizen engagement in recycling at a low cost. Local government support and the mayor's vision of a green city, and leadership, supported programming and underpinned its success. The programs helped Curitiba become Brazil's ecological capital. The *Green Exchange Program* successfully diverted 87,861 tons of recyclable waste from landfills between 1991 and 2022.¹⁵ Through the city's efforts, it also contributed toward a 23 percent recycling rate¹⁶ and decreased littering and open dumping in favelas.¹⁷ In 2022 alone, the program collected approximately 2,600 tons of recyclable materials, including 4,000 L of used oil monthly.¹⁸ 2022 values are estimated to be 30–50 percent lower than pre-pandemic levels. The expectation is that recyclables collected through the program will rebound in the coming years.

Alongside waste diversion, the program developed a viable supply chain for surplus agricultural produce. From 1991 through December 2022, the program distributed 25,123 tons of food, which benefited 3,057,371 low-income families.¹⁹ In 2022, 57,483 families received 718.5 tons of food—approximately 60 tons monthly.

Costs incurred through the *Green Exchange Program* were assessed as significantly lower than what would have been the cost of private waste collection in favelas.²⁰ Alongside its waste-related impacts, the *Green Exchange Program* led to several co-benefits. Notably, fresh produce improved residents' food security and nutrition. Meanwhile, ECOCIDADÃO increased social inclusion and income generation for 1,000 waste pickers (approximately BRL 1,500 or USD 284 per month). As of 2019, ECOCIDADÃO operated 40 waste-sorting facilities throughout the city in which it processed 1,406 tons recyclables per month.²¹

The *Green Exchange Program* has served as a model in Brazil and has been scaled up to other municipalities including Colombo.



Complementary actions to consider

- » While the *Green Exchange Program* successfully mobilized favela residents to participate in recycling activities, separating waste has been stigmatized as an activity of low-income households.²² Governments looking to deploy a similar program could keep this in mind and consider an expanded or complementary program that targets higher-income households.
- » In low-income contexts, residents can adopt a 'scarcity mindset'. This mindset causes individuals to focus their attention on limited resources like money.²³ Such a fixation can leave little room for residents to focus on other aspects of daily life, like waste management. Even small things can seem onerous. This mindset could therefore hinder residents' participation in public initiatives like the *Green Exchange Program*. To combat this mindset, governments implementing similar programs could use memory aids (for example, text reminders) or implement other program modifications.
- » How an issue is presented can mediate citizens' interest in the issue. Practitioners may consider advertising programming using different framings. For instance, they could remind residents that their efforts have monetary savings through the avoided cost of purchasing produce. Experimental methods would be needed to understand the impact of different types of messaging.



Want to know more?

[City Hall of Curitiba: Green Exchange Program](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ IBGE. (1989). *Estimativa da População Residente, EM 01-07-89, Segundo OS Municípios E A Situação Político-Administrativa Vigente EM 01-06-89*. Government of Brazil.
Population in 2021: 1.96 million. Source: IBGE. Cities and States: Curitiba. Retrieved from <https://www.ibge.gov.br/cidades-e-estados/pr/curitiba.html>
- ² Frontline World. (2003). *The Development of Brazil's City of the Future*. Frontline/World. Retrieved from <http://www.pbs.org/frontlineworld/fellows/brazil1203/master-plan.html>
Wheeler, N. (n.d.). *Sustainable city management - Case study of Curitiba, Brazil's ecological capital*. Geo Factsheet Number 151. Curriculum Press. Retrieved from https://www.thegeographeronline.net/uploads/2/6/6/2/26629356/151_sustainable_city_management_curitiba.pdf
- ³ Newman, P., & Jennings, I. (2012). Economy and society. In *Cities as sustainable ecosystems: principles and practices*. Island press.
- ⁴ Soltani, A., & Sharif, E. (2012). A case study of sustainable urban planning principles in Curitiba (Brazil) and their applicability in Shiraz (Iran). *International Journal of Development and Sustainability*, 1(2), 120–134.
- ⁵ Kruljac, S. (2012). Public-Private Partnerships in Solid Waste Management: Sustainable Development Strategies for Brazil. *Bulletin of Latin American Research*, 31, 222–236.
- ⁶ Forster, T., Egal, F., Escudero A. G., Dubeeling, M., & Renting, H. (2015). Milan Urban Food Policy Pact: Selected Good Practices from Cities. Fondazione Giangiacomo Feltrinelli. ISBN 978-88-6835-221-9. Retrieved from <https://ruaf.org/document/milan-urban-food-policy-pact-selected-good-practices-from-cities/#:~:text=The%20Milan%20Urban%20Food%20Policy.improve%20their%20urban%20food%20system>
Rabinovitch, J., Leitmann, J. (1993). *Environmental innovation and management in Curitiba, Brazil* (Working Paper 1). Urban Management Programme. United Nations Centre for Human Settlements, United Nations Development Programme, World Bank.
- ⁷ International Finance Corporation. Curitiba Solid Waste Management Project Phase 1A: Assessment Report. Mott MacDonald, United Kingdom. Retrieved from <https://mid.curitiba.pr.gov.br/2016/00176737.pdf>
Larbi, M., Kellett, J. & Palazzo, E. (2022). Urban Sustainability Transitions in the Global South: A Case Study of Curitiba and Accra. *Urban Forum*, 33, 223–244. doi: 10.1007/s12132-021-09438-4
- ⁸ Kruljac, S. (2012). Public-Private Partnerships in Solid Waste Management: Sustainable Development Strategies for Brazil. *Bulletin of Latin American Research*, 31, 222–236.
- ⁹ Cather A. (2016). *The Green Exchange Program, Curitiba: Urban Food Policy Snapshot*. Food Policy Snapshot Series. Hunter College New York City Food Policy Center. Retrieved from <https://www.nycfoodpolicy.org/green-exchange-program-curitiba-urban-food-policy-snapshot/>
- ¹⁰ Ibid.
- ¹¹ Ministry Secretariat of Environment—Câmbio Verde (Green Exchange). City Hall of Curitiba. Retrieved from <https://www.curitiba.pr.gov.br/conteudo/cambio-verde/344>
International Finance Corporation. Curitiba Solid Waste Management Project Phase 1A: Assessment Report. Mott MacDonald, United Kingdom. Retrieved from <https://mid.curitiba.pr.gov.br/2016/00176737.pdf>
- ¹² City Hall of Curitiba—Programa Ecocidadão (Ecocitizen Program). Retrieved from <https://www.curitiba.pr.gov.br/servicos/programa-ecocidadao/398>
- ¹³ Gibovic, D., Bikfalvi, A. (2021). Incentives for plastic recycling: How to engage citizens in active collection. Empirical evidence from Spain. *Recycling*, 6(2), 29. doi: 10.3390/recycling6020029
- ¹⁴ Currie, J. (2006). The take-up of social benefits. In A. Auerbach, D. Card, & J. Quigley (Eds.), *Public Policy and the Income Distribution* (80–148). Russell Sage Foundation, New York.
- ¹⁵ Based on information received from Eliane Chiuratto—Cleaning Manager, Municipal Secretary of the Environment/Department of Public Cleaning (February 6, 2023).
- ¹⁶ Devendran, A. A., Mainali, B., Khatiwada, D., Golzar, F., Mahapatra, K., & Toigo, C. H. (2023). Optimization of municipal waste streams in achieving urban circularity in the city of Curitiba, Brazil. *Sustainability*, 15(4), 3252. doi: 10.3390/su15043252
- ¹⁷ Soltani, A., Sharif, E. (2012). A case study of sustainable urban planning principles in Curitiba (Brazil) and their applicability in Shiraz (Iran). *International Journal of Development and Sustainability*, 1(2), 120–134.
- ¹⁸ Based on information received from Eliane Chiuratto—Cleaning Manager, Municipal Secretary of the Environment/Department of Public Cleaning (February 6, 2023).
- ¹⁹ Ibid.
- ²⁰ Larbi, M., Kellett, J., & Palazzo, E. (2022). Urban sustainability transitions in the global south: A case study of Curitiba and Accra. *Urban Forum*, 33, 223–244. doi: 10.1007/s12132-021-09438-4
- ²¹ Ferreira, A. R. S., Cordeiro, J. S. S., & Silva, L. S. (2019). *Contrato sustentável: O projeto ecocidadão do município de Curitiba-PR* [Sustainable contract: The Ecocitizen Project of the Municipality of Curitiba-Pr]. 15f. Trabalho de Conclusão de Curso (Graduação em Administração Pública)-Instituto de Ciências Humanas e Sociais, Universidade Federal Fluminense.
- ²² Kruljac, S. (2012). Public-Private Partnerships in Solid Waste Management: Sustainable Development Strategies for Brazil. *Bulletin of Latin American Research*, 31, 222–236.
- ²³ Kahneman, D. (2011). *Thinking, fast and slow*. Macmillan.



Getting people to be more sustainable with their waste disposal in England

Main objective: Increase reusing and recycling



Case summary

A national nonprofit piloted a school-based waste education program called Take Home Action on Waste (THAW) in England's borough of Rotherham. THAW was designed to improve waste management through intergenerational learning. The program conducted activities with students about waste recycling, reuse, and reduction. Students shared their newfound knowledge with their households to encourage proper waste behaviors. The program's complement of waste-related activities, homework, and consistent messaging boosted participation in the borough's recycling scheme by 8.6 percent. The borough subsequently partnered with other councils to increase recycling rates and reduce contamination.



Wheeled recycling and waste bins in Yorkshire, England. © Thomas_Marchhart, istock.com



Challenge statement

Despite national ambitions to increase recycling rates, Rotherham struggled to keep pace. For instance, most residents refrained from participating in the borough's three-part waste segregation scheme (paper, dry recyclables, and organic waste).

Context and description of challenges

Rotherham (2005 population: approximately 253,000)¹ is a borough in South Yorkshire, England.² By the early 2000s, household recycling became one of the policy focal points in the United Kingdom. The national government introduced MSWM regulations statutory recycling targets for local counterparts, which encouraged municipalities to develop local plans to advance national sustainability goals.³

To promote better waste behaviors, Rotherham enhanced its waste collection network in 2003. The borough provided households with a blue box for dry recyclables, a blue bag for paper, and green-wheeled bins for organic waste. In 2004, the borough generated approximately 1.5 kg of MSW per capita per day. Of this, it recycled 15 percent. While the enhanced collection network increased the borough's recycling rate by 7 percent (from 8 percent to 15 percent year on year),⁴ it still fell below England's national average (17 percent).⁵

In 2005, Rotherham introduced a 15-year plan to achieve and sustain a recycling rate of 18 percent and promote composting. This required local governments and communities to find unique ways of getting citizens involved.

Decisions and actions

The UK charity Waste Watch launched the Take Home Action on Waste (THAW) pilot program in July 2005. Waste Watch was previously involved in community-based waste management projects within and beyond Rotherham. THAW was a school-based waste education program. Several facilitators taught program activities in

schools. The program provided students with the knowledge and skills to engage in waste management and pioneer change. The program relied on intergenerational learning. Its goal was to teach children and youth better waste management practices, which students could then instill in their families. Waste Watch linked the THAW program to the curriculum to ensure its relevance.

Waste Watch carried out the project for three years. Big Lottery Fund's Community Recycling and Economic Development (CRED) fund and Rotherham Metropolitan Borough Council jointly funded the initiative. Annual program operating costs amounted to GBP 163,157 (approximately USD 305,104).⁶

The design

In each of the 39 participating schools, Waste Watch first assessed baseline waste management practices in a subset of students (3 students per age group per school; N = 129 total students). The assessment included a questionnaire on household recycling practices (for example, recycling frequency, knowledge of items that were [not] recyclable) and knowledge about reuse and waste reduction.

The program kicked off with a presentation to the entire school which emphasized students' roles in waste management. Over four to six weeks, students participated in activities that focused on the 3Rs. For example, the program taught students to properly segregate their waste for recycling, reuse everyday items to expand their lifespan, and pack a waste-free lunch.

Dovetailing each activity, organizers encouraged students to introduce the key take-aways to their families as homework. This program component was key to intergenerational learning. To facilitate knowledge exchange, each student took home a booklet. The booklet recounted the activities' lessons and prompted families to conduct a participatory activity. It also gave simple waste management suggestions. This process broke down the abstract concept of waste management into smaller, actionable strategies that households could readily adopt. Strategies included identifying recyclable materials and properly segregating waste.



In addition to THAW's core activities, students also participated in specialized training sessions on composting and recycling.⁷ For example, students learned to compost waste at home.⁸ Additionally, THAW invited parents to special school sessions to allow the program facilitators to convey SWM information directly to parents.

Each year, the program ended with a schoolwide assembly which allowed students to reflect on their learnings. Waste Watch conducted a questionnaire with the same set of pupils queried at the program's start. The questionnaire quantified changes in household waste management behaviors. Waste Watch also worked with the municipality to quantify program-induced changes in household waste management.⁹

What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Messengers: Research suggests that regular citizens can facilitate informal learning and influence environmental practices.¹⁰ Children can be particularly important change agents.¹¹ In this case study, children participated in school-based education activities through the THAW program. Children subsequently conveyed learned waste practices to their families to facilitate intergenerational learning and behavior change.

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: Streamlining messages and providing simplified steps can help promote the execution of behaviors.¹² In the present case study, the THAW pilot gave students work booklets to take home. These booklets included a concise list of ways of how households could improve waste management by recycling, reusing, or reducing their waste.

Results

A total of 39 schools and 6,705 students (representing 44 percent of primary schools in the area) participated in the THAW program over its seven-year tenure. The THAW project successfully improved intergenerational learning, as demonstrated by project questionnaires and changes in waste behavior. Comments made by students after participating in the program included: "I found out that we have a blue bag at home for recycling paper, before I did not think we had one and I did not know what could be recycled in it." (10-year-old, Harthill Primary School). "Mum has got a new compost bin and we have started composting hedge cuttings, leaves and fruit peel." (9-year-old, Aston Fence Primary School).¹³

During the THAW project, recycling in communities served by 12 schools increased by 8.6 percent, with increases in one area as high as 24.7 percent. This corresponded to a 4.3 percent increase in the quantity of paper recycled and an 8.7 percent increase in cans, glass, and textiles recycled. Residual waste tonnage decreased by 4.5 percent.¹⁴ This intensive program demonstrated proof of concept about the value of school-based waste education initiatives in promoting more sustainable behaviors.

Following the end of the THAW project, England integrated waste management in school curricula. Rotherham Council is also building on the legacy created by the THAW project. It is currently running a behavior change campaign delivered by Hubbub¹⁵ in partnership with, Barnsley, Doncaster, and Renewi councils (the BDR regional partnership). The campaign's goal is to increase recycling rates and reduce contamination. As part of the campaign, Hubbub trialed interventions in the three pilot areas. These interventions included quizzes, tailored advice, videos, newspaper, and social media on resident's recycling knowledge and practices. For instance, Doncaster created videos in which children explained how to recycle and handle common waste items (for example, clothing, pizza boxes, and plastic film). The most effective intervention will be rolled out to the wider BDR area in 2023.¹⁶





Putting waste for recycling into the council collection wheelie bin. © Alphotographic, istock.com



Complementary actions to consider

- » To better tailor program activities, practitioners employing a similar approach could assess both structural (that is, collection frequency, bin size, and resource constraints) and behavioral (that is, inconvenience, costs, and time) barriers to household waste management practices.
- » Practitioners could use experimental methods to assess the relative influence of educational activities alone and in conjunction with other tools (for example, competition, and commitment devices) on waste management practices.



Want to know more?

[Rotherham Metropolitan Borough Council—Taking Home Action On Waste \(THAW\)](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Crompton, M. (2008). *2007 Population Estimate & Population Trends*. Rotherham Borough Council.
Population in 2021: 265,800. Source: Office of National Statistics. (2022). *How the population changed in Rotherham, Census 2021*. ONS, Government of the United Kingdom. Retrieved from <https://www.ons.gov.uk/visualisations/censuspopulationchange/E08000018/>
- ² Borough refers to an administrative division within a city that has its own government.
- ³ Department of the Environment, Transport and the Regions. (2001). *Guidance on municipal waste management strategies*. Department of the Environment, Transport and the Regions (DETR) Publishing, Wetherby.
- ⁴ Ibid.
- ⁵ Waste and Recycling Statistics. (2009). *Municipal waste management statistics*. Defra, London.
- ⁶ Rotherham Borough Council. (2005). *Rotherham Borough Council-Report to Members*.
- ⁷ Maddox, P., Doran, C., Williams, I. D., & Kus, M. (2011). The role of intergenerational influence in waste education programmes: The THAW project. *Waste Management, 31*(12), 2590–2600.
- ⁸ Rotherham Borough Council. (2006). *Rotherham Borough Council-Report to Members*.
- ⁹ Maddox, P., Doran, C., Williams, I. D., & Kus, M. (2011). The role of intergenerational influence in waste education programmes: The THAW project. *Waste Management, 31*(12), 2590–2600.
- ¹⁰ Van Poeck, K., Læssøe, J., & Block, T. (2017). An exploration of sustainability change agents as facilitators of nonformal learning: Mapping a moving and intertwined landscape. *Ecology and Society, 22*(2).
- ¹¹ Walker, C. (2017). Tomorrow's leaders and today's agents of change? Children, sustainability education and environmental governance. *Children & Society, 31*(1), 72–83.
- ¹² Team, B. I. (2014). *EAST: Four simple ways to apply behavioural insights*. Behavioural Insight Team, London.
- ¹³ Maddox, P., Doran, C., Williams, I. D., & Kus, M. (2011). The role of intergenerational influence in waste education programmes: The THAW project. *Waste Management, 31*(12), 2590–2600.
- ¹⁴ Ibid.
- ¹⁵ Hubbub (hubbub.org.uk) is a creative charity seeking to inspire environmental action. Its experimental campaigns use behavioral insights, creative communication, and collaboration to change people's attitudes and behaviors.
- ¹⁶ Based on information received from Saskia Restorick, Hubbub (January 27, 2023).



Getting people to be more sustainable with their waste disposal and generate less waste in Hong Kong SAR, China

Main objective: Increase reusing and recycling

Other objectives: Change consumption and production behaviors



Case summary

Hong Kong SAR, China's environmental authority developed several waste recycling programs prompted by an ever-increasing waste generation rate. The government installed an extensive network of recycling stations. Thereafter, it introduced a rewards system whereby residents earned points for depositing recyclables at designated drop-off points. Residents could then exchange these points for household items. Complementarily, authorities conducted various outreach and education activities. Owing to the concerted efforts of governing authorities and citizens, the network has recycled 13,500 tons of material since its inception.



Single use plastics recovered during a beach clean up in Butterfly Beach, Hong Kong SAR. © Ricebowlinc, istock.com



Challenge statement

Hong Kong SAR, China's rapid economic expansion fostered a throw-away culture, which exponentially increased its solid waste generation rate. In concert, the region faced several logistical constraints. It had limited capacity for end-of-life solid waste treatment and limited land availability for new landfills.

Context and description of challenges

Hong Kong SAR, China (1996 population: 6.46 million)¹ had a waste generation rate of 1.3 kg per capita per day in 1996 which increased to 1.4 kg per capita per day in 2004.² Its Environmental Protection Department (EPD) sought to reduce the amount of waste sent to landfills through citizen engagement, capacity building, and technical development.³ Most activities revolved around increasing household source segregation. For instance, the EPD introduced awareness programs in schools, residential areas, and commercial hubs. It placed recycling facilities on ground floor, or in designated public areas of housing estates to encourage residents to separate their recyclables from other household waste.⁴ Estate managers sold the collected recyclable waste and distributed the returns among residents. To further motivate residents, the EPD developed a ranking system for housing estates based on their participation.

Despite all efforts, these campaigns were limited in changing behavior. Waste generation rates continued to rise and the population did not segregate at source.⁵ An awareness of the region's deteriorating environmental conditions did not affect residents' willingness to recycle.⁶ Insufficient waste infrastructure and services further discouraged citizens from participating in waste reduction activities. Given the limited number and capacity of recycling bins, waste collectors often combined recyclable and other waste. This practice disincentivized residents to segregate their waste.

As Hong Kong SAR, China expected its three landfills to reach capacity before 2020,⁷ the need for more holistic waste management programs was clear.

Decisions and actions

In 2013, the EPD developed an MSW system called the Community Green (Recycling) Network to maximize waste recovery and recycling opportunities. The EPD designed the network to disseminate information, improve infrastructure and service delivery, and provide personalized guidance to citizens.⁸ The EPD introduced the system through a formal policy intervention that defined the role of different stakeholders. NGOs managed recycling stations, government authorities provided regular waste collection services, and citizens were expected to properly segregate and deposit their waste at designated locations.⁹

During its pilot stage, the EPD set up five community green stations (CGSs). These centers collected recyclables through waste deposit systems. The government used a comprehensive communications strategy—popularized by the slogan 'Use Less, Waste Less'—to engage local communities and familiarize them with the SWM system.

Gradually, the EPD built upon and expanded the initial pilot by creating a robust recycling network in collaboration with housing estates. This network consisted of recycling stations (11), recycling stores (22), and recycling spots (100) as well as mobile booths and centers. As an extension of this program, the EPD created the GREEN\$ Electronic Participation Incentive Scheme (GREEN\$ ePIS) in 2020 to create financial incentives for recycling.¹⁰





REFERENCE CASE STUDY

Increasing the salience of waste generation in Australia

In 2018, Western Australia's Mindarie Regional Council launched the Face Your Waste initiative. Face Your Waste was a community engagement and waste education campaign. It replaced 20 ordinary waste bins with transparent plastic alternatives. Residents voluntarily participated. Each participating household received a residual and a recyclable waste bin. The containers increased the salience of residents' wasteful behaviors. The bins circulated among households in all seven member councils. The campaign subsequently challenged residents to reduce their waste generation. A unique outreach strategy accompanied bin deployment. For instance, the campaign partnered with a local comedian who injected humor into waste minimization messages. The campaign successfully increased citizen engagement around waste management.¹¹

The design

The Community Green (Recycling) Network included several collection outlets to make recycling easier. These included recycling stations, stores, and spots. Recycling stations conducted educational activities and allowed residents to deposit old books, clothes, second-hand products, and eight types of recyclables. Citizens who were not covered under household waste separation at source schemes deposited their waste at recycling stations. They specifically targeted low-value recyclables (for example, glass bottles and electrical waste). Recycling stores were established in 2020 and serviced densely populated areas. These stores increased the accessibility of recycling via convenient locations and extended hours. Citizens could also deposit their waste after hours through self-service kiosks. The stores contained sorting tables,

sinks, and water dispensers where residents could clean and sort their waste. The EPD also set up temporary stalls called recycling spots near residential buildings which lacked nearby recycling facilities. Recycling stations and stores managed recycling spots. Entities transferred recyclables collected at these spots to the nearest recycling station or store before they were sent off for processing.¹²

Educational activities played a significant role in the Community Green (Recycling) Network. The EPD used several outlets (for example, posters, booklets, and booths) to disseminate messaging. These campaigns equally targeted recycling and waste reduction. Nonprofit organizations and schools organized demonstrations, learning programs, and handicraft workshops.¹³ Campaigns targeted residents' commitments to recycling habits. These campaigns also used key messengers (for example, social groups and volunteers) to transmit information. In conjunction, the government launched an augmented reality game to make recycling more fun.¹⁴ Recycling stations conducted interactive programs and used volunteers to address visitors' concerns about waste management and recycling. Additionally, all recycling stores and stations ran active social media pages to sustain citizen engagement. As part of their operations, local authorities conducted workshops and demonstrations to increase awareness of waste segregation and clean recycling.

To further increase the perceived accessibility of recycling, the EPD added iRecycling Stations and Recycling Stores icons to GeoInfo Map and Google Maps. The EPD displayed informational posters on lampposts, noticeboards, and public transit to relay timely prompts at key locations.

Under the GREEN\$ ePI Scheme, all citizens could become program members. Residents received a GREEN\$ card or a Mobile App QR code. Citizens who did not join via the app were required to deposit a minimum of 2 kg of recyclable waste during their first visit to a recycling station (waived for app users).¹⁵ Members received GREEN\$ points each time they deposited a minimum amount of recyclable waste at a station (Figure 10). The points were based on the recyclable's market value. Members exchanged their points for groceries (for example, noodles or rice) or environmentally friendly products (for example, bamboo toothbrushes and recycling



bags). In this way, the initiative attempted to increase the footfall at recycling centers and gradually integrate the practice of waste reduction and recycling into daily life.



Source: Sai Kung Town Recycling Center.¹⁶

What behavioral tools are present in this initiative?

FINANCIAL MECHANISMS



Material rewards: Several studies have shown that—when motivating recycling behavior—monetary incentives are more effective for products with less emotional value and among consumers with lower levels of environmental knowledge. Alternatively, nonfinancial incentives are more effective for products with less emotional value and among consumers with higher environmental expertise.¹⁷ The present case study applied this tool in a traditional way. The GREEN\$ program served as a material incentive to reward recycling through the accrual of points. Residents redeemed points for groceries and environmentally friendly products. In the latter, such products may hold emotional value for their purchasers.

SYSTEM DESIGN MECHANISMS



Accessible services: Making services more convenient and accessible can increase recycling behaviors.¹⁸ In this case, the program increased the network of recycling points and made it easy to locate recycling stations and stores using online maps like Google Maps and GeoInfo.¹⁹

SOCIAL AND MOTIVATIONAL MECHANISMS



Gamification: Applying game-like elements to non-gaming contexts can be a promising way to motivate behavior change across domains.²⁰ In the present case study, the government socialized its upgraded SWM system through the GREEN\$ ePIS program. GREEN\$ ePIS rewarded residents with points for depositing recyclables. Residents could track their point accrual on an app, which provided motivation to continue engaging in the desired behavior.



Results

The recycling stores and GREEN\$ cards helped Hong Kong SAR, China nurture a green lifestyle and progress toward its waste reduction and recycling goals. In 2021, after the introduction of GREEN\$ ePIS, Hong Kong SAR, China recovered 31 percent (1.84 million tons) of MSW for recycling, approximately 19 percent increase from 2020 (1.54 million tons). This resulted in year-on-year recycling increases for plastics and electronic equipment of 9 and 10 percent, respectively.²¹ A joint communication campaign with restaurants preceded the reduction of 2.4 million sets of SUP cutlery.²²

As of August 2021, 11 recycling stations operated across the territory. These stations received over 13,500 tons of recyclables and more than 2,300,000 visitors.²³ Additionally, they conducted more than 8,000 exhibitions, presentations, and workshops and had annual targets regarding the number of visits and events, which they had to meet. Some stations recorded up to 189,520 annual visitors (2018).²⁴ Through late 2021, 120,000 residents were registered as GREEN\$ card users.²⁵ In 2021, the government announced a blueprint for waste reduction and recycling activities through 2035.²⁶ The activities under the Community Green (Recycling) Network are slated to help Hong Kong SAR, China meet its goal of increasing the MSW recovery rate to 55 percent.



Complementary actions to consider

- » Governments looking to replicate this approach may consider installing recycling centers in some locations and leaving similar locations without recycling stores to evaluate causal results.
- » Implementing a data collection system for incentive cards could help decision-makers access behavioral data and evaluate their impact in different locations, across populations, and with respect to chosen rewards.



Want to know more?

[Hong Kong SAR, China waste reduction website](#)



Endnotes

- 1 Demographic Statistics Section. (2022). *Table 1A: Population by sex and age group*. Census and Statistics Department, the Hong Kong SAR Government. Population in 2021: 7.4 million. Source: Demographic Statistics Section. (2022). *Table 1A: Population by sex and age group*. Census and Statistics Department, the Hong Kong SAR Government.
- 2 Tsoi, T. L. C., Tam, W. C. K., & Ho, P. K. K. (2005). *Monitoring of solid waste in Honk Kong: Waste statistics*. Waste Reduction Group, Environmental Protection Department, the Hong Kong SAR Government. Retrieved from https://www.wastereduction.gov.hk/sites/default/files/resources_centre/waste_statistics/msw2004_eng.pdf
- 3 Yau, Y. (2010). Domestic waste recycling, collective action and economic incentive: The case in Hong Kong. *Waste management (New York, N.Y.)*, 30(12), 2440–2447. doi:10.1016/j.wasman.2010.06.009
Waste Reduction Committee. (1998). *Waste Reduction Framework Plan (1998–2007)*. The Hong Kong SAR Government.
- 4 Waste Reduction Programmes—Source Separation of Domestic Waste. Environmental Protection Department, the Hong Kong SAR Government, Retrieved from https://www.wastereduction.gov.hk/en/household/source_detail.htm
- 5 Cohen, S., Martinez. H., & Schroder, A. (2015). *Waste management practices in New York City, Hong Kong and Beijing*. doi: 10.7916/d8-zw22-ph20
- 6 Siu, K. W. M., & Xiao, J. X., (2015). Quality of life and recycling behaviour in high-rise buildings: A case in Hong Kong. *Applied Research in Quality of Life*, 11. doi:10.1007/s11482-015-9426-7.
- 7 Environment Bureau. (2013). *Hong Kong blueprint for sustainable use of resources 2013–2022*. The Hong Kong SAR Government. Retrieved from https://www.epd.gov.hk/epd/psb_charging/files/pdf/WastePlan-E.pdf
- 8 Waste Reduction Programmes—Community Recycling Network – Archive. Environmental Protection Department, the Hong Kong SAR Government. Retrieved from https://web.archive.org/web/20230320133017/https://www.wastereduction.gov.hk/en/community/community_intro.htm
- 9 Waste Reduction Programmes—ECF Community Recycling Centres – Archive. Environmental Protection Department, The Hong Kong SAR Government. Retrieved from https://web.archive.org/web/20230203173551/https://www.wastereduction.gov.hk/en/community/community_recyc_ctr.htm
- 10 What and Where to Recycle—GREEN@COMMUNITY. Environmental Protection Department, Hong Kong. Retrieved from https://www.wastereduction.gov.hk/en/community/crn_intro.htm
- 11 Mindarie Regional Council. (2018). *2018 Annual report*. Tamala Park. W.A. Retrieved from <https://www.mrc.wa.gov.au/documents/7/annual-report-2018>
Famous Sharron—Face Your Waste. (<https://www.famoussharron.com/shaz-tv/advertisements-face-your-waste-campaign>)
Mindarie Regional Council. (2020). Information Bulletin: Issue No 54. Mindarie Regional Council, Tamala Park. W.A.
- 12 Government of the Hong Kong Special Administrative Region. (2021). New milestone for EPD's community recycling network [Press release]. Retrieved from <https://www.info.gov.hk/gia/general/202102/08/P2021020800421.htm>
- 13 Kam-sing, K. (2018, June 5). 绿在区区成效显著 [Remarkable results in green]. news.gov.hk. Retrieved from https://sc.news.gov.hk/TuniS/www.news.gov.hk/chi/2018/06/20180605/20180605_121055_652.html
China Youth Network. (2017). 垃圾分类:香港的经验教训 [Garbage Sorting: Hong Kong's Experience and Lessons]. 深圳市城市管理和综合执法局网站 [Shenzhen Urban Management and Comprehensive Law Enforcement Bureau website]. Retrieved from http://cgj.sz.gov.cn/xsmh/ljfl/pgyjh/flzs/kpyj/content/post_2081512.html
- 14 Environment Bureau (2021). *Waste blueprint for Hong Kong 2035*. Environment Protection Department, the Hong Kong SAR Government. Retrieved from https://www.eeb.gov.hk/sites/default/files/pdf/waste_blueprint_2035_eng.pdf
- 15 What and Where to Recycle—GREEN@ FAQ. Environmental Protection Department, the Hong Kong SAR Government. Retrieved from https://www.wastereduction.gov.hk/en/community/greendollar_faq.htm
- 16 Sai Kung Town Recycling Center. (2022). *City-wide Recycling 6x GREEN\$*. Facebook. Retrieved from <https://www.facebook.com/6green.saikungtown/photos/152460100651005>
- 17 Li, Y., Yang, D., Sun, Y., & Wang, Y. (2021). Motivating recycling behavior—which incentives work, and why? *Psychology & Marketing*, 38(9), 1525–1537. doi:10.1002/mar.21518
- 18 Geiger, J. L., Steg, L., van der Werff, E., & Ünal, A. B. (2019). A meta-analysis of factors related to recycling. *Journal of environmental psychology*, 64, 78–97.
- 19 What and Where to Recycle—GREEN@COMMUNITY. Environmental Protection Department, the Hong Kong SAR Government. Retrieved from https://www.wastereduction.gov.hk/en/community/crn_intro.htm
- 20 Hamari, J., Koivisto, J., & Sarsa, H. (2014, January). Does gamification work? A literature review of empirical studies on gamification. *2014 47th Hawaii International Conference on System Sciences*, 3025–3034.
- 21 Statistics Unit. (2022). *Monitoring of solid waste in Hong Kong: Waste statistics for 2021*. Environmental Protection Department, The Hong Kong SAR Government. Retrieved from <https://www.wastereduction.gov.hk/sites/default/files/msw2021.pdf>
- 22 Environment Bureau. (2021). *Waste blueprint for Hong Kong 2035*. Environment Protection Department, the Hong Kong SAR Government. Retrieved from https://www.eeb.gov.hk/sites/default/files/pdf/waste_blueprint_2035_eng.pdf
- 23 What and Where to Recycle—GREEN@ FAQ. Environmental Protection Department, the Hong Kong SAR Government. Retrieved from https://www.wastereduction.gov.hk/en/community/greendollar_faq.htm
- 24 Audit Commission. (2020). Provision and management of community green stations. Environment Bureau, Environmental Protection Department, The Hong Kong SAR Government. Retrieved from https://www.aud.gov.hk/pdf_e/e74ch08.pdf
- 25 Environment Bureau. (n.d.) Environment Hong Kong 2022. Environment Protection Department, the Hong Kong SAR Government. Retrieved from https://www.epd.gov.hk/epd/misc/ehk22/en/pdf1/web/ehk_2022_en.pdf
- 26 Environment Bureau. (2021). *Waste blueprint for Hong Kong 2035*. Environment Protection Department, the Hong Kong SAR Government. Retrieved from https://www.eeb.gov.hk/sites/default/files/pdf/waste_blueprint_2035_eng.pdf



Getting people to be more sustainable with their waste disposal in Indonesia

Main objective: Increase reusing and recycling

Other objectives: Increase source segregation of organic and other waste



Case summary

Beginning in 2008, Indonesia used waste banks to incentivize residents to recycle. Waste banks allowed residents to deposit recyclables in exchange for cash or household goods. Alongside the economic incentives, waste banks also fostered a sense of belonging among their members. Communities used training, influential figures, and competitions to empower residents to manage their waste better. Waste banks helped divert waste from landfills and provided supplemental income to their users. To date, 11,646 waste banks are established across the country. The waste bank model has since proliferated throughout Indonesia.

Challenge statement

Local governments in Indonesia dealt with increasing population and MSW generation rates. The SWM paradigm revolved around disposal, which put additional pressure on the country's landfills. Further, low-income neighborhoods had low collection rates which led to open dumping and burning.

Context and description of challenges

Indonesia is the world's largest archipelago and one of the most populous countries in the world. Between 1990 and 2000, Indonesia's urban population increased by approximately 30 million.¹ This population surge exacerbated existing gaps in waste services. The majority of Indonesians (66 percent) lacked MSW collection. There were also few targeted policies to deal with increased waste generation. Population surges and increased MSW overloaded waste disposal sites. Both land scarcity and public opposition complicated the provision of new landfill sites. Formal waste collections largely excluded low-income neighborhoods, which led to littering, burning, and open dumping.²

Waste management issues reached an inflection point in the mid-2000s following high-profile events in major cities. In 2001, public opposition to persistent odors closed Surabaya's landfill, which sparked a waste management crisis. Several years later, in 2005, Bandung's overburdened landfill collapsed, causing a landslide and mass casualties.³ These incidents raised the profile of MSWM and led to public demands for better practices nationally.

As public health concerns grew, Indonesia introduced a law in 2008 that called for landfilling alternatives and greater community involvement in SWM activities.⁴ At that time, Indonesia's population was 228,523,300⁵ and the waste generation rate was 34.9 million tons per year (approximately 0.41kg per capita per day).⁶ This law laid the groundwork for better MSWM. Waste management was a particularly pressing issue for lower-income neighborhoods, many of which lacked any standardized system.



Decisions and actions

In 2008, a local educator created Indonesia's first recognized waste bank (*bank sampah*) in Yogyakarta.⁷ The waste bank model alleviated the strain on landfills. Locals ran waste banks in neighborhoods independent of MSWM services. Under this scheme, residents segregated recyclables at source, which they sold at their neighborhood facilities. Residents could extract the funds as cash or exchange waste for goods and services (for example, bill payments, school tuition, health insurance, staple food, and hygiene products).⁸ Waste banks subsequently sold the raw materials to third-party buyers working in or benefitting from the recycling industry.⁹ The model created a new way to manage household waste and educate residents on source segregation and recycling.

After the success of Yogyakarta's inaugural waste bank, other Indonesian cities followed suit.¹⁰ In 2012, the government introduced a regulation that legally recognized waste banks.¹¹ The law defined the roles and responsibilities of different stakeholders involved in the banks' development, operation, and expansion. While the banks were usually run and led by the neighborhood, some banks were supported by a facilitator and managed by a formally employed operator. The facilitators supported core operations (that is, fundraising activities) and marketed upcycled waste. Local governments supported waste banks to expand their scale, scope, and facilities.¹² They also facilitated the sale and negotiated the price of segregated waste to interested third parties.¹³ For example, governments brokered partnerships between waste banks, waste buyers, and recyclers to collect and transport waste to processing plants.¹⁴

In February 2021, the Ministry of Environment and Forestry of Indonesia (*Kementerian Lingkungan Hidup dan Kehutanan Republik Indonesia*) launched a Waste Bank Management Information System (*Sistem Informasi Manajemen Bank Sampah*, SIMBA).¹⁵ SIMBA was a nationwide portal that provided information on the location and type of waste banks across the country. For each waste bank, the portal provided data on the number of users, amount of waste collected, and revenue generated.

Waste banks regularly updated this information, which allowed the local government to regulate the waste bank network.

The design

The waste bank model revolved around communities. To participate, households had to segregate their recyclable waste in bins or garbage bags. Once these bins or bags were full, residents deposited recyclables at waste banks.¹⁶ To log transactions, waste bank operators provided users with an account number and savings book.¹⁷ Volunteers weighed the waste to ascertain its value and deposited funds into the user's account (Figure 11).¹⁸ The 2012 legislation allowed residents to withdraw funds after three months. To increase engagement from higher-income residents, some waste banks encouraged residents to donate waste as a charitable act. The revenue funded social assistance programs for lower-income residents, such as donation packages containing daily necessities.¹⁹

Communities tailored waste bank operations to meet local needs and empowered communities to be self-reliant. Female volunteers and local activists often ran the banks.²¹ Waste banks accommodated local customs when designing and conducting activities. Local waste banks introduced their approach through social gathering events or door-to-door outreach. Waste banks also tailored remuneration (that is, cash, staple



Source: SIMBA, Ministry of Environment and Forestry of the Republic of Indonesia²⁰



foods, or even farming necessities) to local needs.²² Operators monitored and evaluated each bank's performance during monthly meetings. Operators occasionally received an incentive-based wage or fixed salary.²³ Lower-income residents—specifically women—primarily used waste banks. Citizens also gravitated to waste banks for their social benefits and sense of community.²⁴



Women working at a waste bank in Cipinang Besar Selatan, East Jakarta. © Bagus upc, shutterstock.com

Legislation introduced in 2012 required waste bank operators to conduct at least one outreach activity every three months. This included waste management training sessions, workshops, and seminars. Waste banks conducted training sessions alone or with partners (for example, the Association of Southeast Asian Nations Environmental Sustainable Cities [ASEAN ESC]).²⁵ Some collaborated with local universities and their community service programs to campaign for recycling and upcycling waste.²⁶ Residents received training in marketing, waste sorting, and craft making.²⁷ For example, waste banks taught residents to reuse waste by transforming it into crafts ('trashion'), which both parties could sell for additional income.²⁸ Among other items, residents upcycled waste into bags, photo frames,²⁹ and flower pots.³⁰ Some waste banks created and used upcycled waste (for example, art installations and furniture) to decorate their exterior.³¹ These activities also helped shift residents' ingrained mindsets and habits surrounding waste handling. They also helped overcome public misconceptions, namely that waste banks would make neighborhoods dirtier.³²

Communities used unique ways to encourage residents' participation. Influential figures (for example, village heads)³³ and change agents (for example, environmental cadres and heads of household groups) encouraged source segregation and bank membership.³⁴ Some waste banks provided incentives, such as prize raffles, to encourage residents to save their waste.³⁵ All levels of government held cleanliness competitions with area waste banks. These competitions assessed waste banks on (a) overall cleanliness, (b) residents' creativity and innovation in reusing and recycling waste, (c) effective use of green space, and (d) state of environmental sanitation facilities.³⁶ These competitions provided material rewards (cash, motor vehicles, facilities) to winners. Additionally, winners gained public recognition among their peers, which was a source of pride and symbolic reward.

Local government grants and corporate social responsibility schemes from the private sector and state-owned enterprises primarily financed waste banks.³⁷ Waste banks supplemented their income by selling waste materials (to third parties) and upcycled products (to community members). Furthermore, when customers deposited recyclables, waste banks retained 15 percent of the funds—with the remainder deposited



into customers' accounts—to offset operating costs.³⁸ As of 2021, the costs required to establish waste banks stood at approximately IDR 5,500,000 (approximately USD 375), inclusive of equipment costs of a table, chair, weight scale, showcase shelf, and computer. Operational costs were approximately IDR 300,000 (approximately USD 20) per month. The costs varied based on consumables and worker compensation. On average, each bank had 100 users, collecting approximately 3.2 tons of waste a year. Each user collected approximately 3 kg of recyclable waste per month (average monthly savings of IDR 86,000 or approximately USD 8).³⁹

What behavioral tools are present in this initiative?

FINANCIAL MECHANISMS



Material rewards: Incentive schemes can promote positive behaviors in certain contexts.⁴⁰ In Indonesia, waste banks incentivized residents to recycle by associating the activity with monetary benefits. The supplemental income was valuable for lower-income residents. In addition to money, some waste banks allowed residents to exchange recyclables for food, household supplies, or services.⁴¹ Area competitions among waste banks often rewarded winners with money and other material goods, which incentivized them to conform to a high standard.

SOCIAL AND MOTIVATIONAL MECHANISMS



Messengers: Research suggests that the credibility of the individual communicating information can heavily influence behaviors.⁴² Across Indonesia, community leaders and public figures played a key role in uniting communities. These individuals encouraged residents to participate in waste sorting and engage with waste banks. Public figures often visited community associations, where they taught proper waste management and environmental practices to members. Additionally, university students spent their community service hours at waste banks, where they were heavily involved in educating and training residents on waste reuse and recycling.⁴³

Results

The waste bank model provided a vehicle to help Indonesians shift their waste practices and divert waste from landfills. As of 2022, 11,646 waste banks operated across 369 districts and cities, which engaged 383,481 citizens.⁴⁴ Between 2015 and 2021, waste banks earned IDR 17.6 billion (approximately USD 1.17 million) in revenue from selling recyclables.⁴⁵ The revenue could help toward Indonesia's green growth. Waste banks operated under a community-based management approach, which has fostered a sense of belonging among citizens⁴⁶ and increased their economic independence.⁴⁷ On average, a waste bank collected 122.9 kg of recyclable waste per month.⁴⁸ Many residents came to associate waste with monetary gains, which deterred littering.⁴⁹ Some communities received awards for their work with waste banks.⁵⁰ Outreach was instrumental in increasing community involvement. Waste banks fostered new skills among residents and increased their earning potential. For example, selling upcycled products in Java generated estimated monthly profits of IDR 500,000 (approximately USD 56).⁵¹ Low-income neighborhoods (*kampung*s) disproportionately benefited from the bank's financial and social support.

Despite these results, taken at scale, the waste bank model has had varying levels of success and community participation. The overall impact of waste banks on recycling volumes remains quite limited. Reportedly, in the absence of sustained financial support, many waste banks are dormant or partially operational. Separately, SWM norms focus on disposal as opposed to reduction, recycling, and reuse. Many residents see open dumping and burning options as more practical than source segregation, and the former are still widespread.⁵² As of 2014, only 18.8 percent of Indonesians engaged in source segregation.⁵³ Many residents avoid the practice due to the hassle involved,⁵⁴ negative stigma,⁵⁵ or fears of contracting waste-related diseases.⁵⁶ Land acquisition is also a major obstacle for waste banks since facilities require relatively large plots of land. Ministry Decree No. 13/2012 provides a set of requirements that a waste bank must fulfill for its operations, including a requirement for the facility to be operated in an area no less than 40 square meters. Additionally, for waste banks that



act as an intermediary between households and waste collectors, the facility area must be sufficient to keep inventory to keep them from overflowing.⁵⁷

Ensuring that local policies support waste banks is important in ensuring their sustainability. The Indonesian government has officially recognized waste banks as an enabler in the circular economy.⁵⁸ In 2021, the government introduced new legislation to expand the scope of banks from centers of economic transactions to hubs for education and behavior change.⁵⁹



Complementary actions to consider

- » Norms can significantly influence residents' recycling behaviors. Governments could use experimental methods to assess the efficacy of norm messaging on waste bank usage. Indonesians that see their social identity as a 'typical waste bank user' may be more likely to participate.
- » Residents may be disinclined to segregate their waste due to the hassle, negative stigma, and fears of disease. Practitioners could assess the prevalence of different barriers among different socioeconomic classes to devise targeted programs.
- » Waste banks attribute an economic value to waste. This disincentivizes citizens from decreasing their waste generation.⁶⁰ To promote waste reduction, practitioners looking to implement a similar system could test the effectiveness of behavioral tools like social comparisons, whereby households 'compete' to lower their waste generation. This tactic has successfully reduced waste in other countries.⁶¹



Want to know more?

[Guidelines for implementation of waste banks \(Permen LH No. 13 Tahun 2012\)](#)
[Waste Bank Management Information System \(SIMBA\)](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ United Nations Human Settlements Programme & United Nations Economic and Social Commission for Asia and the Pacific. (2015). *The State of Asian and Pacific Cities 2015: Urban transformations shifting from quantity to quality*. ISBN: 978-92-1-132681-9. Retrieved from <https://www.unescap.org/resources/state-asian-and-pacific-cities-2015-urban-transformations-shifting-quantity-quality>
- ² Chaerul, M., Tanaka, M., & V Shekdar, A. (2007). Municipal solid waste management in Indonesia: Status and the strategic actions. *Journal of the Faculty of Environmental Science and Technology*, 12(1), 41–49.
- ³ Lavigne, F., Wassmer, P., Gomez, C., Davies, T. A., Sri Hadmoko, D., Iskandarsyah, T. Yan W. M., Gaillard, J. C., Fort, M., Texier, P., Boun Heng, M., & Pratomo, I. (2014). The 21 February 2005, catastrophic waste avalanche at Leuwigajah dumpsite, Bandung, Indonesia. *Geoenvironmental Disasters*, 1, 10.
Gilby, S., Hengesbaugh, M., Gamaralalage, P. J. D., Onogawa, K., Soedjono, E. S., & Fitriani, N. (2017). *Planning and implementation of integrated solid waste management strategies at local level: The case of Surabaya City*. Institute for Global Environment Strategies. Retrieved from https://www.ccet.jp/sites/default/files/2017-10/CCET%20Surabaya%20Case%20Study_PrintingVer0718_2.reduced.pdf
- ⁴ Act of the Republic of Indonesia Number 18 Year 2008 Regarding Waste Management. President of the Republic of Indonesia.
- ⁵ Badan Pusat Statistik. (2008). *Statistik Indonesia: Statistical Yearbook of Indonesia 2008*. Jakarta, Indonesia.
Population in 2021: 272,682,500. Source: Badan Pusat Statistik. (2022). *Statistik Indonesia: Statistical Yearbook of Indonesia 2022*. Jakarta, Indonesia.
- ⁶ State Ministry of Environment. (2008). *Indonesian Domestic Solid Waste Statistics Year 2008*. Republic of Indonesia. Retrieved from <http://inswa.or.id/wp-content/uploads/2012/07/Indonesian-Domestic-Solid-Waste-Statistics-20082.pdf>
- ⁷ Prihtiyani, E. (2010). *Bank Sampah Gemah Ripah* [Gemah Ripa Waste Bank]. Kompas. Retrieved from https://megapolitan.kompas.com/read/2010/11/03/03105961/Bank_Sampah.Gemah.Ripah
- ⁸ Lestari, S. (2021). *Kiat Membangun Bank Sampah dan Cara Pengelolaannya* [Tips on building a waste bank and how to manage it]. Sleman, Yogyakarta. ISBN: 978-602-5760-56-0.
- ⁹ Presentation by Rosa Vivien Ratnawati, Director General for Household, Commercial, and Toxic Waste, Ministry of Environment and Forestry, presented at the National Coordination Meeting (*Rapat Koordinasi Nasional/Rakornas*) on Waste Banks 2022.
- ¹⁰ Wulandari, D., Utomo, S. H., & Narmaditya, B. S. (2017). Waste bank: Waste management model in improving local economy. *International Journal of Energy Economics and Policy*, 7(3), 36–41.
- ¹¹ Regulation of Minister of Environment, Republic of Indonesia, Number 13 year 2012 concerning Guidelines for the Implementation of Reduce, Reuse, and Recycle through Waste Banks.
- ¹² Regulation of the Minister of Environment and Forestry, Republic of Indonesia, Number 14 Year 2021 concerning Waste Management in Waste Bank. p. 3, 11, and 12.
- ¹³ Regulation of the Minister of Environment and Forestry, Republic of Indonesia, Number 14 Year 2021 concerning Waste Management in Waste Bank. p. 12.
- ¹⁴ Kurniasih, D., Santiasih, I., & Juniani, A. I. (n.d.) *Pengelolaan Bank "Kir" (Kerajinan Ibu Rumah Tangga) Sampah Berbasis Masyarakat ("KIR" Bank Management: Community-Based Waste)*. Politeknik Perkapalan Negeri Surabaya.
- ¹⁵ Sistem Informasi Manajemen Bank Sampah. Ministry of Environment and Forestry, Republic of Indonesia. Retrieved from <https://simba.menlhk.go.id/portal/>
Hukmana, S. Y. (2021). *SIPSN Diluncurkan, Sistem Pengelolaan Sampah se-Indonesia Terintegrasi* [SIPSN launched, integrated waste management system in Indonesia]. Medcom. Retrieved from <https://www.medcom.id/nasional/politik/Rb1m2r3b-sipns-diluncurkan-sistem-pengelolaan-sampah-se-indonesia-terintegrasi>
- ¹⁶ Kholil, A., Budiawan, M., & Jumhur, A. A. (2018). Waste management based on 3R in Mutiara waste banks Bekasi City Indonesia. *World Environment*, 8(3), 71–76.
- ¹⁷ Bahraini, A. (2020). Waste bank to support Indonesia Clean-from-Waste 2025. Waste4Change. Retrieved from <https://waste4change.com/blog/waste-bank-to-support-indonesia-clean-from-waste-2025/>
- ¹⁸ Salim, R. (2013, December 19). Waste Not, Want Not: "Waste Banks" in Indonesia. *World Bank Blogs*. Retrieved from <https://blogs.worldbank.org/eastasiapacific/waste-not-want-not-waste-banks-indonesia#:~:text=What%20is%20a%20waste%20bank,%E2%80%93%20organic%20and%20non-organic>
- ¹⁹ Based on information received from Ika Yudha Kurniasari, Founder of Bank Sampah Resik Becik (November 5, 2022).
- ²⁰ Sistem Informasi Manajemen Bank Sampah. Ministry of Environment and Forestry, Republic of Indonesia. Retrieved from <https://simba.menlhk.go.id/portal/galeri/galeri-1>
- ²¹ Schlehe, J., & Yulianto, V. I. (2019). An anthropology of waste. *Indonesia and the Malay World*, 48(140), 40–59. doi: 10.1080/13639811.2019.1654225
- ²² Usis, T. (2021). *Sampah, Amanah, Rupiah*. Jakarta: *Deputi Bidang Koordinasi Pengelolaan Lingkungan dan Kehutanan, Kementerian Koordinator Bidang Kemaritiman dan Investasi*. Deputy for Coordination of Environment and Forestry Management. Coordinating Ministry for Maritime Affairs and Investment: Jakarta.
- ²³ Regulation of Minister of Environment, Republic of Indonesia, Number 13 year 2012 concerning Guidelines for the Implementation of Reduce, Reuse, and Recycle through Waste Banks.
- ²⁴ Schlehe, J., & Yulianto, V. I. (2019). An anthropology of waste. *Indonesia and the Malay World*, 48(140), 40–59. doi: 10.1080/13639811.2019.1654225



- ²⁵ Geldin, S. (2017). The evolution of Indonesian waste banks: Two tales, two cities, one reality. *Tropical Resources*, 36, 17–26.
- ²⁶ Based on information received from Ika Yudha Kurniasari, Founder of Bank Sampah Resik Becik (November 5, 2022).
- ²⁷ Rinaldy, R., Nulhaqim, S.A., & Gutama, A. S. (2017). Proses Community Development pada Program Kampung Iklim di Desa Cupang Kecamatan Gempol Kabupaten Cirebon [Community development process in the climate village program in Cupang Village, Gempol District, Cirebon District]. *Jurnal Penelitian & PKM*, 4(2), 129–389.
- ²⁸ Asteria, D., Santoso, T., & Sari, R. (2017). Local action for waste bank management through an environmental communication strategy and a collaborative approach for the sustainability of villages. In *Competition and cooperation in social and political sciences* (49–54). Routledge.
- Prasetyo Samadikun, B., Siwi Handayani, D., & Permana Laksana, M. (2018). Waste bank revitalization in Palabuhanratu West Java. *E3S Web of Conferences*, 31, 05004. doi:10.1051/e3sconf/20183105004
- ²⁹ Sekito, T., Prayogo, T. B., Meidiana, C., Shimamoto, H., & Dote, Y. (2019). Estimating the flow of recyclable items and potential revenue at a waste bank: The case in Malang City, Indonesia. *Environment, Development and Sustainability*, 21(6), 2979–2995.
- ³⁰ Oktasari, D. P. (2018). Access To entrepreneurship, capital and marketing with Bank Sampah (Waste Banks) Program. *ICCD*, 1(1), 432–436.
- ³¹ Ni'Mah, N.Z., & Keller-Bischoff, L. (2020). Java's waste banks. Inside Indonesia. Retrieved from <https://www.insideindonesia.org/java-s-waste-banks>
- ³² Fatmawati, F., Mustari, N., Haerana, H., Niswaty, R., & Abdillah, A. (2022). Waste bank policy implementation through collaborative approach: Comparative study—Makassar and Bantaeng, Indonesia. *Sustainability*, 14(13), 7974. doi: 10.3390/su14137974
- ³³ Ragiliawati, R., Qomaruddin, M. B. (2020). Role of community leaders as motivator in waste-bank management in Magetan Regency, Indonesia. *Jurnal Promkes: The Indonesian Journal of Health Promotion and Health Education*, 8(2), 219–227.
- ³⁴ Rachman, I., Soesanto, Q. M. B., Khair, H., & Matsumoto, T. (2020). Participation of leaders and community in solid waste management in Indonesia to reduce landfill waste load. *Journal of Community Based Environmental Engineering and Management*, 4(2), 75–84.
- ³⁵ Irwanto, D. (2019). *Bantaeng Berkolaborasi Bentuk Bank Sampah Mangga Family* [Bantaeng collaborates to form mangga family garbage bank]. Retrieved from <http://kotaku.pu.go.id/view/7926/bantaeng-berkolaborasi-bentuk-bank-sampah-mangga-family>
- ³⁶ Radar Bogor. (2021). *Lomba Bogorku Bersih Berhasil Kurangi Produksi Sampah* [Clean competition successfully reduces waste production]. Retrieved from <https://www.radarbogor.id/2021/07/06/lomba-bogorku-bersih-berhasil-kurangi-produksi-sampah-2>
- Annorista, R. (2022). PT KPI Umumkan Pemenang Lomba Kampung Hijau bersama Bank Sampah Pesisir [PT KPI announces the winners of the green village competition with the coastal garbage bank]. Bontangpost. Retrieved from <https://bontangpost.id/pt-kpi-umumkan-pemenang-lomba-kampung-hijau-bersama-bank-sampah-pesisir>
- Kamandanu, H. (2022). Desa Betiting Gelar Lomba Bank Sampah dan Toga, RT 13 Yakin Dapat Nilai Terbaik [Betiting village holds waste bank contest]. BidikNews. Retrieved from <https://bidik.news/2022/09/18/desa-betiting-gelar-lomba-bank-sampah-dan-toga-rt-13-yakin-dapat-nilai-terbaik>
- ³⁷ Septyanun, N., Ariani, Z., Hidayanti, N. F., Harun, R. R., Hayati, M., Suwandi, S., & Aqodiah, A. (2022). The implementation of regional waste policies and the improvement of public health. *Open Access Macedonian Journal of Medical Sciences*, 10(E), 406–410.
- Sarah, L. (2017). *Implementasi Program Corporate Social Responsibility Perusahaan Multinasional di Indonesia: Studi Kasus Program Bank Sampah Unilever di Kelurahan Tamansari* [Implementation of corporate social responsibility programs for multinational companies in Indonesia. Case study: Program Unilever Garbage Bank in Tamansari Village]. Parahyangan University, Bandung.
- Ministry of State Owned Enterprises. (2022). *Jasa Tirta II Ikut Bentuk Bank Sampah dan Penanaman Pohon* [Jasa Tirta II participates in forming a garbage Bank and planting trees]. Jakarta, Indonesia. Retrieved from https://www.jasatirta2.co.id/publikasi/detail_berita/jasa-tirta-ii-ikut-bentuk-bank-sampah-dan-penanaman-pohonuscsmq1fkm30labxte92
- ³⁸ Miftahorrozi, M., Khan, S., & Bhatti, M. I. (2022). Waste Bank-Socio-Economic Empowerment Nexus in Indonesia: The Stance of Maqasid al-Shari'ah. *Journal of Risk and Financial Management*, 15(7), 294.
- Shuker, I. G., & Cadman, C. A. (2018). *Indonesia - Marine debris hotspot: Rapid assessment synthesis report (English)*. World Bank Group, Washington, DC. Retrieved from <http://documents.worldbank.org/curated/en/983771527663689822/Indonesia-Marine-debris-hotspot-rapid-assessment-synthesis-report>
- ³⁹ Regulation of the Minister of Environment and Forestry, Republic of Indonesia, Number 14 Year 2021 concerning Waste Management in Waste Bank. p. 40.
- Gravitiani, E., Chayyani, N. & Juwita, A. (2021). Cost and benefits analysis of implementing waste bank in Gunung Kidul Beach Area, Yogyakarta. IOP Conference Series: *Earth and Environmental Science*, 940, 012038. doi: 10.1088/1755-1315/940/1/012038.
- ⁴⁰ McKenzie-Mohr, D., & Schultz, P. W. (2014). Choosing effective behavior change tools. *Social Marketing Quarterly*, 20(1), 35–46.
- ⁴¹ Idrus, A. (2014). *Kindergarten accepts garbage as school fees*. The Jakarta Post. Retrieved from <https://www.thejakartapost.com/news/2014/10/14/kindergarten-accepts-garbage-school-fees.html>
- ⁴² Eagly, A. H., & Chaiken, S. (1975). An attribution analysis of the effect of communicator characteristics on opinion change: The case of communicator attractiveness. *Journal of Personality and Social Psychology*, 32, 136–144.
- ⁴³ Puspusari, I. (2022). *PKM Kelompok Bank Sampah Teratai Berbasis 3R (Reduce, Reuse, Recycle) Melalui Digital Management Di Kelurahan Pinang Kota Tangerang* [PKM group of lotus garbage banks based on 3R (reduce, reuse, recycle) through digital management in Pinang Village, Tangerang City]. Budi Luhur. Retrieved from <https://fti.budiluhur.ac.id/2022/09/pkm-kelompok-bank-sampah-teratai-berbasis-3r-reduce-reuse-recycle-melalui-digital-management-di-kelurahan-pinang-kota-tangerang>



- ⁴⁴ Fatmawati, F., Mustari, N., Haerana, H., Niswaty, R., & Abdullah, A. (2022). Waste bank policy implementation through collaborative approach: Comparative study—Makassar and Bantaeng, Indonesia. *Sustainability*, 14(13), 7974. doi: 10.3390/su14137974
- ⁴⁵ Presentation by Rosa Vivien Ratnawati, Director General for Household, Commercial, and Toxic Waste, Ministry of Environment and Forestry, presented at the National Coordination Meeting (*Rapat Koordinasi Nasional/Rakornas*) on Waste Banks 2022. The Rakornas is held annually by the Ministry.
- ⁴⁶ Singhirunnusorn, W., Donlakorn, K., & Kaewhanin, W. (2012). Contextual factors influencing household recycling behaviours: A case of waste bank project in Mahasarakham municipality. *Procedia-Social and Behavioral Sciences*, 36, 688–697.
- ⁴⁷ Asteria, D., Santoso, T., & Sari, R. (2017). Local action for waste bank management through an environmental communication strategy and a collaborative approach for the sustainability of villages. In *Competition and Cooperation in Social and Political Sciences* (49–54). Routledge.
- ⁴⁸ Sistem Informasi Manajemen Bank Sampah. Ministry of Environment and Forestry, Republic of Indonesia. Retrieved from <https://simba.menlhk.go.id/portal/>
- ⁴⁹ Geldin, S. (2017). The evolution of Indonesian waste banks: Two tales, two cities, one reality. *Tropical Resources*, 36, 17–26.
- ⁵⁰ Ragiliawati, R., & Qomaruddin, M. B. (2020). Role of Community Leaders as Motivator in Waste-Bank Management in Magetan Regency, Indonesia. *Jurnal Promkes: The Indonesian Journal of Health Promotion and Health Education*, 8(2), 219–227.
- ⁵¹ Average minimum wage in Indonesia was IDR 1,088.9 (2012). Source: International Labor Organization. (2015). *Indonesia: Trends in wages and productivity*. Prasetyo Samadikun, B., Siwi Handayani, D., & Permana Laksana, M. (2018). Waste Bank Revitalization in Palabuhanratu West Java. *E3S Web of Conferences*, 31, 05004. doi:10.1051/e3sconf/2018310500
- ⁵² Government of the Republic of Indonesia. (2018). *Indonesia - Improvement of Solid Waste Management to Support Regional and Metropolitan Cities*. World Bank Group, Washington, DC. Retrieved from <http://documents.worldbank.org/curated/en/563711525707183119/Indonesia-Improvement-of-Solid-Waste-Management-to-Support-Regional-and-Metropolitan-Cities-Project-environmental-and-social-impact-assessment-and-environmental-social-management-framework-executive-summary>
- Putri, M. O., Djaja, I., Agustina, H., & Fauzia, S. (2020). Solid Waste Reduction Through 3R-Based Waste Management Unit and Waste Bank in Indonesia in 2018. *Indian Journal of Public Health Research & Development*, 11(4).
- Putra, H.P., Damanhuri, E., Marzuko, A. (2017). Landfill Mining Prospect in Indonesia. Proceeding of 3rd Symposium of the Asian Regional Branch of International Waste Working Group. Seoul National University, Seoul.
- ⁵³ Badan Pusat Statistik. (2014). Persentase Rumah Tangga Menurut Provinsi dan Perlakuan Memilah Sampah Mudah Membusuk dan Tidak Mudah Membusuk 2013, 2014, 2021 (Percentage of Households by Province and Treatment of Sorting Perishable and Non-Perishable Waste, 2013, 2014, 2021). Retrieved from <https://www.bps.go.id/statictable/2014/05/02/1360/persentaserumah-tangga-menurut-provinsi-dan-perlakuan-memilah-sampah-mudah-membusuk-dan-tidak-mudahmembusuk-2013-2014.html>
- ⁵⁴ Zakianis, S., & Djaja, I.M. (2017). The Importance of Waste Management Knowledge to Encourage Household Waste-Sorting Behaviour in Indonesia. *International Journal of Waste Resources*, 7(4), 309. doi: 10.4172/2252-5211.1000309
- ⁵⁵ Shahreza, M., Sarwoprasodjo, S., Arifin, H. S., & Hapsari, D. R. (2020). Environmental Communication in the Circular Economic Activity of Waste Bank Communities in South Tangerang City, Indonesia. *International Journal of Progressive Sciences and Technologies*, 19(1), 142–152.
- ⁵⁶ Widiyanto, A. F., & Rahab, R. (2017). Community participation in bank of garbage: Explorative case study in Banyumas regency. *Masyarakat, Kebudayaan dan Politik*, 30(4), 367–376.
- ⁵⁷ Usis, T. (2021). Sampah, Amanah, Rupiah. *Jakarta: Deputi Bidang Koordinasi Pengelolaan Lingkungan dan Kehutanan, Kementerian Koordinator Bidang Kemaritiman dan Investasi*. Deputy for Coordination of Environment and Forestry Management. Coordinating Ministry for Maritime Affairs and Investment: Jakarta.
- ⁵⁸ Presentation by Sinta Saptarina, Rakornas on Waste Bank 2022.
- ⁵⁹ Regulation of the Minister of Environment and Forestry, Republic of Indonesia, Number 14 Year 2021 concerning Waste Management in Waste Bank.
- ⁶⁰ Citarum Haram Juara. (2021). *Asal Mula Bank Sampah Di Indonesia* (The origin of waste banks in Indonesia). Retrieved from <https://citarumharum.jabarprov.go.id/asal-mula-bank-sampah-di-indonesia/>
- ⁶¹ Nomura, H., John, P. C., & Cotterill, S. (2011). The use of feedback to enhance environmental outcomes: A randomised controlled trial of a food waste scheme. *Local Environment*, 16(7), 637–653. doi:10.1080/13549839.2011.586026



Getting people to be more sustainable with their waste disposal in Israel

Objective: Increase reusing and recycling



Case summary

In 2001, Israel introduced a deposit system for plastic, metal, and glass beverage containers to increase recycling. Manufacturers incorporated a deposit (NIS 0.25) into the purchase price of eligible beverage containers (100 ml to 1.5 L). The deposit was refunded when customers returned empty beverage containers to retailers or designated drop-off sites. This provided a monetary incentive for consumers to recycle and abstain from littering. A private corporation facilitated container collections and recycling. In the years following the system's introduction, the government gradually broadened its scope and set increasingly ambitious targets. The deposit system effectively increased container collection rates and decreased littering across the country.



Drop-off site for The Deposit Law on Beverage Container. © Yoav Goell

Challenge statement

In the 1990s, the Israeli government faced public opposition to new landfills and dealt with persistent litter. The government called for the closure of unregulated landfills and developed comprehensive frameworks for integrated SWM. Local authorities were thus expected to attain recycling targets set by the national government.

Context and description of challenges

Israel (2000 population: 6.4 million)¹ experienced a per capita MSW generation rate of 1.8 kg per day (2001).² Plastic—largely beverage containers—comprised the majority of waste.³ Concurrently, the country had meager recycling rates. The majority—approximately 95 percent—of MSW was disposed of in landfills and unregulated dumpsites due to their low cost.⁴ Additionally, littering was quite prevalent throughout the country, with beverage containers peppering the Israeli coastline.⁵



To divert MSW away from landfilling, the state unveiled a national strategy to shut down illegal disposal sites and develop an integrated MSWM plan. The government disbursed funds and provided technical support to local authorities to implement this strategy and divert waste to regulated treatment sites. However, the government had a difficult time creating new waste disposal sites due to opposition from both municipal authorities and residents.⁶ Shortly thereafter, the country started to develop the capacity for waste recycling and treatment to reduce landfilling. In 1993, the Israeli government introduced the Collection and Disposal of Waste for Recycling Law. This law set a 15-year recycling target of 25 percent. The government was subsequently tasked with devising appropriate strategies to reach this target.

Decisions and actions

To institutionalize the 3R principles into MSWM systems across the country, the Israeli government enacted a deposit refund system (DRS) in 1999. The government codified this system through the Deposit Law on Beverage Containers, which came into effect in 2001 and involved numerous stakeholders in its inception and implementation.⁷

Manufacturers incorporated a refundable deposit (NIS 0.25 or approximately USD 0.06) into the purchase price of all non-refillable beverage containers (between 100 ml and 1.5 L).⁸ This charge was passed onto the consumer at points of sale. Consumers who returned empty beverage containers to retailers received a deposit refund. Additionally, reusable beer containers made of glass were subject to a deposit of NIS 1.20.⁹ This provided an economic incentive for residents to recycle. In 2010, the government increased the deposit of non-refillable beverage containers to NIS 0.3 (approximately USD 0.08) to adapt it to economic variations. In 2020, the government expanded the system to cover beverage containers between volumes of 1.5 and 5 L.¹⁰ Under this amendment, large beverage containers were subject to a minimum deposit of NIS 0.3, though beverage manufacturers and importers had the authority to set deposits for these containers at their discretion.



REFERENCE CASE STUDY

Improving recycling through Deposit Refund Schemes in Ecuador

Deposit Refund Schemes (DRSs) are economic instruments that create incentives for consumers to bring used products back to the point of sale. In a DRS, a deposit is paid on purchase of a product and is repaid on return of the end-of-life waste product to an authorized collection point. The deposit is an incentive for the consumer to return the product. The system is used to increase recycling rates and tackle products that are often found littered or illegally dumped. The deposit needs to be transparent and of sufficient value to motivate the consumer to return the item and not treat it as a sunk cost.¹¹ An increasing number of countries globally have introduced DRS due to their high return rate. For example, Guayaquil—Ecuador's economic center and its largest city—introduced a bottle deposit system in 2019. Under this system, citizens could return plastic bottles to designated machines located in bus terminals. Residents received two cents per deposited bottle.¹² The deposit refund was intended to offset the cost of public transport. The system was widely embraced by the public. The city collected 24,000 bottles in the first two months.¹³ In Europe, 11 countries had the DRS in place in 2022. Among these, Norway has achieved 97 percent recycling rate for plastic bottles. Germany, where the DRS targets glass, plastic, and aluminum, has achieved a 98.4 percent total return rate.¹⁴

The design

Under the DRS, PET plastic, metal, and glass bottles were eligible for a deposit. Dairy containers were exempt. To regulate the system, eligible beverage containers were imprinted with the deposit amount and a sign indicating the bottle was eligible for





Container for separate garbage collection in Israel. © Dzurag, istock.com

deposit during manufacturing. Retailers collected a deposit on every eligible bottle sold. Citizens were eligible to return used containers to retail stores or designated drop-off locations for a deposit refund.¹⁵ Citizens could deposit a maximum of 50 containers per day at retail stores. The ubiquity of retail stores made it easy for residents to return empty containers. In parallel, as of 2021, the recycling corporation established approximately 24,000 designated points nationwide to collect the larger bottles that were not subject to a deposit.¹⁶

Beverage manufacturers and importers established a private nonprofit corporation (ELA (*Collection for the Environment*) Recycling Corporation;) to facilitate container collection, transport, and recycling, with the intention to divert all operations pertaining to recycling to one organization. Companies were required to accept and recycle

any eligible beverage containers irrespective of the manufacturer. Manufacturers were required to recycle 90 percent of containers collected (inclusive of all bottles sold by the manufacturer). Additionally, as of 2022, manufacturers were required to collect 65 percent of large (1.5–5 L) beverage containers sold annually.¹⁷ Those that failed to meet this target were fined NIS 0.60 per container not collected. To foster accountability, all manufacturers were required to submit biannual reports to the Ministry of Environmental Protection.¹⁸

The Ministry of Environmental Protection, in collaboration with the Israel Consumer Council, ran a hotline to address grievances pertaining to the system.¹⁹ The ministry's website provided citizens and stakeholders with updates on the deposit system. This website also disseminated details about the system's recycling initiatives. The DRS supported a variety of community causes. Following the law's introduction, Israel incorporated waste management into school curricula. Complementarily, ELA held annual school-based container collection competitions.²⁰ Additionally, during the 2020 Tel Aviv Marathon, students collected and returned all containers used by attendees. Students subsequently transferred the deposit refund to the community to support local initiatives.²¹

What behavioral tools are present in this initiative?

FINANCIAL MECHANISMS



Material rewards: Financial incentives can offset the time and convenience costs associated with recycling.²² In Israel, the government set deposit requirements for beverage containers. Residents were eligible for a subsidy (NIS 0.30–1.20) conditional on returning bottles for recycling. This system incentivized residents to recycle by associating beverage containers with a monetary value.



Results

The law led to reductions in littered beverage containers and landfill volumes as well as cleaner public spaces, and as a co-benefit, it created hundreds of jobs.²³ In 2009, Israel recycled and recovered 13 percent of MSW. Additionally, the deposit system increased the collection rate of beverage containers from 33 percent to 77 percent, between 2001 and 2011, respectively.²⁴ Higher collection rates led to particularly noticeable improvements in beach litter. Beverage bottles and cans accounted for 5 percent of litter along the Israeli coast in 2015, compared to Mediterranean and global averages of 14 percent and 13 percent, respectively, which has been attributed to Israel's deposit system.²⁵ As of 2021, approximately 1 billion beverage containers were collected back through the system.²⁶

The law was recently amended to include larger (up to 5 L) beverage containers. However, the government has experienced difficulties enforcing it, as retail shop owners cannot accommodate the increased inflow of containers.²⁷ Further, the cost of instating and operating the DRS (as seen in other countries) is high, amounting to an average of EUR 7.4 million annually.²⁸ Though theoretically efficient, the DRSs can in practice have high administrative and compliance costs.²⁹ The high costs may impede other countries from replicating this model.



Complementary actions to consider

- » The government relied on incentives, a traditional tool, to increase recycling. However, material incentives can be limited in their effectiveness for long-term behavior change. Additionally, they do not necessarily encourage waste minimization. Governments interested in similar approaches could use experimental methods to assess the effectiveness of both material (the deposit system) and nonmaterial (for example, process simplification and social norms) behavioral tools on littering rates.



Want to know more?

[Government of Israel—Deposit Refund System](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Yaffe, N. (2010). *The population of Israel 1990–2009: Demographic statistics*. Statisti-lite 109. Central Bureau of Statistics, Israel. Retrieved from https://unstats.un.org/unsd/wsd/docs/israel_wsd_brochure.pdf
Population in 2021: 9.5 million, Source: Israel Central bureau of statistics. (2022). *Population of Israel on the eve of 2022*. CBS, Government of Israel.
- ² Nissim, I., Shohat, T., & Inbar, Y. (2005). From dumping to sanitary landfills: Solid waste management in Israel. *Waste Management*, 25(3), 323–327. doi:10.1016/j.wasman.2004.06.004
- ³ Lavee, D. (2020). Are economic tools preferable to direct regulatory measures in achieving environmental goals? *Environmental Policy and Law*, 50(3), 181–191.
- ⁴ Tal, A. (2002). *Pollution in a promised land: An environmental history of Israel*. Berkeley: University of California Press.
Organisation for Economic Co-operation and Development. (2011). *OECD Environmental Performance Reviews: Israel 2011*. OECD Environmental Performance Reviews. OECD Publishing, Paris. doi:10.1787/9789264117563-en
- ⁵ Golik, A., & Gertner, Y. (1992). Litter on the Israeli coastline. *Marine Environmental Research*, 33(1), 1–15.
- ⁶ Nissim, I., Shohat, T., & Inbar, Y. (2005). From dumping to sanitary landfills - Solid waste management in Israel. *Waste Management*, 25(3), 323–327. doi:10.1016/j.wasman.2004.06.004
- ⁷ Barkay, T. (2009). Regulation and voluntarism: A case study of governance in the making. *Regulation & Governance*, 3(4), 360–375.
- ⁸ CM Consulting. (2016). *Deposit Systems for one-way beverage containers: Global overview*. ReLoop Platform. Retrieved from <https://www.cmconsultinginc.com/wp-content/uploads/2017/05/BOOK-Deposit-Global-24May2017-for-Website.pdf>
- ⁹ Ministry of Environmental Protection. (2021). *Waste and recycling*. Government of Israel. Retrieved from https://www.gov.il/en/Departments/faq/bottle_deposit_expansion_faq
- ¹⁰ Ministry of Environmental Protection. (2021). *Waste and recycling*. Government of Israel. Retrieved from https://www.gov.il/en/departments/news/deposite_2021
- ¹¹ World Bank. (2021). *Bridging the gap in solid waste management: Governance requirements for results*. World Bank, Washington, DC. Retrieved from <https://openknowledge.worldbank.org/handle/10986/35703>
Organisation for Economic Co-operation and Development. (2016). *Extended Producer Responsibility: Updated Guidance for Efficient Waste Management*. OECD Publishing, Paris. doi:10.1787/9789264256385-en
- ¹² Alcaldia de Guayaquil. (2019). *En la Terminal Río Daule se in - augura máquina de reciclaje y trituración de botel - las, el jueves 27 de junio* [In the Rio Daule terminal, the plastic bottles recycling machine is unveiled, on Thursday June 27]. Retrieved from <https://web.archive.org/web/20221201011605/https://www.guayaquil.gob.ec/en-la-terminal-rio-daule-se-in-augura-maquina-de-reciclaje-y-trituracion-de-botellas-el-jueves-27-de-junio/>
- ¹³ Agence France-Presse. (2021). *Une ville d'Equateur recycle des bouteilles en plastique pour des tickets de bus* [Ecuador city recycling plastic bottles for bus tickets]. Guayaquil, Ecuador.
- ¹⁴ Deposit Refund Scheme. Best Practices, Plastic Smart Cities. Retrieved from <https://plasticsmartcities.org/products/deposit-return-program>
- ¹⁵ Bottle Bill. (2021). *Resource guide: Israel*. Container Recycling Institute. Retrieved from <https://www.bottlebill.org/index.php/current-and-proposed-laws/worldwide/israel>
- ¹⁶ Ministry of Environmental Protection. (2021). *Waste and recycling*. Government of Israel. Retrieved from https://www.gov.il/en/Departments/faq/bottle_deposit_expansion_faq
- ¹⁷ Based on information received from Adam Schalimtzek, Head of International Relations Division- Israel Ministry of Environmental Protection (January 1, 2023).
- ¹⁸ Ministry of Environmental Protection. (2021). *Bottles, tires, packaging, appliances, plastic bags: Extended producer responsibility*. Government of Israel. Retrieved from https://www.gov.il/en/departments/guides/extended_producer_responsibility?chapterIndex=1
- ¹⁹ Ministry of Environmental Protection. (2021). *Waste and recycling*. Government of Israel. Retrieved from https://www.gov.il/en/departments/news/deposite_2021
- ²⁰ Barkay, T. (2009). Regulation and voluntarism: A case study of governance in the making. *Regulation & Governance*, 3(4), 360–375.
- ²¹ Tlv Times System. (2020). *Collect and recycle*. Retrieved from <https://tlvtimes.co.il/percentd7percent9epercentd7percent93percentd7percent99percentd7percent9a0percentd7percentaa-percentd7percentaapercentd7percent9c-percentd7percent90percentd7percent91percentd7percent99percentd7percent91percentd7percent90percentd7percent95percentd7percenta1percentd7percenta4percentd7percent99percentd7percent9d-percentd7percent95percentd7percent9epercentd7percent9epercentd7percent97percentd7percent96percentd7percenta8percentd7percent99percentd7percent9d/>
- ²² Viscusi, W. K., Hubery, J., & Bell, J. (2012). Alternative policies to increase recycling of plastic water bottles in the United States. *Review of Environmental Economics and Policy*, 6(2):190–211.
- ²³ Lavee, D. (2020). Are economic tools preferable to direct regulatory measures in achieving environmental goals? *Environmental Policy and Law*, 50(3), 181–191.
- ²⁴ Organisation for Economic Co-operation and Development. (2011). *OECD Environmental Performance Reviews: Israel 2011*. OECD Environmental Performance Reviews. OECD Publishing, Paris. doi:10.1787/9789264117563-en
- ²⁵ Pfasternak, G., Zvieli, D., Ribic, C. A., Ariel, A., & Spanier, E. (2017). Sources, composition and spatial distribution of marine debris along the Mediterranean coast of Israel. *Marine Pollution Bulletin*, 114(2), 1036–1045.



- ²⁶ Ministry of Environmental Protection. (2021). *Waste and recycling*. Government of Israel. Retrieved from https://www.gov.il/en/Departments/faq/bottle_deposit_expansion_faq
- ²⁷ Surkes, S. (2021, November 25). Supermarkets ill-prepared for expanded bottle deposit law. *Times of Israel*. Retrieved from <https://www.timesofisrael.com/supermarkets-ill-prepared-for-expanded-bottle-deposit-law/>
- ²⁸ Lavee, D. (2010). A cost-benefit analysis of a deposit–refund program for beverage containers in Israel. *Waste management*, 30(2), 338–345.
- ²⁹ Matheson, T. (2019). Disposal is not free: Fiscal instruments to internalize the environmental costs of solid waste (IMF Working Paper No. 2019/283). International Monetary Fund.



Getting people to be more sustainable with their waste disposal in Nepal

Main objective: Increase reusing and recycling

Other objectives: Increase source segregation of organic and other waste



Case summary

The Nepalese municipalities of Bharatpur and Hetauda created plastic source segregation initiatives with CBOs. The initiatives used J-shaped metal 'suiro' hooks. The hooks provided a simple and effective way for households to separate soft plastics for subsequent recycling. Community groups collected the segregated plastics from participating households, which they sold to informal waste collectors and private firms. Both municipalities created competitions and conducted school programs, training, and handicraft workshops to promote waste reuse and recycling. The initiatives reduced plastic littering and improved drainage across both municipalities.



Empty plastic bottle on the background of the Annapurna mountain range, Himalaya. © Shai-Halud, istock.com



Challenge statement

Limited financial, legal, technological, and human resources affected MSWM in Nepalese municipalities. In conjunction, the growing accessibility of plastic fostered a use-and-throw culture in Bharatpur and Hetauda.

Context and description of challenges

Since the 1990s, Nepal experienced rapid unplanned urbanization and shifting consumer habits. Plastic products (for example, bags) were cheap and often distributed freely.¹ As a result, the proportion of plastic in the solid waste stream steadily increased.² On average, the municipalities of Bharatpur (population: 134,803)³ and Hetauda (population: 90,054)⁴ produced 0.28 and 0.25 kg of waste per capita per day, respectively (2008).⁵ Plastic made up 7 percent of the total waste mix. Nepalese systems prioritized waste collection and disposal over reduction, reuse, or recycling schemes. Low collection rates in Bharatpur and Hetauda fostered a culture of open dumping.⁶ Indiscriminate plastic dumping clogged public drains and polluted ground and surface water. Additionally, plastic bags often blew away from dumping points and littered the streets.⁷ Strategies to curb plastic pollution—such as Hetauda’s 1995 plastic bag ban—were unsuccessful.⁸ With limited alternatives to replace plastic bags, citizens and local businesses did not support these initiatives.

Grassroots initiatives attempted to deal with burgeoning waste issues. CBOs—known as Tole Lane Organizations (TLOs)—catered to individual neighborhoods throughout Nepal.⁹ They collected recyclables, conducted awareness programs, implemented cleanup activities, and facilitated household composting and waste collection.¹⁰ The aforementioned actions laid the groundwork for more robust efforts.

Decisions and actions

In 1996, the Hetauda government provided financial support to a local NGO for a pilot plastic source segregation program. It piloted the program in one ward. Following

its successful uptake, the program expanded across the municipality. In 2003, Bharatpur started an analogous pilot in conjunction with other CBOs. The municipality introduced the program informally to the core market area of the city (three wards) before expanding it to four other wards. By 2010, the initiative gained prominence and was formalized.

Both programs leveraged a simple instrument—the *suiro* hook—to segregate soft plastics. The *suiro* hook was a 1-to-1.5-foot J-shaped metal piece with a small hole on one end and a barbed edge on the other. It was constructed out of galvanized steel wire due to its low-cost and ductile nature.¹¹ Residents hung the hook from its eye and attached plastic on its barbed end.¹² Residents hung *suiro* hooks in or near their kitchens, where it was easy to clean and store plastics.¹³ TLOs collected and sold the aggregated plastic waste to the municipalities. Municipalities sold the plastics to plastic processors. Municipalities formed environmental coordination committees to ensure that TLOs and municipal authorities worked cooperatively.

In the process, each municipality worked with local community groups (women’s groups and TLOs) and private operators.¹⁴ In Hetauda, the municipality purchased *suiro* hooks and distributed them freely to communities through TLOs. In Bharatpur, the municipality and *suiro* program purchased 74 and 26 percent of *suiro* hooks, respectively, and distributed them to residents across seven wards. Initially, a single *suiro* hook cost NPR 5 (approximately USD 0.04), which rose to NPR 15 (approximately USD 0.12), as of 2022. The *suiro* hook became a symbol for recycling. UN-Habitat and UDLE-GTZ Nepal (in Hetauda) and Practical Action Nepal (in Bharatpur) provided supplemental financial support.¹⁵

The design

Suiro hooks provided several advantages over other source separation schemes. First, they provided a convenient way for residents to store recyclable plastics. Second, the hooks prevented soft plastics from blowing away, which mitigated littering and kept drains clear.



Women's groups, TLOs, NGOs, private operators, and municipalities distributed *suiro* hooks to households and local businesses. In parallel, these actors also conducted education and training activities to encourage uptake.¹⁶ In many Nepalese municipalities, women were primarily responsible for waste separation and disposal.¹⁷ Therefore, both municipalities specifically targeted women and school children through speech, quiz, essay writing, and drawing competitions. Bharatpur and Hetauda conducted training for plastics upcycling activities (making handicrafts from used plastic waste) and making cotton bags as SUP alternatives (Figure 12). TLOs also competed with one another in handicraft-making competitions to popularize plastic reuse. The winner received public recognition.¹⁸

The initiative operated through a door-to-door collection system, which removed an additional barrier to participation, as residents did not have to deal with plastic disposal. Women's groups and TLOs collected plastics on a bimonthly to monthly basis.



Source: D. R. Pathak.

Manufacturers ultimately recycled the plastic into products like pipes, ropes, and tents.¹⁹ The municipalities rewarded the TLO that collected the most plastic waste and creatively reused plastic materials.

Alongside educational activities, municipalities used incentives to promote source segregation. For instance, Hetauda periodically awarded households with prizes (worth NPR 1,000 or approximately USD 8). The municipality also issued nonmaterial rewards, such as certificates of appreciation.²⁰ Bharatpur launched a program to award soap to residents who collected 1 kg of nonrecyclable clean plastic to prevent littering and open burning of low-grade plastics.

What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Messengers: Local actors can play a defining role in implementing new initiatives.²¹ In Nepal, several actors helped promote plastic source segregation using *suiro* hooks. Local women's groups and TLOs distributed *suiro* hooks, facilitated outreach activities, and collected plastic waste.

The municipality also selected some individuals as trainers to transfer best practices to other communities.

SYSTEM DESIGN MECHANISMS



Physical cues: Signals within the environment can help prompt specific behaviors. In the present case study, both municipalities distributed a tool (*suiro* hooks) specifically designed to capture soft plastics. *Suiro* hooks provided a salient reminder for residents to engage in the desired behavior (source segregation of plastics). In addition, its convenient feature of keeping trash together out of reach of animals decreased the spreading of waste on the ground, changing the landscape in a positive way.



Results

Between 2003 and 2019, the program distributed 43,000 and 20,000 *suiro* hooks in Bharatpur and Hetauda, respectively.²² In Bharatpur, the *suiro* program collected 2 tons of plastic per month (and sold approximately 1–1.2 tons, generating approximately NPR 30,000 or approximately USD 235 per month).²³ In Hetauda, the initiative collected 1.5 tons of plastic per month and sold approximately 800–900 kg, which generated approximately NPR 5,000 per month. *Suiro* hooks reduced open dumping and improved drainage and soil conditions. TLOs trained hundreds of members to make used plastic handicrafts and cotton bags as SUP alternatives.²⁴ Women and school students who participated in speech, quiz, essay writing, and drawing competitions developed key social skills. Training sessions shifted residents' attitudes about waste and increased civic engagement in waste management. In Bharatpur, group competitions brought together tens of TLOs and hundreds of members. Similarly, on World Environment Day, more than 10,000 people participated in waste segregation campaigns, one of highest participation rates at a single waste-related event.

Despite public interest in the initiative, residents failed to segregate a large proportion of their waste or achieve significant level of recycling.²⁵ Despite its drawbacks, the initiative is an example of a unique method to reduce littering and increase recycling. Other municipalities learned from these early experiences and introduced *suiro* initiatives to increase municipal recycling rates.²⁶ Over time, as different types of plastic and recycling became increasingly commonplace, both municipalities have started to gradually replace *suiro* hooks with colored bins.



Complementary actions to consider

- » Governments could use experimental methods to compare the effectiveness of different methods to curb plastic pollution. An intervention could assess the impact of tools and complementary behavioral strategies (for example, choice architecture and public commitments)—both individually and combined—on plastic waste generation.
- » This initiative focused on end-of-life plastic disposal. However, upstream solutions may prove fruitful. Governments interested in curbing SUP consumption could make reusable alternatives more cost-effective and accessible, while decreasing the accessibility of SUPs.



Want to know more?

[Office of Municipal Executive, Bharatpur](#) and [Office of Municipal Executive, Hetauda](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Manandhar, D. R. (2012). *Situation assessment of SWM at municipalities in eastern regions*, Dharan. SEAM-Nepal.
- ² Bharadwaj, B., & Rai, R. K. (2021). Stakeholders perception of used plastics. In *Handbook of Solid Waste Management: Sustainability through Circular Economy* (1–30). Springer Singapore, Singapore.

Pokhrel, D., & Viraraghavan, T. (2005). Municipal solid waste management in Nepal: Practices and challenges. *Waste Management*, 25(5), 555–562.
- ³ Practical Action Nepal. (2008). *Best practices on solid waste management of Nepalese cities*. European Union under the EC Asia Pro Eco II Program, Kathmandu, Nepal
Population in 2021: 369,377. Source: Central Bureau of Statistics. (2021). *Final Preliminary Report of National Population Census 2021*. Government of Nepal.
- ⁴ Ibid; Population in 2021: 195,951. Source: Central Bureau of Statistics. (2021). *Final Preliminary Report of National Population Census 2021*. Government of Nepal.
- ⁵ Practical Action Nepal. (2008). *Best practices on solid waste management of Nepalese cities*. European Union Under the EC Asia Pro Eco II Program. Kathmandu, Nepal.
- ⁶ Hetauda Municipality Solid Waste Management: Local Initiatives for Sustainable Communities. (2001). Retrieved from https://kitakyushu.iges.or.jp/docs/network_meetings/kin1/Presentations/Session%20II/33%20Hetauda.pdf

Saito, N. (2013). *Solid waste management in Nepal: Current status and policy recommendations*. Asian Development Bank (ADB), Manila, The Philippines.
- ⁷ Alam, R., Chowdhury, M. A. I., Hasan, G. M. J., Karanjit, B., & Shrestha, L. R. (2008). *Generation, storage, collection and transportation of municipal solid waste: A case study in the city of Kathmandu, capital of Nepal*. *Waste Management*, 28(6), 1088–1097. doi:10.1016/j.wasman.2006.12.024
- ⁸ Practical Action Nepal. (2008). *Best practices on solid waste management of Nepalese cities*. European Union under the EC Asia Pro Eco II Program. Kathmandu, Nepal.
- ⁹ United Nations Development Programme. (2002). *Rural Urban Partnership Programme: Annual Report 2001*. Urban Based Local Development. UNDP/UNCHS/NPC/MPPW/MLD. (NEP/96/003).

Kumar, K. S. (2003). *Rural-urban linkage and role of civil society: A successful model for good urban governance in Nepal*. 2nd FIG Regional Conference. Marrakech, Morocco.
- ¹⁰ Acharya, T.P. (2013). *Nepal: Capacity building for waste management - Consultant's report*. Project Number: 44069. IPE Global Private Limited.
- ¹¹ Based on information received from Ganesh Kumar Shrestha, Founding President of Naba Jiban Jyoti Club, Hetauda SMC (December 12, 2022).
- ¹² Nippon Koei Co. LTD. & Yachiyo Engineering Co. LTD. (2005). *The study on the solid waste management for the Kathmandu Valley: Final report - Volume 1: Executive summary*. Japan International Cooperation Agency. Retrieved from https://openjicareport.jica.go.jp/pdf/11808631_01.pdf
- ¹³ Based on information received during Focal Group Discussion with Gyan Darshan Sirjanshil Aama Samuha (December 12, 2022).
- ¹⁴ Rai, R. K., Nepal, M., Khadayat, M. S., & Bhardwaj, B. (2019). Improving Municipal Solid Waste Collection Services in Developing Countries: A Case of Bharatpur Metropolitan City, *Nepal. Sustainability*, 11(11), 3010. doi:10.3390/su11113010
- ¹⁵ Practical Action Nepal. (2008). *Best practices on solid waste management of Nepalese cities*. European Union Under the EC Asia Pro Eco II Program. Kathmandu, Nepal.
- ¹⁶ Practical Action. (2009). *Practical Action Nepal Office Annual Report 2008/09*. Kathmandu, Nepal.
- ¹⁷ Rai, R. K., Nepal, M., Khadayat, M. S., & Bhardwaj, B. (2019). Improving municipal solid waste collection services in developing countries: A case of Bharatpur Metropolitan City, *Nepal. Sustainability*, 11(11), 3010.
- ¹⁸ Based on information received from Januka KC, Section head, Sanitation and SWM section, Bharatpur MPC (December 12, 2022).
- ¹⁹ Acharya, T.P. (2013). *Nepal: Capacity building for waste management - Consultant's report*. Project Number: 44069. IPE Global Private Limited.
- ²⁰ Practical Action Nepal. (2008). *Best practices on solid waste management of Nepalese cities*. European Union Under the EC Asia Pro Eco II Program. Kathmandu, Nepal.
- ²¹ Van Poeck, K., Læssøe, J., & Block, T. (2017). An exploration of sustainability change agents as facilitators of nonformal learning: Mapping a moving and intertwined landscape. *Ecology and Society*, 22(2).
- ²² Based on information received from Dhurba Bhujel, Former Head, Social Development Division, Hetauda Sub-metropolitan City (December 13, 2022).
- ²³ Practical Action Nepal. (2008). *Best practices on solid waste management of Nepalese cities*. European Union under the EC Asia Pro Eco II Program. Kathmandu, Nepal.
- ²⁴ Based on information received from Januka KC, Section head, Sanitation and SWM section, Bharatpur MPC (December 12, 2022).

Based on information received from Bhim Prasad Timalsina, Head, Social Development Division, Hetauda SMC (December 13, 2022)
- ²⁵ Neupane, B., & Neupane, S. (2013). Scenario of solid waste management in Hetauda Municipality, Nepal. *International Journal of Environment*, 2, 2091–2854. doi:10.3126/ije.v2i1.9214
Nepal, M., Karki Nepal, A., Khadayat, M. S., Rai, R. K., Shyamsundar, P., & Somanathan, E. (2022). Low-cost strategies to improve municipal solid waste management in developing countries: Experimental evidence from Nepal. *Environ Resource Econ*. doi: 10.1007/s10640-021-00640-3
- ²⁶ Practical Action Nepal. (2008). *Best practices on solid waste management of Nepalese cities*. European Union under the EC Asia Pro Eco II Program. Kathmandu, Nepal.

UN-Habitat. (2007). *Solid Waste Management in Siddhiput Final Report - Siddhiput Integrated Water and Sanitation Project*. Environment and Public Health Organization (ENPHO).
Acharya, T. P. (2013). *Nepal: Capacity Building for WASTE management - Consultant's report*. Project Number: 44069. IPE Global Private Limited.



Getting people to be more sustainable with and generate less waste in the Republic of Korea

Main objective: Increase reusing and recycling

Other objectives: Increase source segregation of organic and other waste; empower people to improve accountability; change production and consumption behaviors



Case summary

Korean authorities introduced a pay-as-you-throw (PAYT) scheme (the volume-based waste fee [VBWF] system) in the form of prepaid bags to increase source segregation. Residents paid to dispose of residual but not recyclable waste. A strong accountability mechanism followed the system's rollout. The VBWF system gradually fostered a shift in consumption patterns, as reflected by the country's decreased waste generation. In parallel, it improved recycling rates. As of 2017, the country's recycling rate (86 percent) was among the highest of countries globally.



VBWF bags. © Seoul Urban Solutions Agency



Challenge statement

As a consumer culture emerged in Korea, technical and environmental considerations complicated SWM. The general habit of disposing of mixed waste persisted in most Korean cities,¹ which created issues for source segregation schemes.

Context and description of challenges

In 1995, Korea had a population of approximately 44.5 million² and generated approximately 1.3 kg of MSW per capita per day.³ On the heels of rapid economic growth, residents' consumption patterns and wealth changed. These factors increased waste generation rates as residents discarded products readily and before the end of their life span.⁴ Additionally, traditional dining practices—which used many small dishes—contributed to organic waste generation.⁵ The country historically disposed of waste in landfills (78.6 percent in 1994). However, public opposition impeded the government from creating new landfills.⁶

Waste management was also a significant financial burden on local administrations. Traditionally, households paid fixed waste management fees determined by property size. In 1991, SWM services cost KRW 280 billion (approximately USD 380 million). Fee-based revenues only covered approximately 9 percent of this cost.⁷ In 1992, the Korea Resources Recovery Corporation introduced recycling and provided households with complementary bins. However, prevailing habits of disposing of mixed waste limited its success.⁸

The Korean government re-envisioned its waste management strategy to deal with limited land availability and the negative effects of landfills. An evolving landscape of legislative and administrative frameworks provided a backdrop for its revised SWM system.⁹ The government introduced a deposit refund system in 1992 to hold producers responsible for material recycling. It applied to packaging (paper, metal, glass, and PET), tires, lubricants, large home appliances, and batteries. The government charged entities that failed to recycle. However, an underdeveloped recycling sector

constrained the program's success. With the proper legal foundation in place, Korea shifts its waste management focus. These efforts are the focus of the present case study.

Decisions and actions

In response to the prevailing conditions, the Korean government piloted a volume-based waste fee (VBWF). Under this system, households purchased designated bags for residual and organic waste. Local governments determined bag prices. Households paid progressively more as they generated more waste. Households disposed of recyclables for free.

Waste management groups, NGOs, consumers, and government officials contributed to the VBWF policy. Stakeholder engagement (citizens, local governments, and civic groups) played a strong role in tailoring the system to local needs. The government accompanied the policy's rollout with a promotional campaign (though posters, brochures, newspapers, and TV) to increase citizen buy-in.¹⁰

In 1994, the government piloted the VBWF system in 15 cities and provinces.¹¹ As the system gained traction, more municipalities signed on. The government launched the program nationwide in 1995, coinciding with local governments having increased administrative power. Complementarily, the government introduced regulations for SUPs (for example, cups and plastic bags).¹² In 1999, the country phased out free SUP bags. The VBWF system went through several iterations since its inception to increase participation.

The design

Residents purchased designated bags for their residual waste. Convenience and grocery stores sold these bags in multiple sizes. Residents were also required to segregate recyclables (plastic, paper, cans, glass) at no charge.¹³ Residents deposited segregated recyclable, organic, and residual waste at central collection areas (for apartment complexes) or curbside (for detached houses). Each collection container





Waste bins designed to measure the weight of waste. © Seoul Urban Solutions Agency

had labels identifying permissible items, which provided a prompt. The government introduced provisions for organic waste disposal in 2003, which utilized designated bags, magnetic chips, and radio-frequency identification (RFID) tags (depending on the municipality). Disposal bins contained magnetic chips and displayed the weight of waste deposited into the bin. For RFID cards, a user swiped a special card on the bin before depositing his/her waste. The system recorded charges in the user's account per the weight of waste deposited.¹⁴

Beginning in 2003, residents could purchase handled VBWF bags at grocery store checkouts. These bags served two purposes: consumers could use them to carry goods home (eliminating extra waste created by standard plastic bags) and for residual waste. The government fined residents (a maximum of KRW 1 million or USD 910) who did not use VBWF bags or disposed of waste in unauthorized locations. Additionally, residents had their waste collection delayed and had to enroll in mandatory education programs.¹⁵ The government trained citizens as honorary inspectors to report violations. Citizens also acted as change agents to educate the community on best practices.¹⁶ Citizens who reported violators received monetary awards (up to 80 percent of the fine imposed).¹⁷ Over the years, many Korean municipalities incorporated this law to improve compliance.¹⁸

The VBWF policy contributed to improved recycling infrastructure and the introduction of additional companies nationwide to deal with the influx of recyclable materials.

What behavioral tools are present in this initiative?

SYSTEM DESIGN MECHANISMS



Accessible services: Access to convenient infrastructure can mediate household waste behaviors.¹⁹ In Korea, residents discarded recyclables in communal collection areas where they disposed of different materials in separate containers. The government also made VBWF bags readily available at grocery and convenience stores to promote uptake.

FINANCIAL MECHANISMS



Appealing to loss aversion: Research suggests that individuals are more sensitive to losses than comparative gains.²⁰ Weight-based fees on residual recycling can increase recycling²¹ and promote greater diversion rates than fixed collection fees.²² Even small financial costs can potentially deter unwanted waste management behaviors. In Korea, households and commercial entities had to purchase designated bags for their organic and residual waste. This system incentivized residents to minimize their waste footprint to save money on costs associated with waste disposal.

SOCIAL AND MOTIVATIONAL MECHANISMS



Creating accountability: Accountability mechanisms can help enforce environmental regulations.²³ Citizens can help enforce environmental regulations. In Korea, the government used accountability mechanisms to promote adherence to the VBWF system. In conjunction with official monitoring (for example, local officials and security cameras), citizen volunteers reported on elicit waste disposal practices. Together, these systems encouraged compliance. Citizens reported 11 percent of violations through 2014.²⁴



Results

The VBWF system successfully redefined the country's waste management system. The government's commitment (for example, fee introduction, infrastructure rehabilitation, and SUP regulations) helped transition the country toward greener and more sustainable behavior. Initially, the VBWF led to an increase in illegal dumping and burning. Increased monitoring (use of security cameras and citizens' reports), fines, and rewards for reporting illegal behavior curbed this uptick.²⁵

The VBWF system gradually shifted residents' waste disposal practices.²⁶ Most residents now treat recycling as an established habit and do not see it as inconvenient.²⁷ Soon after its inception, Korea's VBWF system reduced the municipal waste generation rate and increased recycling by 16.6 and 15.7 percent, respectively (1994–2001).²⁸ As of 2017, Korea recycled 86 percent of its solid waste, which is among the highest recycling rates globally.²⁹ Even more impressive is the decoupling of economic growth and waste generation. Despite economic growth, per capita household waste generation dropped 23.3 percent, from 1.33 kg per day (1994) to 1.02 kg per day (2017), a level the country has maintained.³⁰

The VBWF system also contributed to more resource-efficient consumer behavior and higher environmental awareness overall. Consumers and producers now equate throwing away waste with throwing away money, which catalyzed a shift away from excess packaging and toward reusable products.³¹ Over the past several years, the government has banned several single-use items. These bans corresponded to decreases in both single-use cups (75 percent year-on-year decrease between July 2018 and June 2019) and SUP bags (84 percent decrease in bakeries between January to May 2019 relative to the previous year). The government complemented these tactics with several soft interventions. For instance, it is currently piloting a single-use cup deposit system to promote a shift toward reusable beverage containers.³² Korea also introduced eco-labeling regimes to make it easier for consumers to purchase more recycled or refillable products.³³ For example, a packaging company developed environmental-friendly food packaging materials. Since the company

started displaying environmental labels on its products, the sales have increased by 252 percent.³⁴

In response to the VBWF's success, the government has recently introduced additional recycling initiatives. In 2021, Korea introduced separate collections for transparent PET containers. Residents are required to clean and remove labels before recycling. In light of these new regulations, 50.6 percent of consumers are already purchasing or planning to purchase unlabeled containers.³⁵



Complementary actions to consider

- » **Illegal dumping and noncompliance still exist within the VBWF system.³⁶ Practitioners considering a PAYT scheme could investigate residents' motivations for illegal dumping. By understanding the barriers to program uptake, officials may be able to more precisely target compliance programs.**



Want to know more?

[Korea Environmental Policy Bulletin](#)



**CHOOSE ANOTHER
CASE STUDY**

Endnotes

- ¹ Dr. Yoo, K. Y. (n.d.) *Municipal solid waste management*. Seoul Institute. Retrieved from https://seoulsolution.kr/sites/default/files/policy/2%EA%B6%8C_10_Environment_Municipal%20Solid%20Waste%20Management.pdf
- ² Byun, M. (2015). *Seoul Statistical Series_01: Population*. The Seoul Institute, Republic of Korea. Retrieved from https://www.seoulsolution.kr/sites/default/files/page/Seoul%20Statistical%20Series_01%20Population.pdf

Population in 2021: 51.74 million. Source: Statistics Korea. (2022). *2021 Population and Housing Census (Register-based Census)*. Republic of Korea. Retrieved from https://kostat.go.kr/board.es?mid=a20108010000&bid=11747&act=view&list_no=419981&tag=&n-Page=2&ref_bid=11742,11743,11744,11745,11746,11747,11748,11749,11773,11774,11750&keyField=&keyWord=
- ³ Ministry of Environment. (2015). Report - *Ministry of Environment*. Republic of Korea. Retrieved from <http://eng.me.go.kr/eng/file/readDownloadFile.do?fileId=115224&fileSeq=1&openYn=Y>
- ⁴ Dr. Kim, K. Y. (2003). *Volume-based Waste FEE system. Korea environmental policy bulletin volume 1*. Ministry of Environment & Korea Environment Institute, Republic of Korea.
- ⁵ Cho, I., Kang, M., Horvath, B., Chowdhury, S., Yoo, J., Yoon, H., Kim, H., Ahn, K., Ryu, H., Nam, J., & Yakovleva, Y. (2017). *Sustainable Development Goals Policy Brief Series No.3*. Comprehensive Study of Waste Management Policies & Practices in Korea and Recommendations for LDCs and MICs. United Nations Development Programme.
- ⁶ Dr. Kim, K. Y. (2003). *Volume-based waste fee system. Korea environmental policy bulletin volume 1*. Ministry of Environment & Korea Environment Institute, Republic of Korea.
- ⁷ Lee, S., & Hur, Y. G. (n.d.), *Volume based waste fee (VBMF) system for municipal solid waste*. Seoul Housing and Communities Corporation. Retrieved from http://susa.or.kr/sites/default/files/resources/%ED%99%98%EA%B2%BD_9_Volume%20Based%20Waste%20Fee%20%28VBMF%29%20System%20for%20Municipal%20Solid%20Waste_0.pdf
- ⁸ Dr. Yoo, K. Y. (n.d.) *Municipal solid waste management*. Seoul Institute. Retrieved from https://seoulsolution.kr/sites/default/files/policy/2%EA%B6%8C_10_Environment_Municipal%20Solid%20Waste%20Management.pdf
- ⁹ Yoon, S. J. (2020). *South Korea's experience with smart infrastructure services: Integrated solid waste management*. Inter-American Development Bank.
- ¹⁰ Kim, Y. S., Kang, S. J., Ryu, J. C., Kim, W. D., Han, K. J., & Shin, Y. E. (2015). *Korea's green growth experience: Process, outcomes and lessons learned*. Global Green Growth Institute. Republic of Korea. ISBN 979-11-952673-5-4.

Kim, D. Y. (2019). *How the Volume-based Waste Fee Policy Increased Household Recycling Rates in the Republic of Korea (1995–2009)*. Global Delivery Initiative Knowledge Sharing Program.
- ¹¹ Dr. Yoo, K. Y. (n.d.) *Municipal Solid Waste Management*. Seoul Institute. Retrieved from https://seoulsolution.kr/sites/default/files/policy/2%EA%B6%8C_10_Environment_Municipal%20Solid%20Waste%20Management.pdf
- ¹² Organisation for Economic Co-operation and Development. (2017). Chapter 4: Waste, materials management and circular economy. In *OECD Environmental Performance Reviews*. OECD Publishing, Paris. doi: 10.1787/9789264268265-en
- ¹³ Kim, I. C. (2002). Korea's policy instruments for waste minimization. *Journal of Material Cycles and Waste Management*, 4,12–22.
- ¹⁴ Lee, S., & Hur, Y. G. (n.d.) *Volume based waste fee (VBMF) system for municipal solid waste*. Seoul Housing and Communities Corporation. Retrieved from http://susa.or.kr/sites/default/files/resources/%ED%99%98%EA%B2%BD_9_Volume%20Based%20Waste%20Fee%20%28VBMF%29%20System%20for%20Municipal%20Solid%20Waste_0.pdf
- ¹⁵ Dr. Kim, K. Y. (2003). *Volume-based waste fee system. Korea environmental policy bulletin volume 1*. Ministry of Environment & Korea Environment Institute, Republic of Korea.
- ¹⁶ Kim, Y. S., Kang, S. J., Ryu, J. C., Kim, W. D., Han, K. J., & Shin, Y. E. (2015). *Korea's green growth experience: Process, outcomes and lessons learned*. Global Green Growth Institute. Republic of Korea. ISBN 979-11-952673-5-4.
- ¹⁷ Dr. Kim, K. Y. (2003). *Volume-based waste fee system. Korea environmental policy bulletin volume 1*. Ministry of Environment & Korea Environment Institute, Republic of Korea.
- ¹⁸ Ministry of Environment & Korea Environment Institute. (2016). Two decades in effect: Volume based waste fee in South Korea. *Korean Environmental Policy Bulletin*, 14(3). Republic of Korea. Retrieved from <https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/Korea%20Environmental%20Policy%20Bulletin%20-%20Two%20Decades%20in%20Effect%2C%20Volume-Based%20Waste%20Fee%20System%20in%20South%20Korea.pdf>
- ¹⁹ Prime Minister's Strategy Unit. (2002). *Waste Not, Want Not: A strategy for tackling the waste problem in England*. Crown, Great Britain.
- ²⁰ Homonoff, T. A. (2018). Can small incentives have large effects? The impact of taxes versus bonuses on disposable bag use. *American Economic Journal: Economic Policy*, 10(4), 177–210.
- ²¹ Bisailon, M., Finnveden, G., Noring, M., Stenmarck, Å., Sundberg, J., Sundqvist, J. O., & Tyskeng, S. (2009). *Nya styrmedel inom avfallsområdet* [New policy measures for waste management].
- ²² Thøgersen, J. (2003). Monetary incentives and recycling: Behavioural and psychological reactions to a performance-dependent garbage fee. *Journal of Consumer Policy*, 26(2), 197–228.
- ²³ Roberts, E., Dobbins, J., & Bowman, M. (1992). The role of the Citizen in environmental enforcement. In *Second International Conference on Environment Compliance and Enforcement* (22–25).
- ²⁴ Ministry of Environment & Korea Environment Institute. (2016). Two decades in effect: Volume based waste fee in South Korea. *Korean Environmental Policy Bulletin*, 14(3). Republic of



- Korea. Retrieved from <https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/Korea%20Environmental%20Policy%20Bulletin%20-%20Two%20Decades%20in%20Effect%2C%20Volume-Based%20Waste%20Fee%20System%20in%20South%20Korea.pdf>
- ²⁵ Based on information received from Jaemin Song, PhD, Associate Professor, University of Seoul (June 17, 2019).
- ²⁶ Lee, S., & Hur, Y. G. (n.d.) *Volume based waste fee (VBMF) system for municipal solid waste*. Seoul Housing and Communities Corporation. Retrieved from http://susa.or.kr/sites/default/files/resources/%ED%99%98%EA%B2%BD_9_Volume%20Based%20Waste%20Fee%20%28VBMF%29%20System%20for%20Municipal%20Solid%20Waste_0.pdf
- Park, S. (2018). Factors influencing the recycling rate under the volume-based waste fee system in South Korea. *Waste Management*, 74, 43–51.
- ²⁷ Ministry of Environment. (2016). Two decades in effect: Volume based waste fee in South Korea. *Korean Environmental Policy Bulletin*, 14(3). Retrieved from <https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/Korea%20Environmental%20Policy%20Bulletin%20-%20Two%20Decades%20in%20Effect%2C%20Volume-Based%20Waste%20Fee%20System%20in%20South%20Korea.pdf>
- ²⁸ Dr. Kim, K. Y. (2003). *Volume-based waste fee system*. Korea environmental policy bulletin volume 1. Ministry of Environment & Korea Environment Institute, Republic of Korea.
- ²⁹ Ministry of Environment—Land & Waste. Republic of Korea. Retrieved from <https://me.go.kr/eng/web/index.do?menuId=466>
- ³⁰ Ibid; Wataya, E., Banna, F. M., Bak, I., Song, J., Yoon, S. H., & Yi, S. (2014). *Green growth in action: Extracting value from municipal solid waste for greener cities: The case of the Republic of Korea*. Knowledge Note Series 04. Korea Green Growth Trust Fund. World Bank Group. Washington, DC.
- ³¹ Ministry of Environment. (2011). *Some success stories of Korean environmental policies: Waste reduction and recycling*. Republic of Korea. Retrieved from <https://www.unapcict.org/resources/ictd-infobank/some-success-stories-korean-environmental-policies>
- ³² So-ra, L., Ji-hye, J., Dong-won, S., Jung, G., In-chul, G., Chan-hee, L., Yong-Woo, H., Soo-Yeol, H. . (2019). *A study on plastic management strategies for transitioning to a circular economy*. Korea Environment Institute. Retrieved from https://www.kei.re.kr/elibList.es?mid=a10101030000&elibName=researchreport&c_id=726249&act=view
- ³³ Zhang, Z. (2008). Asian energy and environmental policy: Promoting growth while preserving the environment. *Energy Policy*, 36(10), 3905–3924.
- ³⁴ Korea Environmental Industry and Technology Institute. (2018). 성공사례집: 환경마크와 함께 할 때
지속가능한 미래, 성장하는 기업 (Success Stories: Sustainable future with eco-label). KEITI. Retrieved from <https://www.keiti.re.kr/site/keiti/ex/board/View.do?cbldx=274&bcldx=30286>
- ³⁵ Korea Consumer Agency. (2021). *Consumer survey: Problems of transparent PET bottle separate discharge*. Retrieved from <https://www.kca.go.kr/smartconsumer/sub.do?menukey=7301&mode=view&no=1003245180>
- ³⁶ Ministry of Environment. (2016). Two decades in effect: Volume based waste fee in South Korea. *Korean Environmental Policy Bulletin*, 14(3). Retrieved from <https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/Korea%20Environmental%20Policy%20Bulletin%20-%20Two%20Decades%20in%20Effect%2C%20Volume-Based%20Waste%20Fee%20System%20in%20South%20Korea.pdf>



Getting people to be more sustainable with their waste disposal and generate less waste in the Solomon Islands

Main objective: Increase reusing and recycling..

Other objectives: Change consumption and production behaviors



Case summary

The city of Honiara piloted the Schools Re-thinking Plastic initiative to reduce SUP consumption. The government worked with local partners to pilot the initiative in five primary and secondary schools (5,307 students). The program replaced single-use lunch containers with reusable alternatives. The initiative assessed the impact of (a) a discount scheme and (b) a deposit refund scheme on SUP consumption. While both interventions led to reductions in SUPs, the deposit refund scheme was comparatively more successful. This initiative contributed to a proposed nationwide ban targeting five types of SUPs.

Challenge statement

SUPs were a common source of pollution in Honiara, the Solomon Islands. Structural barriers—including limited resources, capacity, and available land—affected the scope of SWM services. Combined with growing waste volumes, this burdened Honiara’s SWM infrastructure.

Context and description of challenges

Honiara is the capital city of the Solomon Islands (2019 population: 88,501).¹ The city dealt with rising plastic waste, which accounted for 12 percent of the total MSW generated (1 kg per capita per day, 2014).² The ubiquity of SUPs made them the default choice for Honiara residents. For example, school cafeterias packaged lunches in single-use containers and served them with SUP cutlery. A local study observed that approximately 25 percent of Honiara residents relied on SUPs due to an absence of alternatives. An additional approximately 54 percent used SUPs out of habit.³

Growing waste volumes strained the city’s limited waste management infrastructure and affected service delivery. Residents without access to collection services illegally





Recycling plastic bottle. © miniseries | istock.com

dumped their waste. Littered SUPs blocked city drains.⁴ Private companies collected and landfilled waste from educational institutions three days a week.⁵ Without the capacity for plastic recycling facilities, increasing quantities of waste stressed the city's only disposal site.⁶

As it is a small island nation with limited resources and capacity to manage waste, reducing the consumption of SUPs became a priority.

Decisions and actions

In 2019, the Solomon Islands government, United Nations Development Programme (UNDP), and Behavioural Insights Team co-designed the 'Schools Re-thinking Plastic' initiative. The initiative's objective was to deter SUPs and inculcate the habit of reusing among primary and secondary school students. The initiative also indirectly targeted the behavior of school market vendors, which supplied prepackaged food

for school cafeterias. The project replaced single-use food containers with reusable alternatives. To incentivize their uptake, it assessed the efficacy of two interventions: (a) a deposit return scheme (three schools) and (b) a discount scheme (two schools). The organizations jointly piloted the initiative in five Honiara schools (5,307 students, 6.5 percent of Honiara's population) between July and October 2019. To assess the impact of each intervention, the project team assessed SUP consumption before, during, and after the interventions.⁷

The design

The project team undertook extensive consultations before implementing the initiative. Stakeholder engagement was key to onboarding the vendors and gaining support from students and teachers.

Under the deposit return scheme, vendors served food in reusable stainless-steel bowls and incorporated a refundable fee of SBD 1 into the lunch cost (SBD 10; USD 1.20). Students received a fee refund for returning the empty containers at the end of lunch. This scheme provided students with a monetary incentive to return the containers. In tandem, this tactic appealed to students' aversion to losses, as students incurred a loss of SBD 1 if they kept the containers. The deposit acted as an insurance mechanism.⁸ It also sought to change vendor's behavior who had previously packaged food in SUPs.

Under the discount scheme, vendors gave an SBD 1 discount to students who used reusable containers when purchasing their lunch. Students could bring reusable containers from home. Schools also sold reusable containers to students for a fee (SBD 25 or USD 3). These containers pictured school decals to foster a sense of ownership. This intervention appealed to individuals' preference to avoid paying extra fees associated with using single-use containers.

Complementarily, some schools conducted educational campaigns to reinforce the initiative. These campaigns drew attention to the issue of SUPs and asked students to reduce their SUP (bags, straws, cups, water bottles) consumption more broadly.⁹



What behavioral tools are present in this initiative?

FINANCIAL MECHANISMS



Material rewards: Some studies show that monetary incentives can help change SWM behavior.¹⁰ The Schools Re-thinking Plastic initiative used a deposit return scheme, akin to that used by countries to promote container recycling. Under this scheme, vendors added a deposit onto the purchase price of lunches served in reusable containers. Students received this deposit back after they returned the container. The monetary reward made the desired behavior more attractive.



Appealing to loss aversion: People are more sensitive to losses than equivalent gains.¹¹ The Schools Re-thinking Plastic initiative tested the impact of a discount scheme. Under this condition, students who brought reusable containers during lunch service paid less than those who did not. This incentivized students to shift to the desired behavior to avoid higher costs.

SYSTEM DESIGN MECHANISMS



Defaults: Default options take effect if the decision-maker does not specify an alternative.¹² The Schools Re-thinking Plastics initiative changed the default from single-use to reusable lunch containers. This system made it easier for students to change their plastic consumption habits.

Results

The government successfully introduced the Schools Re-thinking Plastic initiative in four schools. SUP usage decreased between 46 and 100 percent, where reported. The deposit return scheme was comparatively more successful than the discount scheme. The deposit refund acted as a positive reinforcement for students to continue using the scheme. The initiative had a 90 percent compliance rate with students'

proper usage and return of the reusable containers. The discount scheme generated mixed results, with greater uptake among younger relative to older students. Both interventions were cost-effective. While vendors incurred an up-front cost to switch to reusable containers, the containers paid for themselves almost immediately and saved vendors SBD 2,305–5,000 per week (approximately USD 278–603) thereafter.¹³ However, this does not include the full cost of reusable containers (that is, the costs associated with washing the containers).

Local market in the village of Batuna, Solomon Islands © Oliver Foerstner | shutterstock.com



The initiative led to several positive indirect effects. Schools that delivered informational campaigns saw reductions in other SUPs the interventions did not target. Additionally, the initiative led to widespread interest in phasing out other cafeteria items packaged in plastic.¹⁴ The initiative similarly influenced the behavior of vendors. Some lunch vendors began educating others about plastic waste, sold more food in reusable containers, or introduced reusable cutlery and cups.¹⁵ Vendors outside the intervention also phased out SUPs. For instance, coconut vendors sold their products without plastic straws.¹⁶

Schools Re-thinking Plastic successfully increased support for additional action to curb SUPs, such as stronger regulations and penalties. Select schools continued to implement both schemes of their own accord.¹⁷ This initiative contributed to a proposed 2020 nationwide ban targeting five types of SUPs.¹⁸



Complementary actions to consider

- » Secondary school students viewed reusable containers as a socially undesirable activity, which hindered the discount scheme's uptake. Practitioners looking to implement similar activities may consider the role of a student's age in SUP consumption and assess the impact of other behavioral approaches. For example, they could try using messengers to change how students perceive reusable containers.
- » To target SUP consumption more broadly, practitioners might consider testing complementary behavioral interventions. For example, conservation programs have effectively used mascots to evoke pride and inspire pro-environmental behavior.¹⁹



Want to know more?

[Schools Rethinking Plastic Initiative](#)

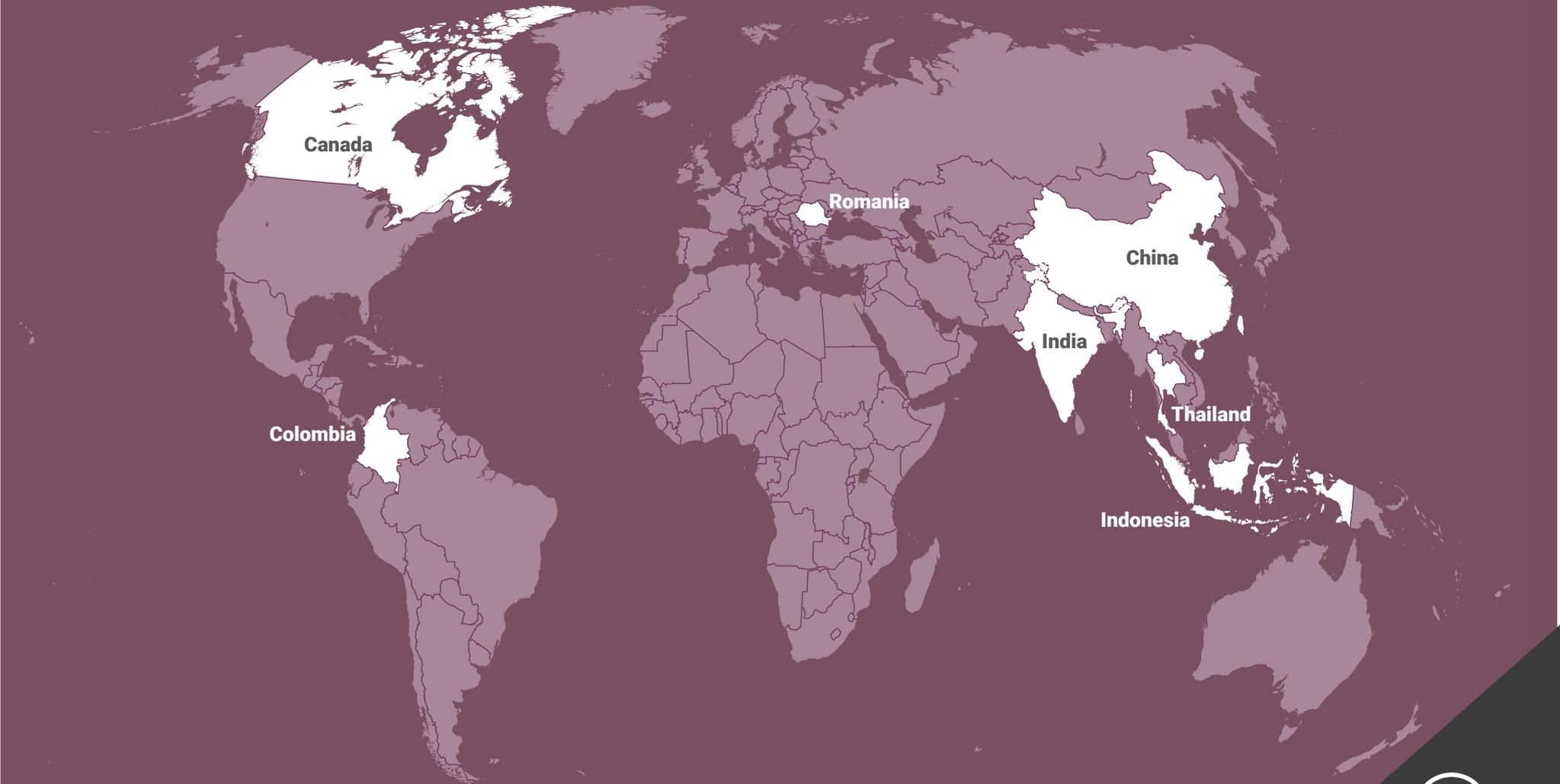


Endnotes

- ¹ Solomon Islands National Statistics Office. Projected population by province 2010–2025. Census Office, Ministry of Finance and Treasury, Solomon Islands Government; Population in 2021: 92,344. Source: Ibid.
- ² Woodruff, A. (2014). *Solid waste management in the Pacific: Solomon Islands Country Snapshot*. Asian Development Bank. Publication Stock No. ARM146614-2. Retrieved from <https://www.adb.org/sites/default/files/publication/42662/solid-waste-management-solomon-islands.pdf>
- ³ Otumawu-Apreku, K. (2020). Solid Waste Management: A Socio-Economic Perspective of Urban and Peri-Urban Communities in Honiara. *International Journal of Environmental Sciences & Natural Resources*, 25(4), 180–192. doi:10.19080/IJESNR.2020.26.556173
- ⁴ British High Commission Honiara. (2022). *UK, D-Cast help students learn how to mitigate plastic pollution*. Government of the United Kingdom. Retrieved from <https://www.gov.uk/government/news/uk-d-cast-help-students-learn-how-to-mitigate-plastic-pollution#:~:text=In%20Honiara%20city%2C%20single%2Duse,issue%20and%20prevent%20plastic%20pollution>
- ⁵ Honiara City Council—Waste Collection in Honiara City. Solomon Islands. Retrieved from <https://honiaracitycouncil.com/index.php/health-and-environment/waste-2/waste-collection-in-honiara-city-2/>
- ⁶ Woodruff, A. (2014). *Solid waste management in the Pacific: Solomon Islands Country Snapshot*. Asian Development Bank. Publication Stock No. ARM146614-2. Retrieved from <https://www.adb.org/sites/default/files/publication/42662/solid-waste-management-solomon-islands.pdf>
- ⁷ The Behavioural Insights Team. (2022). *Schools Rethinking Plastic: Using behavioural insights to reduce single-use plastic waste*. Final analysis and evaluation report.
- ⁸ Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481), 453–458.
- ⁹ The Behavioural Insights Team. (2022). *Schools rethinking plastic: Using behavioural insights to reduce single-use plastic waste*. Final analysis and evaluation report.
- ¹⁰ Viscusi, W. K., Huber, J., & Bell, J. (2012). Alternative policies to increase recycling of plastic water bottles in the United States. *Review of Environmental Economics and Policy*, 6(2), 190–211.
- ¹¹ Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481), 453–458.
- ¹² Pichert, D., & Katsikopoulos, K. V. (2008). Green defaults: Information presentation and pro environmental behaviour. *Journal of environmental psychology*, 28(1), 63–73.
- ¹³ The Behavioural Insights Team (2022). *Schools rethinking plastic: Using behavioural insights to reduce single-use plastic waste*. Final analysis and evaluation report.
- ¹⁴ Schunter, J. (2019). *Changing minds: Testing plastic-free schools in the Solomon Islands*. UNDP Accelerator Lab Pacific. Retrieved from <https://www.undp.org/pacific/news/changing-minds-testing-plastic-free-schools-solomon-islands>
- ¹⁵ The Behavioural Insights Team. (2022). *Schools rethinking plastic: Using behavioural insights to reduce single-use plastic waste*. Final analysis and evaluation report.
- ¹⁶ Menanopo, A. (2019). *St Nicholas College with goal to ban plastic*. Environment Media, Solomon Islands. Retrieved from <https://environment.islesmedia.net/st-nicholas-college-with-goal-to-ban-plastic/>
- ¹⁷ The Behavioural Insights Team. (2020). *Providing a substitute for single-use plastics in the Pacific*. UNDP. Retrieved from <https://www.bi.team/blogs/providing-a-substitute-for-single-use-plastics-in-the-pacific/>
The Behavioural Insights Team (2022). *Schools Rethinking Plastic: Using behavioural insights to reduce single-use plastic waste*. Final analysis and evaluation report.
- ¹⁸ Based on information received from Dr. Karen Tindall, Principal Advisor, the Behavioural Insights Team (January 16, 2023).
- ¹⁹ Green, K. M., DeWan, A., Arias, A. B., & Hayden, D. (2013). Driving adoption of payments for ecosystem services through social marketing. *Conservation Evidence*, 10, 48–52.



2.2.3 Increase segregation of organic and other waste



RETURN TO CASE
SELECTION

Getting people to be more sustainable with their waste disposal in Romania

Main objective: Increase source segregation of organic and other waste

Other objectives: Increase reusing and recycling



Case summary

Sălăcea established a door-to-door collection system after it was accepted into the Zero Waste Cities Network.¹ The system relied on a five-part source segregation scheme (plastic and metal, paper and cardboard, glass, organic waste, and residual waste). The town provided residents with specialized containers for each waste type. As part of this system, the government decreased the size of residual waste containers to deter unnecessary binning. Residents paid lower collection fees if they segregated their waste. The revised collection system was paired with a strong outreach campaign to increase community trust and buy-in. Collectively, these actions facilitated a 55 percent reduction in residual waste collection. Many local municipalities have since replicated Sălăcea's approach.

Challenge statement

Despite investments in infrastructure, Sălăcea grappled with waste management. The waste collection system incentivized the disposal of residual waste relative to recyclables by the former's increased collection frequency. Low source segregation rates compromised the city's ability to meet Romania's recycling targets.

Context and description of challenges

Sălăcea is a small Romanian town with rural characteristics of life (2011 population: 3,036)² that generated approximately 330 tons of MSW annually (0.3 kg per capita per day) (2018).³ Historically, residents separated waste into recyclable and mixed waste and disposed of it in street bins and containers. Residents paid a monthly fee of RON 5 (approximately USD 1) for waste services.⁴

Under the historical system, improper waste disposal practices were common. Low stakeholder engagement contributed to a low (8.4 percent) source segregation rate. The system also disincentivized recycling; the town collected residual waste at twice the rate as recyclables (twice versus once a month). Additionally, waste collection companies lacked incentives to collect and transport



source-segregated waste to relevant facilities.⁵ Consequently, Sălăcea's recycling rate (<1 percent)⁶ stood in stark contrast to both the Romanian (11.1 percent) and EU (46.4 percent) 2018 averages.⁷

In 2020, Romania introduced a mandatory 50 percent reuse and recycling target for municipal waste (target set out in Article 11(2)(a) of Waste Framework Directive [WFD] 2008/98/EC).⁸ The country faced a daily penalty (EUR 200,000) beginning in 2021 if it failed to comply.⁹ The directive motivated Sălăcea to fast-track its zero-waste transition.

Decisions and actions

Following other Romanian cities, Sălăcea joined the international Zero Waste Cities Network in 2018 to aid their transition to a circular zero-waste economy. Sălăcea undertook a 21-step process to obtain zero-waste certification.¹⁰ This included auditing existing SWM infrastructure, creating context-specific objectives, and establishing a working group. The working group brought together NGOs, locals, experts from the municipality, and private SWM operators to guide the municipality's decision-making process.

Sălăcea's zero-waste goals included a 50 percent reduction in waste generation, a 100 percent source segregation rate, and a 90 percent repair, reuse, and recycling rate. Sălăcea implemented a townwide door-to-door waste collection system, modeled after a similar-size Italian city (Rogno). The working group chose Rogno given its similar culture, way of living, and behavior to that of Sălăcea. These similarities increased residents' receptivity to source segregation. The working group used Rogno as evidence to Sălăcea residents that a revised system was possible.¹¹

Under the revised SWM system, households, educational institutions, and commercial entities separated their waste into five streams (residual waste, organic waste, plastic and metal, glass, and paper and cardboard). Each entity paid different fees relative to their residual waste volume.¹² Alongside structural changes to the MSWM system, Sălăcea undertook a four-week educational campaign preceding the

system's launch. The campaign promoted citizen involvement and provided information on waste separation practices.¹³ The program was initially introduced as a three-month pilot covering the whole town, following which it became permanent. Sălăcea covered the system's capital investment costs of approximately RON 92,600 (approximately USD 24,000) with the support of external donations.¹⁴

As of 2022, the household waste collection fee was approximately RON 12 (USD 2.50) per month. The town included the fee in mandatory monthly bills.¹⁵ Household fees covered one-third of the SWM system costs. An EPR scheme and profits from recyclables provided additional funding.¹⁶

The design

The city prioritized stakeholder engagement in the system's implementation. It drew on the expertise of waste operators, treatment facilities, and academics. Citizen involvement was paramount to the revised collection system's success. Community leaders engaged in a four-week education initiative before the system's launch. Authorities and influential figures met with community members at highly trafficked locations including the church, the cultural center, schools, and pubs.¹⁷ They discussed the new system and provided demonstrations on proper waste sorting using the new waste bins. In discussions with residents, officials used selective message framings.¹⁸ Outreach initiatives paid special attention to instilling proper source separation practices in children (verbally and using informational pamphlets) and explained the importance of good waste management for their future. Children then acted as change agents and encouraged their parents to participate. As an example, the government rewarded children who brought in used batteries with bonbons.¹⁹

Local volunteers supported the system's implementation and were essential to building community trust. Volunteers distributed waste disposal kits (three bins, two types of bags, and information) to residents for free, and answered questions about the new collection system.²⁰ Residual waste bins contained RFID chips. The collection authority used the chips to monitor the volume of residual waste disposed of per household.²¹ Under the revised system, the total volume of waste bins remained the



same as in the previous system but was distributed across several types of waste containers.²² Yellow bags collected plastic and metal. Blue bags collected paper and cardboard. Two brown bins (23 L and 10 L) collected organic waste.²³ The city repurposed the historically used 120 L mixed waste bin for glass waste. Lastly, the town encouraged citizens to generate less waste by issuing 40 L residual waste bins (one-third of the previous bin size). Residents were limited in the quantity of residual but not recyclable waste they disposed of each month.²⁴ All actors (from educational institutions to public sector and commercial entities) participated in the new system. The involvement of authorities was important to establish a positive social norm around source segregation and co-opt household participation.

Sălăcea charged residents double the monthly fee if they discarded their residual waste in an improper bin. This acted as a negative incentive. The bins and bags of different colors and sizes provided physical cues to guide waste disposal behavior and prioritize recycling and segregation over residual waste disposal. The waste collection authority encouraged residents to hold waste collection trucks accountable by taking photos of any unlawful activities.²⁵ Sălăcea also used negative incentives to deter littering. Government officials mailed litter to the resident's address, along with a fine (EUR 100 or USD 106).²⁶

The collection company collected plastic, metal, paper, organic, and residual waste twice a month and glass every two months.²⁷ Segregated waste was transferred to a treatment and disposal company. The latter handled end-of-life treatment, including commercial composting, which companies sold as fertilizer. In addition to door-to-door organic waste collection, Sălăcea encouraged residents to participate in home composting. To make it easy for residents, the city distributed 400 wooden crates to enrolled households.²⁸ Residents were encouraged to use the prepared humus as garden fertilizer. In addition to the source separation scheme, the city also set up a collection center for construction and hazardous waste, as well as textiles and furniture that needed repair or were reusable. Residents could dispose of these items free-of-charge, so long as they participated in the source segregation scheme.²⁹ This setup further reduced the amount of waste landfilled.

A waste collection fee supported the expanded system and operated under a PAYT mechanism.³⁰ Sălăcea grandfathered residents who participated in source separation at the old rate (approximately USD 1 per month). If residents chose not to participate, they contributed twice the monthly rate. After the first year, all residents paid the same cost for waste services.³¹



Note: Waste disposal kits included bins of varying sizes and two types of plastic bags (yellow and blue). Residents had the option of two brown bins (a solid and aerated bin) for organic waste. Source: ECO Bihor.³²



What behavioral tools are present in this initiative?

FINANCIAL MECHANISMS



Appealing to loss aversion: Research suggests that individuals are motivated to avoid potential losses.³³ In this case study, citizens could opt in to a tax to support the revised MSW collection service. If they did, residents paid a lower monthly fee than those who did not segregate their waste.

This encouraged residents to practice source separation to avoid incurring additional monetary losses. Many residents saw opting out of the new system as the equivalent of throwing away money.



Negative Incentives: The literature suggests that fines can deter littering, provided they are well enforced, and residents are aware of them.³⁴ The present case study applied this tool in a traditional way. Under Sălăcea's historical system, citizens put most waste in residual bins. When authorities reduced the size of these bins, citizens grappled with how to dispose of their residual waste. In cases where residents generated more residual waste than their bin allowed, some residents improperly disposed of waste in fields and open spaces. Authorities collected and used information contained in the litter to identify individual residents. Residents who littered or dumped their waste in the open were penalized with a fine (sent to their home with the litter) to deter future infractions. The size of the fine (EUR 100) implied that the act was both relatively uncommon and unacceptable.



Material rewards: In certain contexts, material and monetary incentives can promote the uptake of positive MSW behaviors.³⁵ The present case study applied this tool in a traditional way. To promote source segregation, Sălăcea appealed to homeowners' tendencies to avoid monetary losses. However, officials used a different tactic to incentivize children's compliance. To reward children for recycling, they received a bonbon per used battery that they brought to the school. However, material and monetary incentives should be used cautiously to promote SWM behaviors. In some cases, once officials remove the reward, individuals stop performing the target behavior.

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: The design of waste management programs can influence their uptake.³⁶ In Sălăcea, the town provided households with designated waste bins free of charge, eliminating the need for residents to procure their own. Second, volunteers delivered these bins to households. This service eliminated the time and hassle that residents would have incurred if they were required to pick these containers up from a centralized location.



Timely messages: Visual prompts can serve as a timely reminder to engage in waste-related behaviors.³⁷ In Sălăcea, residents received new waste bins and bags. These containers included stickers that identified the waste type in Romanian, Hungarian, and Roma languages to accommodate the town's multilingualism. They also showed images of waste each bin could accommodate. For instance, organic waste bins contained icons of tea bags, banana peels, apple cores, egg shells, and leftover bread. These stickers reduced any uncertainty surrounding which items went into which bin.



Physical cues: The physical characteristics of a given environment can shift waste disposal practices.³⁸ Sălăcea redesigned its waste collection bins to guide residents' disposal practices. The town provided residents with bins of several sizes and colors for waste products. Previously, residents disposed of residual waste in 120 L bins. Notably, under the revised system, Sălăcea provided residents with residual waste bins that were one-third the size of the previous mixed waste bins. These new waste bins implicitly disrupted habitual residual waste disposal practices. These residual waste bins deterred residents from unnecessarily disposing of other types of waste and actively prompted residents to recycle.



Accessible services: Research suggests that access to convenient waste disposal services can affect whether residents participate.³⁹ When Sălăcea revised its SWM system, it transitioned from street bins and containers to a five-part door-to-door collection system. Under this scheme, the collection agency collected glass every two months, and all other types of waste (that is, organic, residual, plastic and metal; paper and cardboard waste) twice a month. The door-to-door collection system increased the perceived convenience of waste disposal and decreased any extra real or perceived effort in recycling.



SOCIAL AND MOTIVATIONAL MECHANISMS



Messengers: Research suggests that the credibility of the individual communicating information can influence behavior.⁴⁰ The present case used authority figures (for example, the town mayor, priest, school director, and private waste management operators) and change agents (that is, children and volunteers) to change waste management practices. Influential figures and volunteers engaged in an educational campaign focusing on different age subsets (children, adults, elders). For instance, priests of different denominations gave speeches about waste and presented the upgraded waste bins. The town also held gatherings with the mayor in local bars and common gathering places. Trained local volunteers engaged in door-to-door outreach and answered residents' questions on the new system. Children were disproportionately receptive to outreach programming. Once educated, authorities sent children home with a brochure containing information on how the SWM system would change. Children subsequently acted as change agents, instilling proper waste practices in their families.



Creating accountability: Studies suggest that an individual's desire to maintain a good public image leads to socially acceptable behaviors, especially when those behaviors are observable.⁴¹ In the current case study, residents were reticent to segregate their waste as they feared that waste collectors would not keep waste streams separate. To ease their concerns, the authority encouraged residents to take photos if collection agents pooled previously segregated waste. Waste collectors became aware that their actions would be socially policed;

this reinforced proper collection behavior. In tandem, this accountability mechanism increased trust among residents and fostered their compliance with the new system.



Frame messaging to personal values, identities, or interests: Research indicates that information presentation can mediate willingness to engage in waste-related behaviors.⁴² Sălăcea is a historic town steeped in tradition. Outreach programming specifically appealed to residents' identities and ties to their town. Before the intervention, residents' ingrained waste management practices degraded the environment. Outreach appealed to residents' desires to leave their children a better environment to convince them to separate their waste.⁴³



Social Norms: Research suggests that individuals' beliefs about how others behave influence their waste management behaviors,⁴⁴ particularly when the behavior is visible.⁴⁵ In Sălăcea, the mayor ensured that all public entities (for example, police stations and the mayoral office) received and utilized the five-bin systems for their waste. This system created a positive social norm around source segregation. Residents could see that the revised system applied equally to all parties and saw a positive example of handling waste from authorities. Similarly, waste disposal is a visible behavior. Households that participated in the revised five-bin system were different from those that did not (that is, from the different colored and sized bins and bags). On collection days, residents could look at neighboring households and see that others segregated their waste, which created a social norm.



Preconditions and challenges

- » The government repurposed residual waste bins for glass recyclables. However, residents were disinclined to use smaller bins for their residual waste, which led to noncompliance. Changing bin sizes alone was insufficient to break ingrained waste management practices.
- » Both the mayor's and private waste collector's commitment to a zero-waste strategy were instrumental in the pilot's design, rollout, and success. Among other things, these agents demonstrated proper waste segregation practices to residents.

- » Authorities' dedication to source segregation and the mayor's support in championing the revised SWM were essential to its success.
- » Before the pilot, the treatment and disposal company upgraded its infrastructure to accommodate source-segregated waste (for example, by creating composting and recycling facilities). Sălăcea's source segregation initiative would have been infeasible without the necessary infrastructure to handle waste after collection.





The director of ECO BIHOR presenting the sorting system in a school. @Zero Waste Romania

Results

Sălăcea demonstrated that towns can transform their SWM systems in under one year. It has become a model city for waste management and is the first Romanian municipality to compost source-segregated organic waste. The three-month pilot reduced the volume of residual waste collected by 55 percent and led to a 97 percent participation rate. As of 2022, 62.9 percent of household waste was segregated at source, up from 15.1 percent pre-intervention. About 70 percent of households engaged in home composting. The source segregation scheme also decreased SWM costs associated with landfilling (for example, costs related to landfill taxes, gate fees, larger trucks, and fuel).⁴⁶

Despite the city's attempt to mitigate residual waste by using smaller bins, residents' established habits were difficult to change. About 15 percent of residents improperly used the 120 L bins for residual waste.⁴⁷ Following the pilot's completion, authorities removed the 120 L bin from the disposal kit (Figure 13). Penalties successfully deterred littering behavior, with the number of fines declining in the years following the pilot (from 26 in 2018 to approximately 3 in 2022). Following Sălăcea's success, Bihor County replicated the five-fraction source segregation system across more than 100 municipalities as of 2020 (400,000+ residents). Based on Sălăcea's experience, the Romanian government will create 300+ collection centers throughout the country. Sălăcea is exploring additional opportunities to promote a circular economy, such as a new recycling facility for textiles.⁴⁸ Other small-size towns could leverage best practices from Sălăcea in upgrading their SWM systems.



Complementary actions to consider

- » Practitioners interested in applying a similar strategy could test behavioral strategies to improve residents' compliance⁴⁹ with the new system. Alongside structural changes, these tools can support shifts in waste management behaviors, especially for well-established waste disposal habits. For instance, they could test the effect of motivational messages that leverage different behavioral insights on compliance.



Want to know more?

[Zero Waste Romania](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Zero Waste Europe. Retrieved from <https://zerowasteurope.eu/>
- ² National Institute of Statistics. (2011). *Populația stabilă pe județe, municipii, orașe și localități componente la RPL_2011* [Population and housing census 2011]. Romania. Population in 2019: 3181, Source: Rastei, E., McQuibban, J. (2019). *Case study 12: The story of Sălăcea*. Zero Waste Europe. Retrieved from https://zerowasteurope.eu/wp-content/uploads/2019/09/zero_waste_europe_cs12_salacea_en.pdf
- ³ Marinela, B., Zoltan, P., Francisc, B., & Klara, H. (2018). *Implementation of zero waste concept in Eastern Europe small communities: Case study: Sălăcea Village, Bihor County*. Annals of the University of Oradea, Fascicle: Environmental Protection Vol. XXX. Retrieved from https://protmed.uroadea.ro/facultate/publicatii/protectia_mediului/2018A/im/01.%20Bodog%20Marinela%201.pdf
- ⁴ Rastei, E., McQuibban, J. (2019). *Case study 12: The story of Sălăcea*. Zero Waste Europe. Retrieved from https://zerowasteurope.eu/wp-content/uploads/2019/09/zero_waste_europe_cs12_salacea_en.pdf
- ⁵ Based on information received from Pászta Zoltán, Manager at ECO BIHOR (October 31, 2022).
- ⁶ Rastei, E., & McQuibban, J. (2019). *Case study 12: The story of Sălăcea*. Zero Waste Europe. Retrieved from https://zerowasteurope.eu/wp-content/uploads/2019/09/zero_waste_europe_cs12_salacea_en.pdf
- ⁷ Eurostat Statistics—Recycling Rate of Municipal Waste. Retrieved from https://ec.europa.eu/eurostat/databrowser/view/sdg_11_60/default/table?lang=en
- ⁸ European Parliament. (2008). Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance). *Official Journal of the European Union*.
- ⁹ Government of Romania. (2016). *Ordonanța de urgență nr. 68/2016 pentru modificarea și completarea Legii nr. 211/2011 privind regimul deșeurilor* [Emergency Ordinance no. 68/2016 for the amendment and completion of Law no. 211/2011 on the waste regime].
- ¹⁰ Dr. Favoino, E., Connett, P., & Rastei, E. (n.d.) *21 de Pași Spre Zero Waste Comunități & Orașe* [21 steps to zero waste communities & cities]. Zero Waste Romania. Retrieved from <https://www.zerowasteromania.org/wp-content/uploads/2021/04/21-de-PASI-SPRE-ZERO-WASTE-4-1.pdf>.
- ¹¹ Based on information received from Pászta Zoltán, Manager at ECO BIHOR (December 19, 2022).
- ¹² Ibid.
- ¹³ Marinela, B., Zoltan, P., Francisc, B., & Klara, H. (2018). *Implementation of zero waste concept in Eastern Europe small communities: Case study: Sălăcea Village, Bihor County*. Annals of the University of Oradea, Fascicle: Environmental Protection Vol. XXX. Retrieved from https://protmed.uroadea.ro/facultate/publicatii/protectia_mediului/2018A/im/01.%20Bodog%20Marinela%201.pdf
- ¹⁴ Zero Waste Romania. (2020). *Sălăcea spre zero waste* [Sălăcea to zero waste]. Retrieved from <https://www.zerowasteromania.org/salacea-spre-zero-waste/>
- ¹⁵ Based on information received from Pászta Zoltán, Manager at ECO BIHOR (October 31, 2022).
- ¹⁶ Based on information received from Pászta Zoltán, Manager at ECO BIHOR (December 19, 2022).
- ¹⁷ Rastei, E., McQuibban, J. (2019). *Case study 12: The story of Sălăcea*. Zero Waste Europe. Retrieved from https://zerowasteurope.eu/wp-content/uploads/2019/09/zero_waste_europe_cs12_salacea_en.pdf
- ¹⁸ Based on information received from Béla Horváth, Mayor of Sălăcea (December 19, 2022).
- ¹⁹ Based on information received from Béla Horváth, Mayor of Sălăcea (December 19, 2022).
- ²⁰ Zero Waste Romania. (2020). *Sălăcea spre zero waste* [Sălăcea to zero waste]. Retrieved from <https://www.zerowasteromania.org/salacea-spre-zero-waste/>
- ²¹ Based on information received from Pászta Zoltán, Manager at ECO BIHOR (October 31, 2022).
- ²² Ibid.
- ²³ Rastei, E., Leonte, A., and Breniuc, I. (n.d.) *CS #12: The case of Sălăcea*. Circular Construct. Retrieved from <http://www.circularconstruct.ircem.ro/wp-content/uploads/2019/07/Zoltan-PASZTAI-ENG.pdf>.
- ²⁴ Based on information received from Pászta Zoltán, Manager at ECO BIHOR (December 19, 2022).
- ²⁵ Based on information received from Pászta Zoltán, Manager at ECO BIHOR (October 31, 2022).
- ²⁶ Based on information received from Béla Horváth, Mayor of Sălăcea (December 19, 2022).
- ²⁷ Zero Waste Romania. (2020). *Sălăcea spre zero waste* [Sălăcea to zero waste]. Retrieved from <https://www.zerowasteromania.org/salacea-spre-zero-waste/>
- ²⁸ Frincu, M. (2019). *Going from 0 to 40% waste recycling rate within 3 months*. Interregeurope.
- ²⁹ Based on information received from Béla Horváth, Mayor of Sălăcea (December 19, 2022).
- ³⁰ Parliament of Romania. (2011). *Lege Nr. 211 din 15 noiembrie 2011 privind regimul deșeurilor* [Law no. 211 of 15 November 2011 on the waste regime].
- ³¹ Based on information received from Béla Horváth, Mayor of Sălăcea (December 19, 2022).
- ³² ECO Bihor: The private company responsible for the collection and treatment of MSW in Sălăcea. (<https://www.ave-bihor.ro/Home/Services#Colectare>)
- ³³ Cheng, T., Woon, D. K., & Lynes, J. K. (2011). The use of message framing in the promotion of environmentally sustainable behaviors. *Social Marketing Quarterly*, 17(2), 48–62.
- ³⁴ Lyndhurst, B. (2012). *Rapid evidence review of littering behaviour and anti-litter policies*. Stirling: Zero Waste Scotland.



- Lewis, A., Turton, P., and Sweetman, T. (2009) *Litterbugs. How to deal with the problem of littering*. London: Policy Exchange.
- ³⁵ Abila, B., & Kantola, J. (2019). The perceived role of financial incentives in promoting waste recycling—Empirical evidence from Finland. *Recycling*, 4(1), 4. doi:10.3390/recycling4010004
- ³⁶ Johansson, K. (2016). Understanding recycling behavior: A study of motivational factors behind waste recycling. *WIT Transactions on Ecology and the Environment*, 202, 401–414.
- ³⁷ Shearer, L., Gatersleben, B., Morse, S., Smyth, M., & Hunt, S. (2017). A problem unstuck? Evaluating the effectiveness of sticker prompts for encouraging household food waste recycling behaviour. *Waste management*, 60, 164–172.
- United Nations Development Programme. (2021). *Social experiment on household waste management: Experiment report*. Retrieved from <https://www.undp.org/bhutan/publications/social-experiment-household-waste-management>
- ³⁸ B. Platt. (2002). *Mini trash bins help office settings reduce waste 50 percent and more: A model for local government recycling and waste reduction*. California Integrated Waste Management Board, 1–15.
- ³⁹ Prime Minister's Strategy Unit. (2002). *Waste Not, Want Not: A strategy for tackling the waste problem in England*. Crown, Great Britain.
- ⁴⁰ Eagly, A. H., & Chaiken, S. (1975). An attribution analysis of the effect of communicator characteristics on opinion change: The case of communicator attractiveness. *Journal of Personality and Social Psychology*, 32, 136–144.
- ⁴¹ Ekström, M. (2012). Do watching eyes affect charitable giving? Evidence from a field experiment. *Experimental Economics*, 15(3), 530–546.
- ⁴² Yao, L., Liang, Y., Li, X., Wang, Z., Jiang, S., Yan, C. (2022). The influence of message framing on project managers' behavioral intentions regarding construction waste reduction. *Buildings*, 12, 1266. doi:10.3390/buildings12081266
- ⁴³ Based on information received from Béla Horváth, Mayor of Sălăcea (December 19, 2022).
- ⁴⁴ Schultz, P.W. (2002). Knowledge, information, and household recycling: Examining the knowledge-deficit model of behaviour change. In T. Dietz & P. C. Stern (Eds.), *New tools for environmental protection: Education, information, and voluntary measures*. National Academy Press, Washington, DC.
- ⁴⁵ Barr, S., Ford, N. J., & Gilg, A. (2003). Attitudes towards recycling household waste in Exeter, Devon: quantitative and qualitative approaches. *Local Environ.*, 8(4), 407–421.
- ⁴⁶ Ibid; Based on information received from Béla Horváth, Mayor of Sălăcea (December 19, 2022).
- ⁴⁷ Zero Waste Romania. (2020). *Sălăcea spre zero waste* [Sălăcea to zero waste]. Retrieved from <https://www.zerowasteromania.org/salacea-spre-zero-waste/>
- ⁴⁸ Based on information received from Béla Horváth, Mayor of Sălăcea and Pásztai Zoltán, Manager at ECO BIHOR (October 31 and December 19, 2022).
- ⁴⁹ Based on information received from Pásztai Zoltán, Manager at ECO BIHOR (October 31, 2022).



Getting people to be more sustainable with their waste disposal in Indonesia

Main objective: Increase source segregation of organic and other waste

Other objectives: Increase reusing and recycling



Case summary

The city of Surabaya created the Surabaya Green and Clean (SGC) initiative to improve community-based SWM. The SGC initiative promoted source segregation, composting, recycling, and general environmental cleanliness. Several tactics were used to mobilize community-led MSWM, including competitions, waste banks, training, and communications. Grassroots action and strong governance worked in concert to improve waste-related behaviors. Over more than a decade, the initiative decreased open dumping and increased waste diversion and community engagement. The initiative has become a model for community SWM schemes throughout Asia.

Challenge statement

SWM in Surabaya was riddled with issues related to administration, citizen engagement, overburdened landfills, and limited technical resources. This constrained the city's capacity to collect, treat, and dispose of waste. Consequently, poorer neighborhoods were typically underserved. Treatment facilities could not accommodate the increasing volumes of waste.



Trash bins for sorting in Surabaya, Indonesia. ©Singgih Dwipantoro, istock.com



Context and description of challenges

Surabaya is Indonesia's second-largest city. Its population reached approximately 2.6 million in 2001.¹ At the time, the city generated approximately 0.7 kg of solid waste per capita per day.² The government disposed of waste in two sanitary landfills. In 2001, one of the landfills (Keputih) closed following residents' complaints about persistent odors and pollution.³ The closure intensified waste issues within the city. The sole landfill and the city's treatment infrastructure could not handle the larger waste volumes. Lack of stakeholder involvement in waste minimization served as another barrier to improving the situation.⁴

In the early 2000s, 60 percent of residents lived in *kampungs*.⁵ These informal urban settlements were built outside the formal planning system and were typically inhabited by lower-income residents.⁶ Residents in *kampungs* had strong social ties and developed a cohesive network of community-based initiatives.⁷ In the absence of municipal waste services, *kampungs* developed local waste management systems. At the same time, an evolving legal framework in Indonesia defined stakeholder responsibilities for MSWM. The framework sought to integrate the 3R principle into SWM services and created the necessary preconditions for subsequent SWM activities in Surabaya. More broadly, NGOs, community groups, and corporate entities were conducting SWM activities throughout Surabaya. These groups independently sought to increase environmental awareness and build residents' capacity to carry out waste management activities. However, they had no formal government banner under which to conduct activities.

In 2002, Surabaya collaborated with the city of Kitakyushu, Japan, through the Kitakyushu International Techno-cooperative Association (KITA) under the Green Sister City program. Kitakyushu was an SWM pioneer in its own right and widely recognized in Japan. It developed the Green Sister City program to provide technical and capacity-building support to cities, including Surabaya.⁸ Before implementing new measures in the city, KITA assessed existing SWM practices and citizens' attitudes. Findings indicated that community service was a vital part of *kampung*

culture. Approximately 42.3 percent of respondents participated in community service, and an astonishing approximately 82 percent participated in waste collection activities. *Kampung* women were especially willing to participate in the community waste management system.⁹

These results informed a pilot project in one *kampung*. The pilot taught residents how to segregate their waste and a local NGO (Pusdakota) handled waste collection. The pilot recruited women as change agents who hosted meetings and educated other households about composting.¹⁰ Since women are disproportionately responsible for household SWM in Indonesia¹¹, it was important that the pilot actively educate women and gain their support. The above activities paved the way for more holistic initiatives, subject to the present case study.

Decisions and actions

In 2004, the government established the Surabaya Green and Clean (SGC) initiative. This community-based waste management program sought to increase source segregation, composting, and recycling.¹² The program—which relied heavily on bottom-up grassroots action—departed from previous top-down environmental management initiatives as it harmonized the SWM work of different actors under a single platform. Under the SGC banner, each actor had differentiated but interconnected responsibilities. Numerous partners supported the SGC initiative, including women's groups (Pemberdayaan Kesejahteraan Keluarga), the private sector, NGOs, Kitakyushu city, and government institutions.¹³ For instance, Unilever Indonesia's non-profit arm, ULI Peduli Foundation, and Kitakyushu city offered technical and financial support, while NGOs helped judge the program's competitions and supported environmental education initiatives.

Since 2004, numerous actors undertook activities under the SGC banner. This case study highlights several core initiatives that have enhanced the SGC's reach such as the creation of the SGC competition, mainstreaming of the waste bank model, and the introduction of the Takakura composting program. First, the annual competition promoted the intersection of art, environmentalism, and economic sustainability. It



assessed communities on general cleanliness as well as waste management and sanitation activities. Second, the waste bank model was expanded to Surabaya to create a market for recyclable waste.¹⁴ It operated through a reward-based system wherein residents deposited segregated recyclables and received cash in exchange.¹⁵ Finally, authorities introduced the Takakura composting program to provide a low-cost way to increase organic waste diversion rates. Collectively, these activities were designed to reduce landfilling and boost community engagement in waste management.

In 2019, the SGC program merged with another government-led initiative called *Free from Waste* to form the *Surabaya Smart City* program. In addition to SWM, the new program focused on poverty, economic empowerment, community health, and food security. The *Surabaya Smart City* program continues to hold an annual competition, the scope of which is nearly identical to the original SGC competition. The *Surabaya Smart City* program engages almost all municipal agencies in Surabaya and has evolved into the government's flagship program.

The design

The SGC initiative promoted more sustainable SWM practices through competitions, training, diversion programs, and communications. First, the SGC initiative ran an annual competition among neighborhood associations (*Rukun Warga*) to foster grassroots action and enable historically underserved regions to engage with the MSWM system. All neighborhood associations could participate, but the competition targeted those in *kampungs*. To initiate the competition and increase its visibility, the mayor organized an opening ceremony. All heads of associations and *kampungs* attended as additional testimony to its importance for their communities. Once the competition was announced by the mayor, *kampung* leaders - who oversaw several neighborhood associations - secured commitments and created a division of labor among residents.¹⁶ Each *kampung* head nominated three neighborhood associations to compete after engaging in several rounds of community consultations.¹⁷ Residents were actively involved in discussions about environmental issues and how they could address them, which helped foster ownership around the intended

activities. The competition's theme varied each year. The criteria on which neighborhood associations were assessed similarly varied but have included metrics on source segregation, recycling, composting, and waste collection; neighborhood waste bank operations; the presence of litter; and general neighborhood cleanliness.¹⁸

Throughout the competition, *kampung* heads were responsible for monitoring activities, managing stakeholders, and aiding neighborhood associations. Neighborhood associations underwent two elimination rounds to identify the Top 500 and Top 200 neighborhoods. The final competition round assessed innovations in environmental and waste management activities.¹⁹ In each round, NGOs organized mandatory capacity-building workshops on topics such as recycling, waste reduction, and composting. Workshops equipped residents with skillsets on the latest SWM innovations. The government issued prizes at the end of each competition. Top-ranked neighborhood associations received social recognition, trophies, cash, and composting and tree planting equipment.²⁰ The government encouraged winning *kampungs* to help others improve their respective neighborhoods.²¹

In parallel to the competition, the SGC conducted widespread training. Both authority figures (heads of *kampungs*) and informal change agents (environmental cadres, women of *kampungs*, and NGOs) were used to facilitate training and increase community involvement in SWM.²² Environmental cadres - most of whom were women and volunteered their time - acted as community mobilizers. They eventually became the backbone of the SGC.²³ The government selected members of the cadre network based on their previous engagement in environmental advocacy activities. Initially, the ULIPeduli Foundation and local NGOs financed the initiation of the network of environmental cadres. The foundation also established a training program called DIKLATIF²⁴ to teach cadres effective communication, teamwork, leadership, and SWM skills.²⁵ Environmental cadres in turn educated women's groups and individual residents on waste management techniques such as source segregation. Cadres also helped residents transform waste into handicrafts to generate additional revenue streams.²⁶ NGOs similarly conducted on-site training and capacity building in *kampungs* on waste bank management, waste upcycling, composting, and wastewater management.²⁷





Man scavenging for plastic bottles in Surabaya, Indonesia. © bubu.com, shutterstock

Third, the SGC introduced waste diversion solutions, including waste banks and composting programs. Waste banks created a market for recyclable waste and simultaneously diverted it from landfills. The banks provided supplemental income for residents and for this reason were more popular in *kampung*s than higher-income neighborhoods. Grassroots environmental NGOs and environmental cadres

helped interested neighborhoods open and operate waste banks. Further, local NGOs helped residents procure necessary facilities and provided basic equipment such as account books and weight scales. Some NGOs also ran intermediary waste banks that collected waste from smaller, community-level waste banks.²⁸ To provide a convenient and low-cost solution for organic waste, Surabaya and Kitakyushu city introduced the Takakura composting method. Surabaya and the ULI Peduli Foundation distributed approximately 80,000 Takakura bins to 40,000 households over five years.²⁹ Residents participated by placing up to approximately 1.2 kg organic waste a day in plastic bins (40 x 25 x 70 cm). The bin's body and lid contained holes to increase the flow of oxygen, initiating the composting process.³⁰ Residents periodically added fermentative bacteria made from local materials (yogurt, fruits, rice husk) which reduced composting time to approximately four days. As a co-benefit, this method prevented odors and flies. The Center for Urban Community Empowerment (Pusdakota Ubaya), the government, NGOs, and environmental cadres educated residents on the Takakura method. The center similarly helped adapt the Japanese approach to the Indonesian climate and culture.³¹ In addition to home composting bins, 70 L composting bins were also installed in communities. Residents were initially apprehensive about composting, which they deemed to be time-consuming, and attracting insects.³² Over time, experience with the method shifted their mindset.³³

Finally, the SGC program was popularized across and mass media (newspapers, television, radio, and magazines)³⁴ and comic books.³⁵ The Jawa Pos daily newspaper devoted a special column to the SGC initiative which provided regular updates on program activities and the annual competition.³⁶ For example, the newspaper printed SGC competition participation forms. The competition required candidates to tear out and submit these forms. The newspaper's support also provided ample exposure and public recognition for competition participants, which acted as a reward in itself. The prospect of being covered in a newspaper article or on TV sustained participants' enthusiasm.



What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Social comparison: The literature suggests that social comparisons and relative ranking systems can elicit competitive behavior.³⁷ The SGC competition benchmarked neighborhood associations against one another. *Kampung* winners subsequently assisted lower-ranked *kampungs* in implementing improvements. Throughout the competition, *kampungs* could also compare their progress to other *kampungs* and implement changes accordingly.



Messengers: Receptivity to and adoption of pro-environmental behaviors can depend on the identity of the person who conveys information.³⁸ The SGC initiative used change agents and influential figures to improve community waste management. *Kampung* leaders established community buy-in, led community discussions, monitored activities, managed stakeholders, mediated disagreements, and secured assistance from environmental cadres. Environmental cadres also educated residents on proper waste management practices. The consistency of cadres underpinned residents' adoption of better SWM behaviors. Eventually, residents saw them as informal authority figures and environmental experts given their position in the community. Residents subsequently deferred to their guidance *kampungs*. Cadres also appointed neighborhood women 'deputies' to inspire broader change among their networks.³⁹



Frame messaging to personal values, identities, or interests: How actors present an issue to an audience can mediate their interest in the topic.⁴⁰ In some *kampungs*, cadres framed the SGC initiative to remove the negative 'slum' stigma associated with their neighborhoods. This tactic helped residents connect with the initiative and its benefits in a way they may not have otherwise. The government also drew on the Indonesian tradition of 'kerja bakti' - the practice of volunteering for community welfare - to increase community engagement.⁴¹



Social Norms: Social norms can have valuable impacts on pro-environmental behavior, especially when actions are visible and have local effects.⁴² In the current case study, several social norms propelled the SGC initiative's adoption. Once residents started to engage in SWM activities, other community members could see this change and followed suit. Similarly, participation in the SGC initiative established a positive social norm around expected waste-related activities and community cleanliness. Once neighborhood cleanliness improved, a precedence

was set for residents to maintain communal areas. Lastly, news outlets dedicated full-page newspaper coverage to highlight citizens' waste activities which provided positive examples of broader community involvement in waste management.



Creating accountability: Studies suggest that an individual's desire to maintain a good public image leads to socially acceptable behaviors, especially when those behaviors are observable.⁴³ *Kampung* heads oversaw and fostered accountability among neighborhood associations. Their activities were overseen by the city government. In cases of noncompliance, the mayor had the authority to discipline or replace *kampung* heads. This system ensured that *kampung* leaders engaged in SGC activities and increased SWM participation among neighborhood associations in their jurisdiction.



Non-material rewards: Public recognition can replace a material reward to encourage pro-environmental behavior.⁴⁴ Top-ranked neighborhood associations in the SGC competitions received social recognition. Additionally, competition winners were interviewed on the radio, published in newspapers, and broadcasted by TV stations. The public recognition provided a strong incentive for continued participation in the SGC initiative.

FINANCIAL MECHANISMS



Material rewards: Some studies have shown that incentives can improve waste-related behaviors.⁴⁵ The present case study applied this tool in a traditional way. The SGC competition issued several rewards to top-ranked neighborhood associations. Rewards included prizes, trophies, cash, and equipment for composting and tree planting. These rewards incentivized subsequent positive waste management behaviors and provided the necessary tools to conduct waste-related activities.

SYSTEM DESIGN MECHANISMS



Salience: Attractive and engaging communications campaigns can increase residents' awareness of and interest in waste-related behaviors.⁴⁶ The SGC established partnerships with local media outlets, including newspapers, radio, and TV. Media outlets increased the profile of waste management and captured citizens' attention. For instance, Jawa Pos, a daily national newspaper based in Surabaya, controlled over 150 local newspapers and TV stations. From the start, it delivered daily news about the SGC initiative.





Preconditions and challenges

- » The mayor's commitment was a key driver for the SGC program and in reforming environmental issues. The mayor fostered collaborations with neighboring governments and was committed to the SGC's long-term vision of waste management. The SGC initiative took five years to gain widespread community support—without government commitment, the SGC's success would have been limited. The support of subsequent mayors similarly allowed the SGC to flourish over the past 19 years.
- » Environmental cadres were the backbone of the SGC. The consistency of their messaging and their long-term commitment stewarded the community-based SWM approach among *kampung*s.
- » The ingrained cultural context underpinned the SGC initiative's success. *Arek* culture—which invokes a competitive spirit—is specific to Surabaya and is not present in other provinces. The SGC competition tapped into residents' inherent competitive tendencies and drove its adoption.⁴⁷
- » In Indonesia, women are disproportionately responsible for household waste management, and hence women's buy-in was crucial for the success of SGC. Women supported the adoption of composting, source segregation, recycling, and proper waste disposal within their households.
- » Surabaya's administrative structure supported the SGC initiative's success. *Kampung* heads were appointed by the mayor and were directly under the city government's mandate. *Kampung* heads were therefore directly accountable to the government. The mayor was able to replace *kampung* heads at any time, which incentivized these individuals to support SGC activities and mobilize their communities to do the same.
- » The SGC initiative encountered challenges in shifting residents' attitudes on waste management. Residents historically associated waste with dirtiness and illness. Environmental cadres spent over a year consistently educating the community before attitudes started to shift.⁴⁸ This challenge underscores the protracted nature of behavior change and the need for long-term initiatives to shift SWM practices.

Results

The SGC initiative played a considerable role in facilitating improved SWM in Surabaya. The government and communities' commitment helped the program succeed. The program significantly boosted waste diversion rates and has consistently decreased landfilling by 10 percent every year.⁴⁹ The Takakura composting method similarly helped increase waste diversion rates, which residents continue to use to this day.⁵⁰ Between 2005 and 2010, home composting reduced the amount of organic waste landfilled by 30 percent (an estimated reduction of 3,421 metric tons of CO₂e emissions).⁵¹ As of 2017, the city established 21 composting centers.⁵² Similarly, as of 2019, Surabaya established 374 waste banks,⁵³ which significantly reduced open

dumping. Waste banks also provided low-income groups with supplemental monthly income⁵⁴ and became hubs for community activities.

These outcomes would not have been possible without strong grassroots support which environmental cadres and local women facilitated. Many of the initial cadres recruited in 2005 are still active today.⁵⁵ As of 2017, Surabaya recruited 28,000 environmental cadres.⁵⁶ Regular education and recognition of the initiative's tangible benefits gradually facilitated shifts in resident's waste behaviors. As community ownership improved, participation in the annual SGC competition increased, which included 1,020 neighborhood associations in 2022 (up from 500 in 2005).⁵⁷



Alongside improving waste management practices, the SGC program led to several co-benefits, including better social and economic conditions. For example, the program prompted the creation of community-based ecotourism initiatives⁵⁸ and other revenue-generating income streams.⁵⁹ The SGC initiative's success has influenced similar initiatives in Indonesia and elsewhere in Asia.⁶⁰



Complementary actions to consider

- » Within a city, different neighborhoods may face unique challenges in engaging in proper waste management behaviors. Governments looking to deploy a similar initiative could collect community-based data to understand participation rates and barriers to uptake.⁶¹
- » While the SGC initiative increased public receptivity to source segregation, several barriers to its widespread adoption remain. For instance, many residents fail to segregate their waste because they feel it is too time-consuming. Residents in other cities may face similar barriers to source segregation. Governments interested in source segregation programs could devise targeted behavior change initiatives in response to identified barriers.



Want to know more?

[JawaPos: Surabaya Green and Clean](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Badan Pusat Statistik. (2010). *Sensus Penduduk 2010*. Jakarta. Population in 2021: approximately 2.9 million. Source: Badan Pusat Statistik. (2021). *Sensus Penduduk 2020*. Jakarta.
- ² Plan for Final Disposal by Landfill. (n.d.) Japan International Cooperation Agency. Ministry of Public Works, Republic of Indonesia. Retrieved from https://openjicareport.jica.go.jp/pdf/11135506_03.pdf
- ³ Gilby, S., Hengesbaugh, M., Gamaralalage, P. J., Onogawa, K., Soedjono, E. S., & Fitriani, N. (2017). *Planning and implementation of integrated solid waste management strategies at local level: The case of Surabaya City*. IGES, UNEP. Retrieved from https://www.ccet.jp/sites/default/files/2017-10/CCET%20Surabaya%20Case%20Study_PrintingVer0718_2_reduced.pdf
- ⁴ Kurniawan, T. A., Puppim de Oliveira, J., Premakumara, D. G. J., & Nagaishi, M. (2013). City-to-city level cooperation for generating urban co-benefits: The case of technological cooperation in the waste sector between Surabaya (Indonesia) and Kitakyushu (Japan). *Journal of Cleaner Production*, 58, 43–50. doi: 10.1016/j.jclepro.2013.08.002
- ⁵ Duncan, G. (2006). *Indonesia now with Duncan Graham: Johan Silas*. Retrieved from <http://indonesianow.blogspot.com.au/2006/07/johan-silas.html>
- ⁶ Ernawati, R., Santosa, H. R., & Setijanti, P. (2013). Facing urban vulnerability through kampung development: Case study of kampungs in Surabaya, Indonesia. *Humanities and Social Sciences*, 1(1), 1.
- ⁷ Shirleyana, S., Hawken, S., & Sunindijo, R. Y. (2018). City of Kampung: Risk and resilience in the urban communities of Surabaya, Indonesia. *International Journal of Building Pathology and Adaptation*, 36(5), 543–568. doi: 10.1108/IJBPA-02-2018-0025
- ⁸ Gilby, S., Hengesbaugh, M., Gamaralalage, P. J., Onogawa, K., Soedjono, E. S., & Fitriani, N. (2017). *Planning and implementation of integrated solid waste management strategies at local level: The case of Surabaya City*. IGES, UNEP. Retrieved from https://www.ccet.jp/sites/default/files/2017-10/CCET%20Surabaya%20Case%20Study_PrintingVer0718_2_reduced.pdf
- ⁹ Premakumara, D. G. J. (2012). *Kitakyushu City's International Cooperation for Organic Waste Management in Surabaya City, Indonesia and its replication in Asian Cities*. IGES. Retrieved from https://www.iges.or.jp/en/publication_documents/pub/discussionpaper/bi-en-ja-77/2604/Surabaya%5BEnglish%5D.pdf
Silas, J. (2002). *Waste management problems in Surabaya: An integrated sustainable approach*. Environmental Department of Kitakyushu City, Japan. Retrieved from <https://kitakyushu.iges.or.jp/docs/sp/swm/3%20Waste%20management%20problems%20in%20Surabaya.pdf>
- ¹⁰ Geldin, S. (2017). The evolution of Indonesian waste banks: Two tales, two cities, one reality. *Tropical Resources*, 36, 17–26. Yale School of Forestry and Environmental Studies.
- ¹¹ Setiawan, R. (2020). Factors determining the public receptivity regarding waste sorting: A case study in Surabaya City, Indonesia. *Sustainable Environment Research*, 30(1). doi: 10.1186/s42834-019-0042-3
- ¹² Tauran, T., Ma'ruf, M. F., & Suyatno, S. (2015). Social entrepreneurship in waste management: Surabaya's experience. *Journal of Governance and Development*, 11, 53–66.
- ¹³ Premakumara, D. G. J., Abe, M., & Maeda, T. (2011). Reducing municipal waste through promoting integrated sustainable waste management (ISWM) practices in Surabaya city, Indonesia. *WIT Transactions on Ecology and the Environment*, 144(1), 457–468. doi: 10.2495/ECO110401
Wijayanti, D. R., & Suryani, S. (2015). Waste bank as community-based environmental governance: A lesson learned from Surabaya. *Procedia-Social and Behavioral Sciences*, 184, 171–179. doi: 10.1016/j.sbspro.2015.05.077
Wibisono, H., Firdausi, F., & Kusuma, M. E. (2020). Municipal solid waste management in small and metropolitan cities in Indonesia: A review of Surabaya and Mojokerto. In *IOP Conference Series: Earth and Environmental Science*, 447(1), 012050. IOP Publishing.
Isnaeni, N. (2016). *Public-private-community partnership: A case of Unilever's corporate social responsibility in Surabaya, Indonesia*. University of Malaya, Kuala Lumpur.
- ¹⁴ For additional information on this model, please refer to the [Indonesia/ Waste Banks](#) case study.
- ¹⁵ Wijayanti, D. R., & Suryani, S. (2015). Waste bank as community-based environmental governance: A lesson learned from Surabaya. *Procedia-Social and Behavioral Sciences*, 184, 171–179. doi: 10.1016/j.sbspro.2015.05.077
- ¹⁶ Pemerintah Kota Surabaya (Surabaya City Government)—Launching Surabaya Green and Clean 2018. Retrieved from <https://www.surabaya.go.id/id/berita/49398/launching-surabaya-green-and-cl>
Based on information received from Asri Hardini—Environmental Cadre Regional Coordinator for East Surabaya (February 24, 2023).
- ¹⁷ Fasla, F. (2014). *Pola Komunikasi Antara Kader Lingkungan Dengan Masyarakat di Kelurahan Gunung Anyar Surabaya Dalam Pelaksanaan Program Green and Clean Pemerintah Kota Surabaya*. Universitas Pembangunan Nasional Veteran, Surabaya.
- ¹⁸ Gervasi, M. (2010). Green and Clean Initiative: Surabaya, Indonesia. UCLG Committee. Retrieved from https://www.uclg-cisdp.org/sites/default/files/observatory/files/2021-06/Surabaya_EN.pdf
- ¹⁹ Kumalasari, V. (2015). Evaluasi Program Surabaya Green and Clean Berbasis Sustainable Development (Studi pada Dinas Kebersihan dan Pertamanan Kota Surabaya). *Jurnal Administrasi Publik (JAP)*, 3(10), 1753–1757.
- ²⁰ Gervasi, M. (2010). *Green and Clean Initiative: Surabaya, Indonesia*. UCLG Committee. Retrieved from https://www.uclg-cisdp.org/sites/default/files/observatory/files/2021-06/Surabaya_EN.pdf



- ²¹ Wijayanti, D. R., & Suryani, S. (2015). Waste bank as community-based environmental governance: A lesson learned from Surabaya. *Procedia-Social and Behavioral Sciences*, 184, 171–179. doi: 10.1016/j.sbspro.2015.05.077
- ²² Letfiani, E., Widyasari, A. (2015). Kampung Maspati as a sustainable kampung in Surabaya City. *Journal of Architecture & Environment*, 14(2), 163–172.
- Prasetyo, W. H., Kamarudin, K. R., & Dewantara, J. A. (2019). Surabaya green and clean: Protecting urban environment through civic engagement community. *Journal of Human Behavior in the Social Environment*, 29(8), 997–1014. doi: 10.1080/10911359.2019.1642821
- Ernawati, R., Santosa, H.R. & Setijanti, P. (2014). Community initiatives in developing sustainable settlements. Case study Kampung in Surabaya Indonesia. *International Journal of Engineering Research & Technology*, 3(6), 2242–2245. doi: 10.17577/IJERTV3IS061623
- ²³ Gilby, S., Hengesbaugh, M., Gamaralalage, P. J., Onogawa, K., Soedjono, E. S., & Fitriani, N. (2017). *Planning and implementation of integrated solid waste management strategies at local level: The case of Surabaya City*. IGES, UNEP. Retrieved from https://www.ccet.jp/sites/default/files/2017-10/CCET%20Surabaya%20Case%20Study_PrintingVer0718_2_reduced.pdf
- Kurniawan, T. A., Puppim de Oliveira, J., Premakumara, D. G. J., & Nagaishi, M. (2013). City-to-city level cooperation for generating urban co-benefits: The case of technological cooperation in the waste sector between Surabaya (Indonesia) and Kitakyushu (Japan). *Journal of Cleaner Production*, 58, 43–50. doi: 10.1016/j.jclepro.2013.08.002
- ²⁴ DIKLATIF: Pendidikan dan Pelatihan Singkat Kader Lingkungan Aktif (A Short-Course and Training Program for Active Environmental Cadres).
- ²⁵ Geldin, S. (2017). The evolution of Indonesian waste banks: Two tales, two cities, one reality. *Tropical Resources*, 36, 17–26. Yale School of Forestry and Environmental Studies.
- ²⁶ Tauran, T., Ma'ruf, M. F., & Suyatno, S. (2015). Social entrepreneurship in waste management: Surabaya's experience. *Journal of Governance and Development*, 11, 53–66.
- ²⁷ Based on information received from Yasmin, S.E., Head of Lohjinawi, an environmental NGO based in Surabaya (February 23, 2023).
- Based on information received from Melik Masfiatin, Deputy head of Wehasta, an environmental NGO based in Surabaya (February 23, 2023).
- ²⁸ Based on information received from Yasmin, S.E., Head of Lohjinawi, an environmental NGO based in Surabaya (February 23, 2023).
- ²⁹ Kurniawan, T. (2014). *The global environment and Japanese innovation: Takakura Home Composting (THC) in Surabaya (Indonesia)*. Japanese Economic Foundation. Retrieved from https://www.jef.or.jp/journal/pdf/197th_special_article_5.pdf
- Premakumara, D.G.J. (2012). *Kitakyushu City's International Cooperation for Organic Waste Management in Surabaya City, Indonesia and its replication in Asian Cities*. IGES. Retrieved from https://www.iges.or.jp/en/publication_documents/pub/discussionpaper/bi-en-ja-ZZ/2604/Surabaya%5BEnglish%5D.pdf
- ³⁰ Jiménez-Antillón, J., Calleja-Amador, C., & Romero-Esquivel, L. (2018). Food waste recovery with Takakura portable compost boxes in offices and working places. *Resources*, 7(4), 84. doi:10.3390/resources7040084
- ³¹ Isnaeni, N. (2016). *Public-private-community partnership: A case of Unilever's corporate social responsibility in Surabaya, Indonesia*. University of Malaya, Kuala Lumpur.
- ³² Gilby, S., Hengesbaugh, M., Gamaralalage, P.J., Onogawa, K., Soedjono, E.S., & Fitriani, N. (2017). *Planning and implementation of integrated solid waste management strategies at local level: The case of Surabaya City*. IGES, UNEP. Retrieved from https://www.ccet.jp/sites/default/files/2017-10/CCET%20Surabaya%20Case%20Study_PrintingVer0718_2_reduced.pdf
- ³³ Gervasi, M. (2010). *Green and Clean Initiative: Surabaya, Indonesia*. UCLG Committee. Retrieved from https://www.uclg-cisdp.org/sites/default/files/observatory/files/2021-06/Surabaya_EN.pdf
- ³⁴ JawaPos—Surabaya green and clean. Retrieved from <https://www.jawapos.com/tag/surabaya-green-and-clean/>
- Dhokhikah, Y., Trihadiningrum, Y., & Sunaryo, S. (2015). Community participation in household solid waste reduction in Surabaya, Indonesia. *Resources, Conservation and Recycling*, 102, 153–162
- ³⁵ Nonomori. (2022). *Manga Study Guide - Our future: International Environmental Cooperation & Business Kitakyushu Style*. Environment Bureau, Kitakyushu city. Retrieved from <https://asiangreencamp.net/eng/general/comic/comic.pdf>
- ³⁶ Sumarah, N. (2016). The influence of Jawa post publication and group involvement towards public participation in Surabaya Green and Clean (SGC) Program. *Wacana*, 19(2), 113–121.
- ³⁷ Klege, R. A., Visser, M., Datta, S., & Darling, M. (2022). The power of nudging: Using feedback, competition, and responsibility assignment to save electricity in a non-residential setting. *Environmental and Resource Economics*, 81, 573–589. doi: 10.1007/s10640-021-00639-w
- ³⁸ Palm-Forster, L. H., Ferraro, P. J., Janusch, N., Vossler, C. A., & Messer, K. D. (2019). Behavioral and experimental agri-environmental research: Methodological challenges, literature gaps, and recommendations. *Environmental and resource economics*, 73(3), 719–742. doi: 10.1007/s10640-019-00342-x
- ³⁹ Based on information received from Asri Hardini— Environmental Cadre Regional Coordinator for East Surabaya (February 24, 2023).
- Based on information received from Yasmin, S.E., Head of Lohjinawi, an environmental NGO based in Surabaya (February 23, 2023).
- ⁴⁰ Andrews, A.C., Clawson, R.A., Gramig, B.M. & Raymond L. (2013). Why do farmers adopt conservation tillage? An experimental investigation of framing effects. *Journal of Soil and Water Conservation*, 68(6), 501–511. doi: 10.2489/jswc.68.6.501
- ⁴¹ Isnaeni, N. (2016). *Public-private-community partnership: A case of Unilever's corporate social responsibility in Surabaya, Indonesia*. University of Malaya, Kuala Lumpur.
- ⁴² Perry, G. L., Richardson, S. J., Harré, N., Hodges, D., Lyver, P. O., Maseyk, F. J., Taylor, R., Todd, J. H., Tylianakis, J. M., Yletyinen, J., & Brower, A. (2021). Evaluating the role of social



- norms in fostering pro-environmental behaviors. *Frontiers in Environmental Science*, 9. doi: 10.3389/fenvs.2021.620125
- ⁴³ Ekström, M. (2012). Do watching eyes affect charitable giving? Evidence from a field experiment. *Experimental Economics*, 15(3), 530–546. doi: 10.1007/s10683-011-9312-6
- ⁴⁴ Brick, K., De Martino, S., & Visser, M. (2017). *Behavioural nudges for water conservation: Experimental evidence from Cape Town*. doi: 10.13140/RG.2.2.25430.75848
- ⁴⁵ Asare, W., Oduro Kwarteng, S., Donkor, E. A., & Rockson, M. A. (2020). Recovery of municipal solid waste recyclables under different incentive schemes in Tamale, Ghana. *Sustainability*, 12(23), 9869. doi: 10.3390/su12239869
- ⁴⁶ Winterich, K. P., Nenkov, G. Y., & Gonzales, G. E. (2019). Knowing what it makes: How product transformation salience increases recycling. *Journal of Marketing*, 83(4), 21–37. doi: 10.1177/0022242919842167
- ⁴⁷ Based on information received from Asri Hardini—Environmental Cadre Regional Coordinator for East Surabaya (February 24, 2023).
- ⁴⁸ Ibid.
- ⁴⁹ Based on information received from Agustinus—Subdivision for Pollution Control, Surabaya Municipal Environmental Agency (February 10, 2023).
- ⁵⁰ Based on information received from Yasmin, S.E., Head of Lohjinawi, an environmental NGO based in Surabaya (February 23, 2023).
- ⁵¹ Kurniawan, T. (2014). *The Global environment and Japanese innovation: Takakura Home Composting (THC) in Surabaya (Indonesia)*. Japanese Economic Foundation. Retrieved from https://www.jef.or.jp/journal/pdf/197th_special_article_5.pdf
- ⁵² Gilby, S., Hengesbaugh, M., Gamaralalage, P.J., Onogawa, K., Soedjono, E. S. & Fitriani, N. (2017). *Planning and implementation of integrated solid waste management strategies at local level: The case of Surabaya City*. IGES, UNEP. Retrieved from https://www.ccet.jp/sites/default/files/2017-10/CCET%20Surabaya%20Case%20Study_PrintingVer0718_2_reduced.pdf
- ⁵³ Warmadewanthi, & Haqq, M. (2019). Implementation of waste banks for reduction of solid waste in South Surabaya. *MATEC Web of Conferences*, 276, 06021. doi:10.1051/mateconf/201927606021
- ⁵⁴ Wijayanti, D. R., & Suryani, S. (2015). Waste bank as community-based environmental governance: A lesson learned from Surabaya. *Procedia - Social and Behavioral Sciences*, 184, 171–179. doi:10.1016/j.sbspro.2015.05.077
- ⁵⁵ Based on information received from Asri Hardini—Environmental Cadre Regional Coordinator for East Surabaya (February 24, 2023).
- ⁵⁶ Gilby, S., Hengesbaugh, M., Gamaralalage, P. J., Onogawa, K., Soedjono, E. S., & Fitriani, N. (2017). *Planning and implementation of integrated solid waste management strategies at local level: The case of Surabaya City*. IGES, UNEP. Retrieved from https://www.ccet.jp/sites/default/files/2017-10/CCET%20Surabaya%20Case%20Study_PrintingVer0718_2_reduced.pdf
- ⁵⁷ Hakim, A. (2022). *Penghargaan “SSC 2022” munculkan beragam kampung tematik di Surabaya* [The “SSC 2022” award presented various thematic villages in Surabaya]. Antara. Retrieved from <https://jatim.antaranews.com/berita/666294/penghargaan-ssc-2022-munculkan-beragam-kampung-tematik-di-surabaya>
- Mintorogo, D. S., Arifin, L. S., Widigdo, W. K., & Juniwati, A. (2015). *Historical old ‘Kampung’ toward sustainable green and clean habitat*. The International Joint Conference SENVAR-iN-TA-AVAN 2015. Johor, Malaysia.
- ⁵⁸ Prasetyo, W. H., Kamarudin, K. R., & Dewantara, J. A. (2019). Surabaya green and clean: Protecting urban environment through civic engagement community. *Journal of Human Behavior in the Social Environment*, 29(8), 997–1014. doi: 10.1080/10911359.2019.1642821
- ⁵⁹ Tahir, A., Yoshida, M., & Harashina, S. (2011). Expanding the implementation of community-based waste management: Learning from the green and clean program in Indonesia. *Journal of Environmental Information Science*, 40(5), 79–88.
- ⁶⁰ Geldin, S. (2017). The evolution of Indonesian waste banks: Two tales, two cities, one reality. *Tropical Resources*, 36, 17–26. Yale School of Forestry and Environmental Studies.
- Tahir, A., Mitsuo, Y., & Sachihiko H. (2011). Expanding the implementation of community-based waste management: Learning from the green and clean program in Indonesia. *Journal of Environmental Information Science*, 40, 79.
- ⁶¹ Dhokhikah, Y., Trihadiningrum, Y., & Sunaryo, S. (2015). Community participation in household solid waste reduction in Surabaya, Indonesia. *Resources, Conservation and Recycling*, 102, 153–162.



Getting people to be more sustainable with their waste disposal in Colombia

Objective: Increase source segregation of organic and other waste



Case summary

The municipality of Cajicá, Colombia, introduced the Green Containers Program (GCP) to encourage organic waste segregation. The local governing authority distributed specialized organic waste bins to users (households, commercial entities, educational institutions, and public agencies). Complementarily, authorities provided users with simplified instructions and a pretreating material to make the desired behavior easy. The municipality collected organic waste weekly and brought it to a central composting facility. A consistent communication strategy—underpinned by a door-to-door awareness campaign—alongside municipal support facilitated shifts in waste management behavior. The GCP increased source segregation rates by 71.9 percent.

Challenge statement

In the early 2000s, Cajicá's only landfill (Doña Juana) had reached capacity. The municipality was eager to extend the landfill's life span but had limited financial and administrative resources to overhaul its SWM system.

Context and description of challenges

The MSW produced in low- and middle-income countries typically has high organic content. However, the separate collection of organic waste was historically uncommon in the Latin American and Caribbean region.¹ Most regions did not view MSW as a resource. Similarly, only 3.6 percent of Colombian cities engaged in some kind of source separation.² Naturally, citizens' default behavior was to dispose of mixed waste. Therefore, changes to the waste management system required changing habitual practices.

Cajica is a small municipality in Colombia with 44,721 inhabitants.³ It generated approximately 0.5 kg of MSW per capita per day in 2006. Organic waste made up 56 percent of the total waste mix.⁴ The municipality grappled with MSWM. Its landfill was nearing capacity and it was costly and resource intensive to dispose of waste in neighboring municipalities.⁵ Shortly after the introduction of the country's 2002 National Development Plan, Cajicá introduced its own SWM plan (PGIRS). The PGIRS included a framework to strengthen MSWM services and increase public buy-in for



municipal-led MSW initiatives.⁶ The plan also emphasized the 3R principle in waste management, including waste reduction, separate collections, waste reuse, and recycling. The municipality's local waste authority - Sanitary Collection Enterprise (EPC) - led the plan's implementation. To achieve Cajicá's waste treatment and recycling goals, the EPC had to develop new systems and facilitate changes in waste generators' behavior.

Decisions and actions

The PGIRS laid the foundation for Cajicá's improved waste management activities and its transition toward a circular economy. The EPC introduced a pilot program in 2005 to utilize the region's high organic waste volumes.⁷ Motivated residents helped facilitate activities.⁸ The pilot encouraged citizens to segregate their waste into two streams (organic and inorganic). The municipality jointly introduced an outreach campaign on the benefits of composting.⁹ The municipality collected and sent organic waste to a composting plant. Participating households later received packages of humus (the end product in the composting process). The pilot program gave the EPC insights on citizen behavior and highlighted the existing SWM system's limitations.

Cajicá subsequently established a more robust composting initiative called the Green Containers (*Caneca Verde*) Program (GCP), which built upon the pilot. The EPC launched the GCP in 2008. The municipality integrated the program within the local SWM system to ensure its sustainability. The municipality distributed green plastic organic waste containers to households, commercial entities, and educational institutions. The green containers had false bottoms (or holes in the bottom) to drain leachate. The municipality encouraged residents to use the nutrient-rich leachate as garden fertilizer (Figure 14). Alongside the green containers, residents also received bokashi, which pretreated organic waste. The municipality collected the pretreated organic waste weekly and diverted it to private compost and vermiculture plants.¹⁰ After a 50-day treatment period at the composting facility, the company sold the humus to the agricultural sector and garden stores for household use.¹¹ A community-based education and outreach strategy complemented the above tactics.

In 2018, the GCP's annual expenditure was approximately USD 350,000 (or USD 5.8 per capita). Operating costs were lower than the cost of separate collection and treatment at a central composting facility. The municipal government financed the GCP.

The design

The municipality distributed green containers, bokashi, and simplified instructions to residents. To ensure that all socioeconomic groups participated, low- and middle-income communities (Socio-Economic Classes [SECs] 1–4)¹² received green containers for free, while high-income communities (SECs 5–6) and commercial entities purchased them. These containers mitigated the hassle of finding a suitable storage vessel for segregated waste. The vessels and their green color provide cues to residents to engage in waste segregation.

Citizens disposed of organic waste in the green container and mixed in bokashi to initiate the composting process. Bokashi is a composting material made of rice or wheat bran. It is mixed with effective microorganisms (EMs) to catalyze the fermentation of organic waste through anaerobic digestion and initiate decomposition. In addition to its role in decay, bokashi prevented odors, which can be barriers to home composting. The process of fermentation in the bokashi composting technique allows for all kinds of organic waste (including meat and dairy) to be composted together. It does not require a specific ratio of greens and browns, but the composting container must remain closed to encourage decomposition, which protects against insects or rodents.¹³ This pretreatment also mitigated the time and effort associated with sorting and composting at the central plant. Cajicá collected pretreated organic waste weekly to ease the financial burden posed by centralized composting facilities. The EPC's waste collectors emptied and transported the pretreated organic waste to a composting plant. These weekly collections mitigated the space burden of permanent home composting setups, which can prevent usage.

To make continued participation in the GCP as easy as possible, the municipality distributed a free 2 kg pack of bokashi to participants bimonthly.¹⁴ During distribution, trained personnel answered residents' questions. This constant contact underpinned



the program's consistent communication strategy and ensured that residents felt supported and understood the waste separation process. Cajicá supported these activities with educational initiatives tailored to households, commerce, industry, official institutions, schools, and universities. Trainers facilitated awareness campaigns and capacity-building activities. Cajicá also collaborated with various NGOs and local organizations to deal with the scheme's social aspects. The municipality utilized hands-on activities, brochures, videos, social media, workshops, and training to increase source segregation.¹⁵ For instance, the municipality developed school activities to instill a sense of responsibility toward waste management from a young age. Trainers encouraged students to share the information with family members and the local community to improve their waste management practices. Additionally, the EPC created an annual school contest to socialize the topic of waste management.¹⁶



Source: Empresa de Servicios Públicos de Cajicá.¹⁷

FIGURE 15 Easy guides for source segregation of organic waste and use of bokashi

Manejo Adecuado de la Caneca Verde

- 1. Utilice caneca plástica de doble fondo**
- 2. Aplique una cucharada de Bokashi EM sobre el fondo de la caneca**
- 3. Coloque los residuos sólidos sobre el Bokashi EM**
- 4. Espolvoree una cucharada de Bokashi EM todas las noches**
- 5. Presione los residuos hacia el fondo para sacar el aire**
- 6. Tape herméticamente la caneca**
- 7. Drene los líquidos dos veces por semana, aplíquelos en los sifones o como fertilizante, diluyéndolo en un balde de agua.**

Logos: CAJICÁ NUESTRO COMPROMISO, EPC, PGIRS, SECRETARÍA DE AMBIENTE Y DESARROLLO TERRITORIAL

Note: Bullet points: 1. Use double bottom plastic container; 2. Apply a tablespoon of Bokashi EM on the bottom of the container; 3. Place the solid waste on top of the Bokashi EM; 4. Sprinkle a tablespoon of Bokashi EM every night; 5. Tightly cover the can and press the debris to the bottom to remove the air; 6. Drain the liquids twice a week, apply them in the siphons or as fertilizer, diluting it in a bucket of water. Source: Hettiarachchi et al. (2018).¹⁸



What behavioral tools are present in this initiative?

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: Simplifying the presentation of information can significantly affect compliance.¹⁹ In household waste segregation, convenience and simplicity are crucial to adoption.²⁰ Through door-to-door campaigns, trainers distributed both specialized organic waste containers and information on the composting process to households. The instructions included simplified text alongside photos that illustrated each step. Together, these tactics increased the ease with which households could execute the target behavior.



Defaults: Choice architecture can significantly influence an individual's behavior. Defaults (settings that automatically apply) are used to increase the ease and uptake of pro-environmental behaviors.²¹ In Cajicá, the program automatically distributed packets of bokashi to all participating households. Participants did not need to request the delivery of bokashi nor were they burdened with coordinating its purchase or pickup. This encouraged the sustained adoption of source separation by making the target behavior easier.



Salience: Research suggests that individuals attend to features of their environment that stand out.²² The municipality used several mediums to advertise the GCP, including social media, advertising, brochures, videos, and workshops.



Physical cues: The physical characteristics of a given environment can shift waste disposal practices. Cajicá issued bright green collection bins to residents for organic waste. These bins introduced a new feature to household environments and provided a cue to guide proper waste disposal.



Accessible services: Research suggests that access to convenient waste disposal services can affect whether residents participate.²³ MSW management staff collected organic waste on Mondays and Tuesdays across eight routes that covered the municipality's urban and rural areas.²⁴ Publicly available waste collections increased the ease of engaging in the waste system.

SOCIAL AND MOTIVATIONAL MECHANISMS



Messengers: The effectiveness of information can depend on who is conveying the message.²⁵ In the present case study, Cajicá used both change agents (that is, program trainers) and authority figures (EPC officials) to conduct a door-to-door outreach and education strategy. In the three months before the GCP, Cajicá organized an outreach campaign to teach residents the benefit of composting and relay information on the GCP. Personnel visited single-family homes, residential complexes, educational institutions, municipal administration offices, and commercial buildings.²⁶ During outreach sessions, trainers delivered organic waste bins, bokashi, and information on the GCP. After the GCP was operational, trainers led awareness campaigns and capacity-building activities. As of 2020, the GCP had 18 full-time trainers.²⁷ In addition to the above, program trainers delivered bokashi to participating residents bimonthly. They used this time as an in-person training opportunity to answer any questions. Trainers similarly conducted outreach at schools, which utilized a learning-by-doing approach to composting. The goal was to teach children, who could then become change agents. Once educated, children taught their families about organic waste source segregation.



Social comparison: Research suggests that comparisons among peers, such as competitions, can promote sustainable behaviors.²⁸ Cajicá used competitions to encourage recycling and environmental awareness in youth. The EPC organized an annual waste-related school contest called 'Eco-Arte'. Students from different schools constructed artwork with recycled materials. This practice helped increase the popularity of source separation. Similarly, the municipality held competitions with post-secondary school art students. Students constructed artwork using recycled or recovered materials. A committee assessed artwork on its creativity, originality, aesthetics, and use of recyclables.²⁹



Social Norms: Research suggests that individuals' beliefs about how others behave influence their waste management behaviors,³⁰ particularly when the behavior is visible.³¹ In Cajicá, residents placed organic waste containers outside for weekly collections. Residents could see whether their neighbors participated in the GCP using these containers. As more individuals participated in the GCP, this created a positive social norm.



FINANCIAL MECHANISMS



Material rewards: Under specific circumstances, low-value in-kind incentives can effectively encourage waste-related behaviors.³² Once the organic waste was collected, Cajicá transferred it to a private company to finish the composting process. GCP participants received humus monthly to use as garden fertilizer. This material reward was a positive incentive that encouraged residents to continue segregating their waste.



Preconditions and challenges

- » The Cajicá government had no mechanism to recover the service charge from the public, so it bore all costs. The absence of a revenue stream could imperil the program if the municipal budget changes.
- » The bokashi production process was manual, which could constrain the quality, the amount produced, and the GCP's expansion. The Cajica government has stressed the need to improve this system.³³
- » Door-to-door collection and education are integral to the GCP. With Cajica's rising population, maintaining the same level of citizen interaction may be infeasible.
- » Cajicá's growing population may test the GCP's viability if individuals immigrate from cities where waste separation is uncommon or socially unacceptable.

Results

Through the GCP, Cajicá set a benchmark for organic waste source separation programs across the country. The GCP delivered approximately 13,429 green containers between 2008 and 2014, net of replacements.³⁴ During that time, organic waste decreased from 56 percent (2007) to 16 percent (2014) of the waste mix.³⁵ Further, the percentage of users who separated their waste at source increased from 8.2 percent (2009) to 17.4 percent (2014). Since 2014, the program has collected between 485 and 551 tons of pretreated organic waste monthly and served 25,000 households (88,000 inhabitants) (2018).³⁶ As a co-benefit, the GCP reduced costs associated with landfilling (that is, human resource costs) and extended their lifespan.³⁷

Through education, training, and simplified instructions, the program gave residents tools and support to modify their waste management habits. Since its inception, the program has trained thousands of residents. In 2014, the GCP trained 14,222 citizens (24 percent of residents).³⁸ In 2017, workshops trained 7,177 residents,³⁹ of which most attendees were individuals from schools (56.1 percent) and single-family households (23.9 percent).

The program was well-received across demographics, from households to waste workers. Discussions with residents revealed a sense of ownership of the solutions.⁴⁰ The program's success extended beyond individual activities to building, planning, and design changes. Public-private partnerships developed guidelines to ensure that new residential apartment buildings allocated sufficient capacity and attention to waste management needs to foster continued source separation.⁴¹





Complementary actions to consider

- » Governments may consider enacting a service charge for waste management services to at least middle- and high-income households to help ensure the financial viability of likeminded programs. They could explore the possibility of charging users for SWM services through a utility bill, as many Latin American and Caribbean countries have done.
- » Governments overseeing could assess long-term (> 1 year) source segregation rates across relevant audiences (households, educational institutions, industry, government, commercial) and socioeconomic classes.⁴² Each group may have different barriers, motivations, and capacities to engage in source separation. These data could help improve program uptake.



Want to know more?

[Sanitary Collection Enterprise, Cajicá](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Machado, C. R., & Hettiarachchi, H. (2020). Composting as a municipal solid waste management strategy: Lessons learned from Cajicá, Colombia. In H. Hettiarachchi, S. Caucci, & K. Schwärzel (Eds.), *Organic waste composting through nexus thinking*. Springer, Cham. doi:10.1007/978-3-030-36283-6_2
- ² Espinoza, P. T., Acre, E. M., Daza, D., Faure, M. S., & Terraza, H. (2010). *Regional evaluation on urban solid waste management in Latin America and the Caribbean – 2010 Report*. Pan American Health organization (PAHO), Inter-American Association of Sanitary and Environmental Engineering (AIDIS), Inter-American Development Bank (IDB).
- ³ National Administrative Department of Statistics. *General census 2005*. Government of Colombia. Retrieved from <https://www.dane.gov.co/index.php/en/statistics-by-topic-1/population-and-demography/census-2005>
Population in 2021: 96,678. Source: National Administrative Department of Statistics. *National census 2018: Proyecciones De Población Municipal Por Área (Population Projections by Area)*. Government of Colombia.
- ⁴ Municipal Mayor of Cajicá. (2015). *Actualización del Plan de Gestión Integral de Residuos Sólidos 2016–2027* [Update of the Comprehensive Solid Waste Management Plan 2016–2027]. Municipality of Cajicá.
- ⁵ Based on information received from Oscar Nicolás Echeverry - Profesional Universitario Aseo Empresa de Servicios Públicos de Cajicá S.A. E.S.P. Sanitary Collection Enterprise (September 20, 2022).
- ⁶ Machado, C. R., & Hettiarachchi, H. (2020). Composting as a municipal solid waste management strategy: Lessons learned from Cajicá, Colombia. In H. Hettiarachchi, S. Caucci, & K. Schwärzel (Eds.), *Organic waste composting through nexus thinking*. Springer, Cham. doi:10.1007/978-3-030-36283-6_2
- ⁷ Based on information received from Oscar Nicolás Echeverry - Profesional Universitario Aseo Empresa de Servicios Públicos de Cajicá S.A. E.S.P. Sanitary Collection Enterprise, (September 20, 2022).
- ⁸ Ospina, D. (2009). *Aprovechamiento Y Valorización De Residuos En Cuatro Municipios De Cundinamarca* [Use and recovery of waste in four municipalities of Cundinamarca]. Industrial University of Santander, Bucaramanga.
- ⁹ Based on information received from Oscar Nicolás Echeverry - Profesional Universitario Aseo Empresa de Servicios Públicos de Cajicá S.A. E.S.P. Sanitary Collection Enterprise, (September 20, 2022).
- ¹⁰ Machado, C.R., & Hettiarachchi, H. (2020). Composting as a municipal solid waste management strategy: Lessons learned from Cajicá, Colombia. In H. Hettiarachchi, S. Caucci, & K. Schwärzel (Eds.), *Organic waste composting through nexus thinking*. Springer, Cham. doi:10.1007/978-3-030-36283-6_2
- ¹¹ Based on information received from Oscar Nicolás Echeverry - Profesional Universitario Aseo Empresa de Servicios Públicos de Cajicá S.A. E.S.P. Sanitary Collection Enterprise (September 20, 2022).
- ¹² Communities in Cajicá are categorized into six SECs. SECs 1, 2, and 3 denote those residents with fewer resources and who are beneficiaries of subsidies in public services. SEC 4 residents are those who are not a beneficiary of subsidies but do not have to pay cost overhead of public service provision. Residents belonging to SECs 5 and 6 have greater economic resources and are expected to pay cost overheads. Information sourced from National Administrative Department of Statistics (DANE), Colombia.
- ¹³ Footer, A. (2013). *Bokashi composting: Scraps to soil in weeks*. New Society Publishers. ISBN 0865717524.
- ¹⁴ Municipal Mayor of Cajicá. (2015). *Actualización del Plan de Gestión Integral de Residuos Sólidos 2016–2027* [Update of the Comprehensive Solid Waste Management Plan 2016–2027]. Municipality of Cajicá.
- ¹⁵ Ibid.
- ¹⁶ Machado, C. R., & Hettiarachchi, H. (2020). Composting as a municipal solid waste management strategy: Lessons learned from Cajicá, Colombia. In H. Hettiarachchi, S. Caucci, & K. Schwärzel (Eds.), *Organic waste composting through nexus thinking*. Springer, Cham. doi:10.1007/978-3-030-36283-6_2
- ¹⁷ Empresa de Servicios Públicos de Cajicá (Sanitary Collection Enterprise). (2022). *Campañas Sectoriales*. Facebook. Retrieved from <https://www.facebook.com/epccajica/posts/3296175603949681>
- ¹⁸ Hettiarachchi, H., Meegoda, J., & Ryu, S. (2018). Organic waste buyback as a viable method to enhance sustainable municipal solid waste management in developing countries. *International Journal of Environmental Research and Public Health*, 15(11), 2483. doi:10.3390/ijerph15112483
- ¹⁹ Sunstein, C.R. (2013). *Simpler: The future of government*. Simon & Schuster, New York.
- ²⁰ Schwab, N., Harton, H. C., & Cullum, J. G. (2014). The effects of emergent norms and attitudes on recycling behavior. *Environment and Behavior*, 46(4), 403–422.
- ²¹ Sunstein, C. R., & Reisch, L. A. (2014). Automatically green: Behavioral economics and environmental protection. *Harvard Environmental Law Review*, 38(1), 127.
- ²² Bertrand, M., Karlan, D., Mullainathan, S., Shafir, E., & Zinman, J. (2009). What's advertising content worth? Evidence from a consumer credit marketing field experiment. *Quarterly Journal of Economics*, 125(1), 263–305.
- ²³ Prime Minister's Strategy Unit. (2002). *Waste Not, Want Not: A strategy for tackling the waste problem in England*. Crown, Great Britain.
- ²⁴ Pulido Bernal, D. A. (2019). *Percepción de los habitantes del municipio de Cajicá sobre el programa "Caneca Verde" en el marco del PGIRS* [Perception of the inhabitants of the municipality of Cajicá about the "Caneca Verde" Program In the framework of PGIRS]. Specialization In Environmental Planning and Resource Management Natural Militar University of New Granaa. Retrieved from <https://core.ac.uk/download/pdf/344703723.pdf>



- ²⁵ Whiting, A., Kecinski, M., Li, T., Messer, K. D., & Parker, J. (2019). The importance of selecting the right messenger: A framed field experiment on recycled water products. *Ecological Economics*, 161, 1–8. doi:10.1016/j.ecolecon.2019.03.004
- ²⁶ Based on information received from Oscar Nicolás Echeverry - Profesional Universitario Aseo Empresa de Servicios Públicos de Cajicá S.A. E.S.P. Sanitary Collection Enterprise (September 20, 2022).
- ²⁷ Machado, C. R., & Hettiarachchi, H. (2020). Composting as a municipal solid waste management strategy: Lessons learned from Cajicá, Colombia. In H. Hettiarachchi, S. Caucci, & K. Schwärzel (Eds.), *Organic waste composting through nexus thinking*. Springer, Cham. doi:10.1007/978-3-030-36283-6_2
- ²⁸ van Horen, F., van der Wal, A., & Grinstein, A. (2018). Green, greener, greenest: Can competition increase sustainable behavior? *Journal of Environmental Psychology*, 59, 16–25. doi:10.1016/j.jenvp.2018.08.007
- ²⁹ Pulido Bernal, D. A. (2019). *Percepción de los habitantes del municipio de Cajicá sobre el programa "Caneca Verde" en el marco del PGIRS* [Perception of the inhabitants of the municipality of Cajicá about the "Caneca Verde" Program in the framework of PGIRS]. Specialization In Environmental Planning and Resource Management Natural Militar University of New Granaa. Retrieved from <https://core.ac.uk/download/pdf/344703723.pdf>
- ³⁰ Schultz, P. W. (2002). Knowledge, information, and household recycling: Examining the knowledge-deficit model of behaviour change. In T. Dietz, & P. C. Stern (Eds.), *New tools for environmental protection: Education, information, and voluntary measures*. National Academy Press, Washington, DC.
- ³¹ Barr, S., Ford, N. J., & Gilg, A., (2003). Attitudes towards recycling household waste in Exeter, Devon: Quantitative and qualitative approaches. *Local Environ.*, 8(4), 407–421.
- ³² Newman, C., Mitchell, T., Holmlund, M., & Fernandez, C. (2019). *Group incentives for the public good: A field experiment on improving the urban environment* (Policy Research Working Paper No. 9087). World Bank, Washington, DC. Retrieved from <https://openknowledge.worldbank.org/handle/10986/33056>
- ³³ Santa Mesa, S. J., & Pérez Ríos, L. M. (2017). *Actualización Plan de Gestión Integral de Residuos Sólidos del municipio de Filandia–Quindío* [Update of the Comprehensive Solid Waste Management Plan of the municipality of Filandia-Quindío]. Municipality of Filandia-Quindío.
- ³⁴ Municipal Mayor of Cajicá. (2015). *Actualización del Plan de Gestión Integral de Residuos Sólidos 2016–2027* (Update of the Comprehensive Solid Waste Management Plan 2016–2027). Municipality of Cajicá.
- ³⁵ Ibid.
- ³⁶ Jain, S, & Newman, D. (2018). *Global Food waste management: An implementation guide for cities*. World Biogas Association. Retrieved from <https://www.worldbiogasassociation.org/wp-content/uploads/2018/05/Global-Food-Waste-Management-Full-report-pdf.pdf>
- Based on information received from Oscar Nicolás Echeverry - Profesional Universitario Aseo Empresa de Servicios Públicos de Cajicá S.A. E.S.P. Sanitary Collection Enterprise, (September 20, 2022).
- ³⁷ Ibid.
- ³⁸ Municipal Mayor of Cajicá. (2015). *Actualización del Plan de Gestión Integral de Residuos Sólidos 2016–2027* (Update of the Comprehensive Solid Waste Management Plan 2016–2027). Municipality of Cajicá.
- ³⁹ Sanitary Collection Enterprise of Cajicá. (2017). *Waste management report submitted to the municipal council of Cajicá*. Sanitary collection Enterprise, Cajicá.
- ⁴⁰ Jimenez Zarante, A. M. (2020). *Manejo adecuado de los residuos sólidos en el Municipio de Cajicá, programa implementado por medio del plan integral de gestión de residuos sólidos PGIRS* [Adequate management of solid waste in the Municipality of Cajicá, a program implemented through the comprehensive solid waste management plan PGIRS]. Universidad Nacional Abierta y a Distancia (UNAD).
- ⁴¹ Machado, C. R., & Hettiarachchi, H. (2020). Composting as a municipal solid waste management strategy: Lessons Learned from Cajicá, Colombia. In H. Hettiarachchi, S. Caucci, & K. Schwärzel (Eds.), *Organic waste composting through nexus thinking*. Springer, Cham. doi:10.1007/978-3-030-36283-6_2
- ⁴² Grau, J., Terraza, H., Velosa, R., Milena, D., Rihm, A., & Sturzenegger, G. (2015). *Solid waste management in Latin America and the Caribbean*. Inter-American Development Bank, Washington, DC.



Getting people to be more sustainable with their waste disposal in Canada

Main objective: Increase source segregation of organic and other waste

Other objectives: Increase reusing and recycling



Case summary

Practitioners conducted two experiments to assess whether convenience affected diversion rates of recyclables (paper, glass, and plastic containers) and organic waste. They used distance (proximity to apartment suite) as a proxy for convenience. Bins were placed at varying distances from apartment suites in residential and student residence buildings. The amount of organic waste and recyclables that residents diverted from landfills was then quantified. Convenience increased diversion rates of recyclables and organic waste by 70–147 percent. This trial subsequently informed the building design of student residences and multifamily residential dwellings.

Challenge statement

Despite national increases in composting and recycling in Canada, most waste was still landfilled. Residents in multifamily dwellings reported the lowest rates of



Bringing awareness to waste and recycling in Vancouver, British Columbia, Canada. © EmilyNorton, shutterstock



composting and recycling. Bin inaccessibility, inconvenience, and time constraints all hindered waste diversion.

Context and description of challenges

Canada, with a population of 33,476,688 (2011),¹ generated 2.12 kg of MSW per capita per day (2008).² Residential waste constituted a significant proportion of landfill contents (40 percent in 2013).³ Additionally, despite access to recycling programs (93 percent in 2007), only 25 percent of MSW was diverted for recycling and composting.⁴ Furthermore, a 2011 national survey indicated that approximately 12 percent of Canadians with access to composting programs chose not to participate.⁵

Canadian residents faced several barriers to composting and recycling. Odors, insufficient time, lack of available bins, and the absence of municipal-led programs undermined participation in composting programs. Similarly, insufficient time, space, and inconvenience limited recycling.⁶ Consequently, many residents resorted to including such material in residual waste bins, leading to high contamination and low diversion rates.⁷ Housing type was also a major determinant in waste diversion behavior. Notably, multifamily dwellings had disproportionately lower composting rates relative to single-family or detached households (22 percent versus 77 percent, respectively).⁸ Traditional awareness and informational campaigns failed to bolster waste diversion rates. As multifamily dwellings accounted for approximately 28 percent of all households in Canada,⁹ engaging these residents was integral to improving waste diversion rates in Canada.

Decisions and actions

In 2014, a team of researchers at the University of British Columbia assessed how convenience influenced recycling and organic waste collection in a series of interventions. Convenience was defined as the distance from the entrance of an apartment suite to the closest available disposal bin. The first intervention was conducted in several apartment complexes focusing exclusively on organic waste diversion. The

second intervention, on the other hand, was conducted in university student residences; practitioners manipulated the distance between recycling and organic waste bins relative to students' suites. Both experiments measured the weight (in kg) of organic waste and recyclables (where applicable) as a function of varying levels of convenience.¹⁰

The design

The influence of convenience was assessed in two interventions. The first investigated organic waste collection rates in three apartment buildings (N = 113 apartment units) across three conditions. All buildings had comparable demographics and layouts. The intervention randomly assigned each apartment to one of three treatments (listed from most to least convenient): (a) one bin located by the elevator on each apartment floor and one bin located in the waste disposal area, (b) one bin placed at the building entrance by elevators and one bin placed in the waste disposal area, and (c) one bin located outside the building in the main waste disposal area (which also contained bins for residual waste and recycling). The organic waste was weighed twice a week and collected weekly.

In the second intervention, both organic and recyclable (paper and container) waste collection rates were assessed in six towers across two university student residences (N = 1,906 students). The six towers were randomly assigned to one of four conditions. This intervention consisted of a convenient condition where bins were placed in the hallway on each floor and three inconvenient conditions where (a) a bin was located in the basement of the building (ranging from 41 to 163 ft away); (b) recycling and organic waste bins were placed in different locations, with the recycling and residual waste located in the basement and the organic waste bin located outside; and (c) recycling and organic waste bins were located in the basement, with a garbage chute for residual waste located in the hallway on residence floors. The effect of each condition was assessed on the weight of recyclables and organic waste twice weekly.¹¹



What behavioral tools are present in this initiative?

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: Decreasing the proximity (a barrier) between residents and appropriate infrastructure can boost waste management behaviors like recycling.¹² The current case study assessed the impact of distance to recycling and organic waste bins on waste disposal.

Results

Convenience mediated waste disposal in both experiments, whereby shorter trips boosted waste diversion rates. In the first intervention, apartment units with organic waste bins on each floor diverted significantly more waste relative to those with inconveniently located bins. Placing bins in convenient locations increased organic waste collection rates by 70 percent. On average, residents diverted approximately 1.25, 0.85, and 0.75 kg per bedroom per week in the most convenient, convenient, and inconvenient conditions, respectively.

In the second intervention, students diverted significantly more recyclable and organic waste when bins were on residential floors relative to in the basement or outside. In the convenient condition, container, paper, and organic waste collections increased by 147, 137, and 139 percent, respectively. By weight, students diverted approximately 0.7 kg per person per week of container and paper recyclables and approximately 0.45 kg per person per week of organic waste. Students diverted similarly low levels of containers, paper, and organic waste in the inconvenient conditions.¹³

This case reinforces the role of convenience in waste management programs and its value in diverting waste from landfills. Its success has informed the design of new student residences. Additionally, the design guidelines of waste diversion

infrastructure now prioritize convenience in student residences, multifamily residential dwellings, and academic buildings.¹⁴



Complementary actions to consider

- » Across both interventions, even minimal levels of inconvenience hindered waste diversion.¹⁵ Such data could inform the placement of residual waste bins in multifamily dwellings. For instance, past studies indicate that decreasing the convenience of residual waste bins can promote waste diversion.
- » Research suggests that individuals are most receptive to change during transitional periods.¹⁶ New tenants, for instance, may be more inclined to adopt proper recycling and composting practices than existing ones. City programs could target new residents to help them develop a habit of waste diversion. Such initiatives could run complementary to measures that increase the convenience of waste disposal infrastructure.



Want to know more?

[Municipal Solid Waste Management in Canada](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Statistics Canada—Population and Dwelling Count Highlight Tables 2011. Retrieved from <https://www12.statcan.gc.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Table-Tableau.cfm?LANG=Eng&T=101&S=50&O=A>
Population in 2021: 36,991,981. Source: Statistics Canada. (2022). *Population and dwelling counts: Canada, provinces and territories*. Government of Canada. Retrieved from <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=9810000101>
- ² Smith, R., Trant, D., & Tait, M. (2012). *Human Activity and the environment: Waste management in Canada 2012 - Updated*. Statistics Canada, Ministry of Industry, Government of Canada. Catalogue no. 16-201-X.
- ³ Mustapha, I. (2013). *Composting by households in Canada*. Environstats, Statistics Canada, Government of Canada. Catalogue no. 16-002-X ISSN 1913-4320.
- ⁴ Bordt, M. (2007). *EnviroStats, Summer 2007 Vol. 1 No. 1*. Statistics Canada, Ministry of Industry, Government of Canada. Catalogue no. 16-002-XIE ISSN 1913-4320. Retrieved from <https://www150.statcan.gc.ca/n1/en/pub/16-002-x/16-002-x2007001-eng.pdf?st=QJ7Ji8I>
- ⁵ Statistics Canada—Households and the Environment Survey (HES). (2011). Retrieved from <https://www12.statcan.gc.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Table-Tableau.cfm?LANG=Eng&T=101&S=50&O=A>
- ⁶ Munro, A. (2010). *Recycling by Canadian Households, 2007*. Environment Accounts and Statistics Analytical and Technical Paper Series. Retrieved from <https://www150.statcan.gc.ca/n1/daily-quotidien/130318/dq130318b-eng.htm>
- ⁷ Continuous Improvement Fund. (2010). *Guidelines for implementing best practices in municipal multi-residential recycling programs*. Canada.
Based on information received from Bud Fraser, Senior Planning & Sustainability Engineer, the University of British Columbia (October 5, 2022).
- ⁸ Mustapha, I. (2013). *Composting by households in Canada*. Environstats, Statistics Canada, Government of Canada. Catalogue no. 16-002-X ISSN 1913-4320.
- ⁹ LeVasseur, S., Laporte, C., & Heisz, A. (2017). *Dwellings in Canada - Census of population, 2016*. Statistics Canada, Minister of Industry, Government of Canada. Catalogue no. 98-200-X2016005. ISBN 978-0-660-08240-0.
- ¹⁰ DiGiacomo, A., Wu, D. W. L., Lenkic, P., Fraser, B., Zhao, J. & Kingstone, A. (2018) Convenience improves composting and recycling rates in high-density residential buildings. *Journal of Environmental Planning and Management*, 61(2), 309–331. doi: 10.1080/09640568.2017.1305332
- ¹¹ Ibid.
- ¹² O'Connor, R. T., Lerman, D. C., Fritz, J. N., & Hodde, H. B. (2010). Effects of number and location of bins on plastic recycling at a university. *Journal of Applied Behavior Analysis*, 43, 711–715. doi: 10.1901/jaba.2010.43-711
- ¹³ DiGiacomo, A., Wu, D. W. L., Lenkic, P., Fraser, B., Zhao, J., & Kingstone, A. (2018). Convenience improves composting and recycling rates in high-density residential buildings. *Journal of Environmental Planning and Management*, 61(2), 309–331. doi: 10.1080/09640568.2017.1305332
- ¹⁴ Based on information received from Bud Fraser, Senior Planning & Sustainability Engineer, The University of British Columbia (October 5, 2022).
- ¹⁵ Rosenthal, S., & Linder, N. (2021). Effects of bin proximity and informational prompts on recycling and contamination. *Resources, Conservation and Recycling*, 168, 105430.
- ¹⁶ Verplanken, B., & Roy, D. (2016). Empowering interventions to promote sustainable lifestyles: Testing the habit discontinuity hypothesis in a field experiment. *Journal of Environmental Psychology*, 45, 127–134.



Getting people to be more sustainable with their waste disposal in China

Objective: Improve segregation of organic and other waste



Case summary

The city of Nanjing started an incentivized waste-sorting program called the Green Account Scheme to increase waste diversion rates. Residents were required to separate their organic waste for daily pickup. The scheme rewarded residents' waste-sorting behavior with points, which residents exchanged for goods and services. A public-private partnership facilitated the program, and local community committees managed its operation. While incentives and social norms established residents' interests in the scheme, habits and a dedicated collection staff facilitated the program's long-term success.

Challenge statement

In past decades, the Chinese government rolled out several waste segregation programs. However, increasing consumption, limited waste separation experience, and insufficient infrastructure undermined their success.



As the Chinese government increases awareness about waste disposal, Nanjing, Jiangsu implements waste separation collection bins across the city. © Dreamstime.com



Context and description of challenges

Nanjing is one of China's 20 largest cities. Its history and culture are intimately tied to food owing to a thriving food industry. In 2008, organic waste constituted 70.6 percent of the waste mix in Nanjing¹ (2010 population: approximately 8 million).² Between 1991 and 2009, households within Jiangsu Province (of which Nanjing is the capital) reported disproportionately higher organic waste volumes relative to similar eastern and central Chinese provinces.³ Cultural values—such as concerns about food freshness and negative attitudes towards leftovers—contributed to burgeoning organic waste generation rates.⁴

As concerns surrounding waste generation and disposal grew, government officials in China strengthened SWM regulations.⁵ In 2000, the Ministry of Housing and Urban-Rural Development launched a source separation pilot program in Nanjing and seven other provinces.⁶ This model was a departure for Nanjing, which historically lacked a well-established MSW disposal system or relied exclusively on landfills.⁷ These waste-sorting programs, however, saw limited success and primarily used awareness campaigns to promote behavior change.⁸ Residents were also disinclined to participate because there was no infrastructure to treat the separate waste.

China's commitment to curb organic waste increased steadily throughout the early 2000s and 2010s. These included bans on extravagant banquets⁹ and the Clean Your Plate social media campaign.¹⁰ In parallel, the government increased its attention and financing of treatment facilities for organic waste. This interest primed subsequent organic waste source separation schemes, including a new pilot program in Nanjing.

Decisions and actions

In 2013, the Nanjing government introduced a pilot organic waste-sorting program. The pilot project involved 23,000 households across 23 Nanjing communities. Due to historically low source separation rates, Nanjing devised an incentive scheme called the Green Account Scheme which used a new electronic smart card system to reward residents with points for correctly separating their organic waste.¹¹

District authorities and waste collection companies established a public-private partnership to operate the program. Community committees coordinated with collection companies and residents. The private companies managed the collection and transport of sorted waste. They were also responsible for promoting the scheme among residents. After pickup, companies transferred the waste to a government-managed centralized waste treatment facility.¹²

In the early 2020s, Nanjing extended the Green Account Scheme to rural districts. A collector and verification agent visited households to inspect the waste and credit residents' accounts with points. The government increased the program's scope to reward residents for hazardous waste collection and community outreach. The government gave extra points to the top three performing residents. Rural residents exchanged points for daily supplies in local supermarkets once a month.¹³

REFERENCE CASE STUDY

Chinese Innovation in SWM

In recent years, myriad Chinese municipalities have established innovative SWM programs. In 2013, the port city of Ningbo implemented a source separation and recycling program across six districts. The program used financial incentives where (a) neighborhoods that performed source separation were awarded grants for community activities and (b) residents deposited presorted dry waste in vending machine-type units for cash.

Additionally, the government leveraged accountability mechanisms by using QR-equipped bags for organic waste disposal. An extensive outreach campaign sustained citizen participation throughout the program. In total, 905,000 households (approximately 39 percent) participated in source separation, increasing the source separation rate to 17.5 percent annually (March 2020).¹⁴



The design

Several levels of government supported the Green Account Scheme. Nanjing's government district or subdistrict office monitored its implementation and provided funding. Local community committees mitigated issues with the Green Account Scheme's introduction and answered resident's questions. Community committees recorded and shared waste collection information with the local governing authority through the SWM Information System.

A private company collected food waste daily at an assigned collection site between 6:30 and 9:30 a.m. Residents collected and brought organic waste in plastic bags to the designated collection site. Company staff recorded the weight of each resident's organic waste and manually emptied residents' organic waste bags into designated green bins. The staff visually inspected drop-offs for nonorganic waste items. Residents discarded the bags in which they collected their organic waste into a designated bin provided by the company. The company transported the waste to a government-authorized kitchen waste treatment facility.¹⁵

The Green Account Scheme utilized an electronic SWM Information System to record organic waste segregation through smart cards.¹⁶ Each household was eligible for one smart card and received points for correctly segregating their waste. Residents exchanged points (accrued at a rate of 1 per day to a maximum of 30 points per month) for goods and services monthly. Different items (for example, eggs and knife sharpening) cost different point amounts. Reportedly, residents especially valued eggs; this item motivated some nonparticipants to enroll in the Green Account Scheme.

The company's daily presence helped residents establish a waste-sorting habit. Daily organic waste collections also allowed residents to socialize with each other and with the collection company's staff. Groups of residents regularly planned social gatherings, such as line dancing, near organic waste drop-offs.

Community committees publicized monthly participation rates—including points awarded per household and weight of organic waste collected—on posters. They

recognized top-performing apartments in red text. This public recognition acted as a nonmaterial reward. Collection companies encouraged participation through leaflets and a hotline was set up to provide information on waste-sorting techniques. The government also fined residents who violated the program's terms.¹⁷

To facilitate accountability, the municipality developed a credit-based evaluation system. The municipality graded companies on their performance (collecting, transporting, and disposing of waste). The government included credits in the business portfolio of companies, which were useful to compare SWM services during bidding activities.

What behavioral tools are present in this initiative?

FINANCIAL MECHANISMS



Material rewards: Research suggests that—in certain circumstances— incentive schemes can promote positive MSW behaviors.¹⁸ In Nanjing, residents received points for separating their food waste. Residents could exchange points for groceries, household items, or services. Residents especially valued eggs as a reward. The incentive scheme offset the opportunity costs of engaging in waste separation (that is, time and energy and distance to collection point).

SOCIAL AND MOTIVATIONAL MECHANISMS



Social comparison: The literature suggests that the relative standing of individuals among their peers can influence MSW practices.¹⁹ In Nanjing, a poster near the collection bins showed the quantity of food waste sorted the previous month. It also denoted points awarded to households, intended to foster positive social norms and compare each household's relative standing.



Social Norms: Research suggests that individuals' beliefs about how others behave influence their waste management behaviors,²⁰ particularly when the behavior is highly visible.²¹ In Nanjing, residents indicated that their neighbors' behavior facilitated their waste segregation behavior. Additionally, residents could see how many of their neighbors separated their waste through posters.



Results

In Nanjing, incentives acted as a catalyst for residents to form positive waste management habits. As of 2015, 6,000 long-term participants segregated their food waste for at least 20 days a month. The program facilitated social interactions, both among residents and between residents and the collection company. These interactions acted as reinforcement to sustain waste practices. Positive social norms were particularly influential to facilitate community participation. Indeed, when incentives were temporarily suspended in 2016, waste-sorting rates remained high due to habits and social norms.²² Habits appeared to be strongest when the program was established for over a year.²³ Convenience mediated participation: apartment buildings further from designated collection areas contained fewer participating households. Distance primarily deterred new over existing participants.²⁴

More generally, since 2018 China has made ambitious policy commitments toward a circular economy including better resource utilization, resource efficiency, and carbon neutrality. In November 2020, Nanjing mandated household source segregation. Through this initiative, the government evaluated and publicized information on urban districts' SWM efforts monthly. Communities received ratings (A, B, or C in order of decreasing performance).²⁵ The government fined residents (CNY 200 or approximately USD 30) for failing to segregate their waste.²⁶ This system largely replaced the Green Account Scheme in urban areas. In 2021, 11 communities (269 residential compounds) received 'A' ratings, 64 communities (4,090 compounds) received 'B' ratings, and 25 communities (1,125 compounds) received 'C' ratings.²⁷ As of 2022, Nanjing collected and treated 1,923 tons of organic waste daily.²⁸



Complementary actions to consider

- » The collection schedule was a barrier to participation in the present case.²⁹ Small hassles like this may also impede participation in waste diversion programs elsewhere. Practitioners may consider performing diagnostics to first understand residents' core barriers to organic waste segregation before introducing programming to increase the ease of participation.



Want to know more?

[Nanjing Government: Solid Waste Management](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- 1 Tai, J., Zhang, W., Che, Y., & Feng, D. (2011). Municipal solid waste source-separated collection in China: A comparative analysis. *Waste Manage*, 31(8), 1673–1682. doi: 10.1016/j.wasman.2011.03.014
- 2 National Bureau of Statistics of China. (2010). *Sixth National Population Census*. People's Republic of China.
Population in 2021: 9.3 million. Source: National Bureau of Statistics of China. (2021). *Compendium of the Seventh National Population Census (No. 3)*. People's Republic of China.
- 3 Qi, D., Apolzan, J. W., Li, R., & Roe, B. E. (2020). Unpacking the decline in food waste measured in Chinese households from 1991 to 2009. *Resources, Conservation and Recycling*, 160, 104893.
- 4 Leung, H. (2015). *No doggy bag please: Chinese attitudes on food waste*. Royal Roads University (Canada).
- 5 Suocheng, D., Tong, K. W., & Yuping, W. (2001). Municipal solid waste management in China: Using commercial management to solve a growing problem. *Utilities policy*, 10(1), 7–11.
- 6 Tai, J., Zhang, W., Che, Y., & Feng, D. (2011). Municipal solid waste source-separated collection in China: A comparative analysis. *Waste Manage*, 31(8), 1673–1682. doi: 10.1016/j.wasman.2011.03.014
- 7 Ma, J., Luo, Z., Chen, F., Zhu, Q., Zhang, S., & Liu, G. J. (2018). A practical approach to reduce greenhouse gas emissions from open dumps through infrastructure restructuring: A case study in Nanjing City, China. *Sustainability*, 10(8), 2804.
- 8 Zhang, H., Wen, Z., & Chen, Y. (2016). Environment and economic feasibility of municipal solid waste central sorting strategy: A case study in Beijing. *Frontiers of Environmental Science & Engineering*, 10, 1–11.
Dai, Y. C., Gordon, M. P. R., Ye, J. Y., Xu, D. Y., Lin, Z. Y., Robinson, N. K. L., Woodard, R., & Harder, M. K. (2015). Why doorstepping can increase household waste recycling. *Resources, Conservation and Recycling*, 102, 9–19. doi: 10.1016/j.resconrec.2015.06.004
- 9 Gu, W. (2014, January 16). Beijing's corruption crackdown is a boon for bargain-hunting Chinese. *Wall Street Journal*.
- 10 Wang, L., Yang, Y., & Wang, G. (2022). The Clean Your Plate Campaign: Resisting table food waste in an unstable world. *Sustainability*, 14(8), 4699.
- 11 Li, C. J., Huang, Y. Y., & Harder, M. K. (2017). Incentives for food waste diversion: Exploration of a long term successful Chinese city residential scheme. *Journal of Cleaner Production*, 156, 491–499. doi: 10.1016/j.jclepro.2017.03.198
- 12 Cao, J., Zhao, J., Cao, Q., Wu, Y., Luo, J., Qian, T., & Bo, C. (2019). Comparison of Two Disposal Modes of Municipal Solid Waste Based on Life Cycle Assessment. *Environmental Protection Science*, (6), 92–100. doi: 10.16803/j.cnki.issn.1004-6216.2019.06.016
- 13 Xinhua News Agency. (2022, May 17). 高淳固城：垃圾分类好处多 “绿色账户”促分类 [Gaocun District: Green Account Scheme to catalyze waste segregation]. *Sina News*. Retrieved from https://k.sina.com.cn/article_5675440730_152485a5a02001env6.html?pid=ikjia.cn
- 14 Mathur, K. (2019). *Implementation Completion Report (ICR) review: CN-Ningbo municipal solid waste recycling*. Report number: ICRR0022457. IEG, World Bank. Retrieved from <https://documents1.worldbank.org/curated/en/878751622737441606/pdf/China-CN-Ningbo-Municipal-Solid-Waste-Recycling.pdf>
Ionkova, K. (2020). *Implementation Completion and Results Report IBRD82500: Ningbo Municipal Solid Waste Minimization and Recycling Project (P123323)*. World Bank, Washington, DC. Retrieved from <https://documents1.worldbank.org/curated/en/545241608684659091/pdf/China-Ningbo-Municipal-Solid-Waste-Minimization-and-Recycling-Project.pdf>
- Neighbour, D. (2020). *Insight out: Closing the loop on wastewater in China*. China Environment Forum, Wilson Center. https://www.wilsoncenter.org/sites/default/files/media/uploads/documents/Insight%20Out_dec%202019_spread.pdf
- 15 Li, C. J., Huang, Y. Y., & Harder, M. K. (2017). Incentives for food waste diversion: Exploration of a long term successful Chinese city residential scheme. *Journal of Cleaner Production*, 156, 491–499. doi: 10.1016/j.jclepro.2017.03.198
- 16 Nanjing Municipal People's Government. (2013). *Measures of the Nanjing MSWM Classification Administration. No.292 [2020] of Order of Nanjing Municipal People's Government*. Retrieved from <https://baike.baidu.com/item/%E5%8D%97%E4%BA%AC%E5%B8%82%E7%94%9F%E6%B4%BB%E5%9E%83%E5%9C%BE%E5%88%86%E7%B1%BB%E7%AE%A1%E7%90%86%E5%8A%9E%E6%B3%95/2330025>
- 17 Ibid; Li, C. J., Huang, Y. Y., & Harder, M. K. (2017). Incentives for food waste diversion: Exploration of a long term successful Chinese city residential scheme. *Journal of Cleaner Production*, 156, 491–499. doi: 10.1016/j.jclepro.2017.03.198.
- 18 Abila, B., & Kantola, J. (2019). The perceived role of financial incentives in promoting waste recycling—Empirical evidence from Finland. *Recycling*, 4(1), 4. doi: 10.3390/recycling4010004
- 19 Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic Appl. Soc. Psychol.*, 21, 25–36. doi: 10.1207/s15324834basps2101_3
- 20 Schultz, P. W. (2002). Knowledge, information, and household recycling: Examining the knowledge-deficit model of behaviour change. In T. Dietz, P. C. Stern (Eds.), *New tools for environmental protection: Education, information, and voluntary measures*. National Academy Press, Washington, DC.
- 21 Barr, S., Ford, N. J., & Gilg, A. (2003). Attitudes towards recycling household waste in Exeter, Devon: Quantitative and qualitative approaches. *Local Environ.*, 8(4), 407–421.
- 22 Li, C. J., Huang, Y. Y., & Harder, M. K. (2017). Incentives for food waste diversion: Exploration of a long term successful Chinese city residential scheme *Journal of Cleaner Production*, 156, 491–499. doi: 10.1016/j.jclepro.2017.03.198



- ²³ Li, C., Wang, Y., Li, Y., Huang, Y., & Harder, M. K. (2021). The incentives may not be the incentive: A field experiment in recycling of residential food waste. *Resources, Conservation and Recycling*, 168, 105316.
- ²⁴ Li, C., Zhang, Y., Nouvellet, P., Okoro, J. O., Xiao, W., & Harder, M. K. (2020). Distance is a barrier to recycling—or is it? Surprises from a clean test. *Waste Management*, 108, 183–188.
- ²⁵ Nanjing Urban Management Bureau. (2022). *Household waste segregation performance ranking in Nanjing*. Nanjing Municipal People's Government. Retrieved from http://cgj.nanjing.gov.cn/zhuantizhuanlan/ljfl_20190625/xgzx_20190625/202212/t20221212_3782428.html
- ²⁶ Nanjing Urban Management Bureau. (2020). 南京市生活垃圾管理条例 [Nanjing MSWM Regulations]. Nanjing Municipal People's Government. Retrieved from http://cgj.nanjing.gov.cn/zhuantizhuanlan/ljfl_20190625/flfg_20190625/202009/t20200911_2403683.html
- ²⁷ Nanjing Urban Management Bureau. (2021). 生活垃圾强制分类全面实施一周年 [First anniversary mandatory waste separation in Nanjing]. Nanjing Municipal People's Government. Retrieved from http://cgj.nanjing.gov.cn/zhuantizhuanlan/ljfl_20190625/xgzx_20190625/202111/t20211102_3176863.html
- ²⁸ Nanjing Urban Management Bureau. (2022). 全面分类两周年，全市日均收处厨余垃圾1923吨增长翻一番 [Daily kitchen waste treatment reaches 1,923 tons two years after mandatory waste separation]. Nanjing Municipal People's Government. Retrieved from http://cgj.nanjing.gov.cn/zhuantizhuanlan/ljfl_20190625/xcsp_20190625/202212/t20221212_3782276.html
- ²⁹ Li, C., Wang, Y., Li, Y., Huang, Y., & Harder, M. K. (2021). The incentives may not be the incentive: A field experiment in recycling of residential food waste. *Resources, Conservation and Recycling*, 168, 105316.



Getting people to be more sustainable with their waste disposal in India

Objective: Increase source segregation of organic and other waste



Case summary

The city of Kumbakonam, Tamil Nadu, implemented Project Sarvam to decentralize the SWM system and help shift residents' waste attitudes and behaviors. The project used social, financial, and design-based interventions to encourage source segregation, composting, and proper waste disposal. Complementarily, the city expanded its capacity for end-of-life waste treatment by developing a resource recovery facility and refuse-derived fuel (RDF) plant. Project activities successfully increased source segregation rates to 70 percent.

Challenge statement

India's small towns had underdeveloped municipal services due to financial and technical constraints.¹ Kumbakonam is an active religious center and many visitors aggravated the existing difficulties in SWM. These conditions increased organic and plastic waste generation and littering.

Context and description of challenges

The city of Kumbakonam (2011 population: 140,000)² is known as the Temple City of South India. It welcomes myriad local and non-local visitors to its temples every day. It is also the host city for historically significant religious events. The city's thriving event scene and throngs of visitors prompted the establishment of food distribution services. However, this caused organic waste to surge. Alongside increasing volumes of organic waste, the city also grappled with the disposal of single-use products distributed to visitors at temples (for example, plastics and straws).³ Visitors increased the volumes of plastic waste, as a culture of plastic use and disposal was also prevalent among residents.⁴

Kumbakonam generated approximately 0.5 kg of MSW per capita per day, comprising up to 65 percent organic content and 22 percent nonrecyclable waste (2015).⁵ Despite the high organic content, a small-scale study reported that 96 percent (N = 288) of respondents did not practice home composting. Most residents were also unaware of proper SWM practices.⁶

In the absence of an effective SWM system, Kumbakonam struggled to prevent the improper disposal of waste in several parts of the city. Uncontrolled open dumps were commonplace, which posed public health and environmental issues. The city attempted to promote proper waste handling by placing waste bins (167 in total) across the city, but the bins were inconveniently located and improperly used.⁷



In response to burgeoning MSW rates, the city unsuccessfully attempted to improve MSWM. For example, the city removed public waste bins for their door-to-door waste collection system, but open dumping increased.⁸ Dovetailing these unsuccessful attempts to promote better MSWM and inspired by the success of a neighboring municipality, Kumbakonam re-envisioned its MSWM strategy.

Decisions and actions

In 2015, Kumbakonam legally mandated waste source segregation. The city developed 'Project Sarvam' to promote compliance with the law.⁹ Project Sarvam was a multidimensional initiative designed to increase awareness of the importance of waste sorting and regulate littering. Project Sarvam decentralized SWM treatment in a stepwise process. The city first initiated a community outreach program. Outreach used citizen volunteers, private firms, and local philanthropists to promote good waste practices.

Following the outreach program, the city created composting facilities to divert waste away from the local landfill that was reaching capacity. The municipality took a two-pronged approach to composting. The city assisted residents in establishing home composting setups. Kumbakonam also established a network of municipal-run compost sites (called Micro-Composting Centers [MCCs])¹⁰ in highly trafficked areas (for example, markets and bus stops).¹¹ These centers made composting more convenient for residents.

In 2019, following the state's ban on plastic bags, Kumbakonam developed a bylaw that restricted SUPs (for example, cups and plates). Penalties accompanied the bylaw. Producers who violated the law had their licenses revoked.¹² Alongside these initiatives, the government set up a resource recovery facility with refuse-derived fuel (RDF) functionality. The facility sorted and sold recyclable waste. It processed residual waste into RDF for cement plant feedstock.



Source: Kumbakonam Municipal City Municipal Corporation website.

The design

Project Sarvam relied on numerous stakeholders—including NGOs, self-help groups (SHGs),¹³ resident associations, and students. These groups acted as behavior change messengers and encouraged source separation among residents. The city oversaw stakeholders, monitored their progress, and transferred funds from the national mission on cleanliness (Swachh Bharat Mission) to respective beneficiaries.

In line with the municipality's source segregation policy, citizens segregated their waste into green (organic waste) and red (recyclable/residual waste) bins. The government instructed waste collectors to collect only segregated waste. Messengers (volunteers and officials) conducted community outreach to encourage source segregation. Outreach tactics used prosocial motivation and emphasized the importance of the city's cleanliness and business environment.¹⁴

The municipality drew on several tactics to deter open dumping, which consisted largely of education and incentives. For instance, volunteers provided educational programming in schools and at temple sites. The municipality also ran awareness campaigns and leveraged social media platforms (for example, WhatsApp) to



reinforce proper waste management practices. A network of 80 SHGs disseminated information from awareness programs.¹⁵ Local philanthropists partnered with the municipality; they gave households a gold coin for following waste management rules. Kumbakonam also issued littering fines (INR 10–1,000 or USD 0.13–13) although the government eventually removed them after public opposition. To deter open dumping at vulnerable points, volunteers drew on the floors of such sites (*kolams*: floor drawings). *Kolams* appealed to residents' cultural and religious values. The city also deployed municipal workers to such areas. Further, Kumbakonam planted fruit and vegetable plants between houses to deter open dumping.¹⁶

What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Frame messaging to personal values, identities, or interests: The presentation of information can influence pro-environmental behaviors.¹⁷ In Kumbakonam, volunteers used drawings that leveraged cultural and religious values to deter waste dumping.

FINANCIAL MECHANISMS



Material rewards: In certain contexts, monetary incentives can promote the uptake of positive MSW behaviors.¹⁸ The present case study applied this tool in a traditional way. Households in Kumbakonam received a gold coin annually for correctly segregating their waste to reward proper MSW behavior.

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: Making an undesirable behavior more difficult or effortful can deter individuals from engaging in it.¹⁹ In Kumbakonam, the government planted fruit and vegetable plants in alleyways between housing complexes that would otherwise serve as disposal sites. These plants made it more difficult for residents to engage in improper waste disposal behaviors.

Results

The source segregation rate reached 80 percent during the project's initial stage. As of 2021, it was 65–70 percent. The program provided socioeconomic support to 6,000 women associated with 80 SHGs. Ten thousand women and children learned better waste management practices under the program.²⁰ The Ministry of Housing and Urban Affairs (MoHUA) awarded Kumbakonam the 'Swachhata Excellence Award' (excellence award for cleanliness) in 2019 for engaging women-led SHGs to further the goals of the Clean India Mission.²¹ The city also received INR 500,000 (approximately USD 7,000) in funds.²²

The program saw limited success in convincing residents to practice composting. Residents were disinclined to compost at homes since its setup attracted insects and caused odors. Despite the shortcomings of home composting setups, residents embraced MCCs.



Complementary actions to consider

- » Educational programs to reduce littering are often limited if conveniently located disposal options are unavailable.²³ Practitioners undertaking similar interventions could pair educational and outreach programming with easily accessible and attractive waste bins.
- » Research suggests that messaging targeting items that should not go in recycling bins is comparatively more effective than informing residents which items are permissible.²⁴ Governments may be inclined to align their communications tactics with this guidance.



Want to know more?

[Kumbakonam City Municipal Corporation](#)
[Press Release: Ministry of Housing and Urban Affairs,](#)
[Government of India](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Harriss-White, B. (2019). Waste, social order, and physical disorder in small-town India. *The Journal of Development Studies*, 1–20. doi:10.1080/00220388.2019.157738
- ² Census (2011), Primary Census Abstracts, Registrar General of India, Ministry of Home Affairs, Government of India; Population in 2021: approximately 0.14 million. Source: Biswas, A., Parida, S., Chaudhary, K., Singh, R., Tewari, S., & Singh, S. (2021). *Waste-Wise Cities: Best practices in municipal solid waste management*. Centre for Science and Environment and NITI Aayog, New Delhi.
- ³ Ibid.
- ⁴ Indhira, K., Senthil, J., Vadivel, S., Appl, A., & Res, S. (2015). Awareness and attitudes of people perception towards to household solid waste disposal: Kumbakonam Town, Tamilnadu, India. *Arch. Appl. Sci. Res*, 7, 6–12.
- ⁵ Centre for Science and Environment. (2020). *Clean it right: Dumpsite management in India*. School of Circular Economy, Anil Agarwal Environment Training Institute (AAETI), CSE. Retrieved from <http://www.indiaenvironmentportal.org.in/content/472142/clean-it-right-dumpsite-management-in-india/>
- ⁶ Indhira, S. K., & Senthil, J. (2015). *Solid waste management perception attitudes and health status in Kumbakonam using geo spatial analysis*. Bharathidasan University. Retrieved from <http://hdl.handle.net/10603/291911>
- ⁷ Senthil, J., Vadivel, S., & Murugesan, J. (2012). Optimum location of dust bins using geo-spatial technology: a case study of Kumbakonam town, Tamil Nadu, India. *Advances in Applied Science Research*, 3(5), 2997–3003.
- ⁸ Biswas, A., Parida, S., Chaudhary, K., Singh, R., Tewari, S., & Singh, S. (2021). *Waste-Wise Cities: Best practices in municipal solid waste management*. Centre for Science and Environment and NITI Aayog, New Delhi.
- ⁹ Ibid.
- ¹⁰ MCCs are composting sites developed in service areas, promoted by Tamil Nadu State Government, to establish a decentralized composting network in the state. (https://tnpcb.gov.in/pdf_2019/AnnualRptSolidwaste1920.pdf)
- ¹¹ Ibid.
- ¹² Down to Earth. (2022). *Kumbakonam's plastic waste used as fuel in cement factories: The cleanest cities of India #6*. Retrieved from <https://www.youtube.com/watch?v=XKYQ-b7U7FgM>
- ¹³ Group of 8–20 women associated through a community-based saving model. SHGs commonly develop microenterprises to financially support the members in a sustainable manner.
- ¹⁴ Biswas, A., Parida, S., Chaudhary, K., Singh, R., Tewari, S., & Singh, S. (2021). *Waste-Wise Cities: Best practices in municipal solid waste management*. Centre for Science and Environment and NITI Aayog, New Delhi.
- ¹⁵ Karthik, D. (2019, February 17). Swachhata Excellence Award 2019: Kumbakonam bags third prize. *The Times of India*. Retrieved from <https://timesofindia.indiatimes.com/city/chennai/swachhata-excellence-award-2019-kumbakonam-bags-third-prize/article-show/68036286.cms>
- ¹⁶ Biswas, A., Parida, S., Chaudhary, K., Singh, R., Tewari, S., & Singh, S. (2021). *Waste-Wise Cities: Best practices in municipal solid waste management*. Centre for Science and Environment and NITI Aayog, New Delhi.
- ¹⁷ White, K., MacDonnell, R., & Dahl, D. W. (2011). It's the mind-set that matters: The role of construal level and message framing in influencing consumer efficacy and conservation behaviors. *J. Market. Res.*, 48(3), 472–485. doi:10.1509/jmkr.48.3.472
- ¹⁸ Abila, B., & Kantola, J. (2019). The Perceived role of financial incentives in promoting waste recycling—Empirical evidence from Finland. *Recycling*, 4(1), 4. doi: 10.3390/recycling4010004
- ¹⁹ Mazar, A., Tomaino, G., Carmon, Z., & Wood, W. (2020). Sustaining sustainability: Lessons from the psychology of habits. *PsyArXiv Prepr*.
- ²⁰ Biswas, A., Parida, S., Chaudhary, K., Singh, R., Tewari, S., & Singh, S. (2021). *Waste-Wise Cities: Best practices in municipal solid waste management*. Centre for Science and Environment and NITI Aayog, New Delhi.
- ²¹ Karthik, D. (2019). Swachhata Excellence Award 2019: Kumbakonam bags third prize. *The Times of India*. Retrieved from <https://timesofindia.indiatimes.com/city/chennai/swachhata-excellence-award-2019-kumbakonam-bags-third-prize/articleshow/68036286.cms>
- ²² Ministry of Housing and Urban Affairs. (2018). *Deendayal Antyodaya Yojana National Urban Livelihoods Mission: Swachhata Excellence Awards 2018–19: Guidelines*. Retrieved from http://www.sudaup.org/hlink/14_09_2018_2.pdf
- ²³ Almosa, Y., Parkinson, J., & Rundle-Thiele, S. (2017). Littering reduction: A systematic review of research 1995–2015. *Social Marketing Quarterly*, 23(3), 203–222.
- ²⁴ Downes, J., Borg, K., Tull, F. & Kaufman, S. (2021). *Reducing contamination of household recycling: Online survey experiments to improve kerbside recycling knowledge*. Prepared for the BWA Waste and CE collaboration, BehaviourWorks Australia, Monash University.



Getting people to be more sustainable with their waste disposal in Thailand

Main objective: Increase source segregation of organic and other waste

Other objectives: Increase reusing and recycling



Case summary

The province of Chiang Rai introduced the Chiang Rai Zero Waste initiative to improve community-based waste management. The government encouraged households to install a home composter (sa-wian) and use the humus in their home gardens. The government created a province-wide competition, leveraged social norms, and used symbolic rewards to encourage uptake. As the initiative expanded, it promoted household segregation of recyclables and worked more closely with villages to provide an enabling environment for better waste practices. The initiative's community-led approach led to a 96.7 percent household participation rate in home composting and recyclable source segregation. The source segregation scheme is currently active in 142 municipalities across the province.



© Chiang Rai Zero Waste Facebook



Challenge statement

Municipalities in northern Thailand could not afford to provide complete waste collection and disposal services. Without formal mechanisms to promote source segregation, few households voluntarily engaged in the practice.

Context and description of challenges

Chiang Rai (2018 population: 1,292,130)¹ is the northernmost province in Thailand. In 2014, the rural province generated approximately 0.93 kg of MSW per capita per day,² the majority of which was organic (66 percent). Waste collection was costly and few municipalities were able to provide waste collection services. In turn, 83 percent of provincial districts resorted to open dumping and burning for MSW disposal.³ Previous attempts at upscaling SWM infrastructure in Chiang Rai were unsuccessful as it could not accommodate the region's high volumes of waste.⁴ Additionally, the Chiang Rai Provincial Administrative Organization and municipalities faced strong public opposition to new landfilling sites.⁵ In theory, source segregation was a way to improve the sustainability of MSWM. However, in practice, there was no mechanism to facilitate changes in residents' SWM behaviors. Additionally, despite the high fraction of organic waste, it had no market value and provided households with no financial benefit.⁶

In the 2010s, several subdistricts in Chiang Rai introduced bottom-up community-based waste diversion initiatives.⁷ These initiatives provided the foundation for broader participatory approaches to SWM across the province.

Decisions and actions

In 2015, the Chiang Rai Provincial Administrative Organization launched the Chiang Rai Zero Waste (CRZW) initiative to increase waste diversion rates. The initiative drew on community-based waste management schemes in the province. It centered around organic waste source segregation given its ubiquity. The initiative encouraged

households to construct 'sa-wians' which were easy-to-use home composting units made of bamboo or other ubiquitous materials such as old roof tiles or nets.⁸ This setup alleviated the need for frequent waste collection services.

The design

Sa-wians offered households a hassle-free way to dispose of their organic waste. Residents could continuously add organic waste to sa-wians, which required no ongoing maintenance. The lack of maintenance required by these units mitigated the barrier to entry for household composting. Additionally, residents had experience with sa-wians, which had been used in northern Thailand to store rice paddies. The units were of low cost (THB 200 or USD 6.2) and lasted two to three years.

The government initiated the first phase of the project with a competition. The Chiang Rai Provincial Administrative Organization issued an official letter of invitation to the mayors of all 143 municipalities. Mayors promoted the competition to villages within their municipality. The contest was also publicized directly to village heads using social media, through which they received manuals and photos of sa-wians. Village heads registered their village's interest in participating. Village heads eagerly participated in light of the possibility of receiving recognition from the Governor of Chiang Rai. As a quorum of village heads started to enter the competition, this created a social norm, and others similarly joined in.⁹

Residents were required to build their sa-wians using locally sourced materials. Village heads shared pictures of sa-wians on social media. Sharing photos - alongside the visibility of sa-wians across villages - created a positive social norm. Over three months, households across 105 villages in Chiang Rai participated in the competition. The head of each participating village received a certificate and a pin. The top 83 villages were short-listed to commemorate the Queen's 83rd birthday. The household that made the best sa-wian in each village received a 71-inch poster. The poster contained a picture of their sa-wian, information about the CRZW movement, and sa-wian instructions. In addition to being a nonmaterial reward, the visibility of these posters helped co-opt village interest in sa-wians. Teams from 15 villages were



awarded trophies and invited to a single-day workshop to build an innovative sa-wian. Authorities selected the competition's winner from this workshop based on aesthetics, creativity, and durability. The top 15 villages' sa-wians displayed their creations in prominent locations across Chiang Rai.¹⁰

Under the second phase, the CRZW introduced a formalized version of the initiative across 18 rural villages (at least one per district) in Chiang Rai.¹¹ The government created a Memorandum of Understanding with these villages. The government turned these villages into 'learning centers' for their respective districts. Village households composted their organic waste using sa-wians, cultivated edible gardens, and sorted their recyclable waste. Residents subsequently sold recyclables or saved them for community projects. For instance, villages used the recyclables to create handicrafts or to start a waste bank. The Chiang Rai Provincial Administrative Organization financially supported villages (that is, through a one-time installment of THB 20,000 or USD 560). Residents of the villages conducted training in other villages on home composting. Local authorities complemented the above activities with training and awareness workshops. They also provided channels to market and sell household recyclables.

A five-person team (consisting of government actors and researchers from three universities in Chiang Rai) conducted evaluations. This team evaluated village activities against the scope of activities under the Memorandum of Understanding. Evaluations assessed villages' progress on source segregation, composting, and MSW disposal. Evaluation activities included interviews with key community leaders and household surveys (25 per village, randomly selected). Structured interviews provided information on each village's demographics and community norms related to waste management. The surveys assessed household demographics, community participation in waste management, and how as well as the extent to which households segregated organic waste and recyclables.¹²

What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Social comparison: The literature suggests that the relative standing of individuals among their peers can influence MSW practices.¹³ The CRZW initiative socialized home composting through sa-wian making competitions. Villages submitted pictures of sa-wians in their communities, which officials from the Chiang Rai Provincial Administrative Organization assessed.



Nonmaterial rewards: Some studies show that symbolic incentives facilitate changes in waste management behavior.¹⁴ Symbolic rewards like social recognition are also comparatively less likely to crowd out intrinsic motivation than monetary rewards.¹⁵ Under the sa-wian making competition, heads of participating villages received certificates from the Governor of Chiang Rai. The 15 villages that constructed the best sa-wians were also invited to display their sa-wians at provincial landmarks (for example, temples), which provided a form of public recognition.



Messengers: Studies on social influence show that we are more likely to internalize the claims or opinions of those perceived as credible and comply with those of perceived legitimate authority.¹⁶ In Chiang Rai, village heads were key in promoting the sa-wian making competition during the first phase of the CRZW initiative. These individuals disseminated information on the competition and co-opted participation from their villages (through, for example, radio announcements).¹⁷ These village heads were also influential in facilitating activities through the second phase of the CRZW initiative.

Results

The program successfully promoted household source segregation and composting. Following the CRZW initiative, 96.7 percent of households independently managed their organic waste. Participating villages embraced sa-wians. The majority of these households (91.6 percent) disposed of their organic waste using sa-wians, relative



to 22 percent pre-intervention. Through the initiative, households in the 18 participating villages constructed 4,880 sa-wians (approximately 1.83 per household). Once households installed sa-wians, almost half (44.9 percent) also practiced liquid composting, the product of which they used as garden fertilizer. This system eased the financial burden on the province's SWM system. The cost of constructing the 4,880 sa-wians (THB 0.98 million or approximately USD 26,000) was significantly cheaper than the long-term cost of waste collection (estimated at THB 2.26 or USD 0.06 per kg), leading to a return on investment within three months.¹⁸

The community's receptivity to home composting led to their willingness to segregate recyclables under the CRZW's second phase. The evaluations indicated that 96.7 percent of households in the 18 participating villages segregated at least one type of recyclable. While the program focused on organic and recyclable waste segregation, the initiative led to spillover effects whereby households also started segregating their hazardous waste. Based on the success of the CRZW pilot, the CRZW expanded to 253 villages in 2017.¹⁹ In 2018, the Chiang Rai Provincial Administrative Organization introduced mini-composters suitable for urban residents with limited storage. As of 2022, 142 municipalities segregated their waste at source (inclusive of organic, recyclable, and hazardous waste).²⁰

The CRZW initiative provides evidence that targeted waste management initiatives can be instrumental in gaining community participation and lending support for broader and more holistic downstream projects.



Complementary actions to consider

- » Experimental methods can help practitioners generate causal conclusions. Those looking to engage in similar initiatives could deploy interventions in select villages while keeping others as controls. Such learnings could provide meaningful information on what works and for whom across villages in which the initiative is implemented.



Want to know more?

[Chiang Rai Zero Waste](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ รายงานสถิติจำนวนประชากรและบ้านประจำปี พ.ศ.2561 [Statistics, population and house statistics for the year 2018]. Registration Office Department of the Interior, Ministry of the Interior. Retrieved from https://stat.bora.dopa.go.th/new_stat/webPage/statByYear.php
Population in 2021: 1,298,425; Source: National Statistical Officer. (2021). *Number of population from registration by age, sex and province 2021*. National Statistical Officer, Thailand.
- ² Phatthayaporn Unroj. (2021). แนวปฏิบัติที่ดีในการจัดการขยะแบบมีส่วนร่วมของเทศบาลตำบลเชียงเทือง อำเภอเทือง จังหวัดเชียงราย-พลิกวิกฤตเป็นโอกาส [Good practices for participatory waste management of Wiang Thoeng Sub-District Municipality, Thoeng District, Chiang Rai Province - Turning crisis into opportunity]. *Environmental Journal*, 25(1). Retrieved from <http://www.ej.eric.chula.ac.th/content/6137/302>
- ³ Ibid.
- ⁴ Manomaivibool, P., Srivichai, M., Unroj, P., & Dokmaingam, P. (2018). Chiang Rai Zero Waste: Participatory action research to promote source separation in rural areas. *Resources, Conservation and Recycling*, 136, 142–152. doi:10.1016/j.resconrec.2018.04.002
- ⁵ Based on information received from Panate Manomaivibool, professor, Mae Fah Luang University (November 24, 2022).
- ⁶ Boonrod, K., Towprayoon, S., Bonnet, S., & Tripetchkul, S. (2015). Enhancing organic waste separation at the source behavior: A case study of the application of motivation mechanisms in communities in Thailand. *Resources, Conservation and Recycling*, 95, 77–90.
- ⁷ Manomaivibool, P., Srivichai, M., Unroj, P., & Dokmaingam, P. (2018). Chiang Rai Zero Waste: Participatory action research to promote source separation in rural areas. *Resources, Conservation and Recycling*, 136, 142–152. doi:10.1016/j.resconrec.2018.04
- ⁸ Manomaivibool, P. (n.d.) *Evaluation Report 1-2-0 Public Participation Model for Waste Management*. Ngao Tambon Municipality. Retrieved from https://publicadministration.un.org/unpsa/Portals/0/UNPSA_Submitted_Docs/2019/9AF8B5B7-B91D-4F87-BC89-FCC03F1C9354/Evaluation%20Report%20Ngao.pdf?ver=2018-11-29-202402-020
Pariatamby, A., Hamid, F. S., & Bhatti, M. S. (2020). *Sustainable waste management challenges in developing countries*. IGI Global. ISBN 9781799802006.
- ⁹ Based on information received from Panate Manomaivibool, professor, Mae Fah Luang University (November 24, 2022).
- ¹⁰ Ibid.
- ¹¹ Manomaivibool, P., Srivichai, M., Unroj, P., & Dokmaingam, P. (2018). Chiang Rai Zero Waste: Participatory action research to promote source separation in rural areas. *Resources, Conservation and Recycling*, 136, 142–152. doi:10.1016/j.resconrec.2018.04.
- ¹² Ibid.
- ¹³ Downes, J., Borg, K., Tull, F. & Kaufman, S. (2021). *Reducing contamination of household recycling: Online survey experiments to improve kerbside recycling knowledge*. Prepared for the BWA Waste and CE collaboration, BehaviourWorks Australia, Monash University.
- ¹⁴ Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic Appl. Soc. Psychol.*, 21, 25–36. doi: 10.1207/s15324834basp2101_3
- ¹⁵ Department for Food and Rural Affairs. (2017). *Single-use plastic carrier bags charge: Data in England for 2016 to 2017*. Government of the United Kingdom.
- ¹⁶ Ryan R. M., & Deci E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25(2000), 54–67.
- ¹⁷ Milgram, S., & Gudehus, C. (1978). *Obedience to authority*. Ziff-Davis Publishing Company.
- ¹⁸ Manomaivibool, P., & Dokmaingam, P. (2017). *Final report: The review of solid waste management cost and the life cycle assessment of solid waste management systems: Principles and customization for local governments in Thailand*. Thailand Research Fund, Bangkok (in Thai).
Manomaivibool, P., Srivichai, M., Unroj, P., & Dokmaingam, P. (2018). Chiang Rai Zero Waste: Participatory action research to promote source separation in rural areas. *Resources, Conservation and Recycling*, 136, 142–152. doi:10.1016/j.resconrec.2018.04
- ¹⁹ Ibid.
- ²⁰ Based on information received from Panate Manomaivibool, professor, Mae Fah Luang University (November 24, 2022).



2.3 Getting people to generate less waste



RETURN TO CASE
SELECTION

2.3.1 Change consumption and production behaviors



RETURN TO CASE
SELECTION

Getting people to generate less waste and be more sustainable with their waste in Ireland

Objective: Change consumption and production behaviors



Case summary

The Irish government introduced a plastic bag levy (EUR 0.15 per bag) in 2002. Retailers imposed the charge at points of sale to decrease plastic bag usage and littering. A strong outreach campaign and high levels of public backing supported its introduction. The public embraced the scheme, leading to approximately 90 percent decline in SUP bags and a significant decrease in littering. The government recently introduced new regulations to tax other single-use products.

Challenge statement

Retailers in Ireland distributed approximately 1.2 billion plastic bags annually in the 1990s.¹ This created significant environmental issues, particularly littering. A leading survey ranked Ireland the second worst European country for coastal plastic waste litter. Regulations failed to curb plastic littering, which became a public nuisance.



Shopping cart with reusable bags. © melissabrock1, istock.com



Context and description of challenges

Ireland (2002 population: approximately 3.9 million)² experienced rapid economic growth in the 1990s that afforded it the nickname ‘Celtic Tiger’. Waste production rose significantly in the late 1990s, which posed environmental challenges. In line with changing consumption patterns, residents increasingly used SUPs.

In response, the government issued a series of regulations. These included the Litter Pollution Act of 1997, which restricted garbage disposal in public spaces.³ Local authorities—responsible for enforcing the act—were required to increase awareness about the negative consequences of litter. Despite regulations, SUP bags were often discarded indiscriminately and constituted 5 percent of total national litter.⁴ Ireland’s high winds frequently scattered littered bags, which accumulated along roadsides and coastlines.⁵ Consequently, plastic litter became increasingly salient to residents and visitors, the latter of which threatened the tourism industry.⁶

As environmental issues mounted, the Irish government used awareness campaigns to galvanize environmental action. Their effectiveness was limited. In the late 1990s and early 2000s, surveys revealed widespread public concern about the environment and waste but limited pro-environmental behaviors.⁷ As residents struggled to act on their environmental intentions, the government turned to fiscal measures to deter plastic consumption.

Decisions and actions

In 2001, the Irish government introduced the Waste Management (Environmental Levy) (Plastic Bag) Regulations to curb plastic consumption. Consultations with the major stakeholders—industries, government, and retailers—followed the regulation’s launch. Under this legislation, plastic bags were subject to a levy of EUR 0.15 (approximately USD 0.13) per bag. The regulation excluded bags used to separate foods for hygienic purposes (dimensions smaller than 255 x 345 mm).⁸ The government used data from a national consultation to set the levy which indicated residents were

either unwilling to pay for a plastic bag or inclined to pay a small amount.⁹ The government intentionally set the bag levy high to discourage consumption. The regulations established the rate at which the government could increase the levy annually and set a minimum rate of 70 cents for a reusable bag. This avoided the need to set a physical definition for a reusable bag, which proved difficult to define at the time of the levy’s design.

The levy—which came into effect in March 2002—complemented the country’s existing littering ban. The government instated the levy over six months at EUR 1.2 million (approximately USD 1,116,000). During this time, the government purchased reusable bags and modified retailer computer systems to accommodate the change and track revenues. In the lead-up to the levy’s launch, the government also initiated an outreach campaign (EUR 358,000 or USD 332). Ongoing administrative costs amounted to EUR 350,000 (approximately USD 451,500) annually.¹⁰

The government diverted collected revenues—together with revenues from Ireland’s landfill levy—into a national Environment Fund. The fund supported environmental projects, including Ireland’s National Litter Pollution Monitoring Survey and the ‘Green Schools’ primary and secondary education program, and provided core funding for Irish environmental NGOs. Following the introduction of the tax, gradual increases deterred plastic consumption levels from rebounding. In 2007, the government increased the tax to its current rate of EUR 0.22 to deal with rising SUP bag usage (Figure 18).¹¹

The design

Public participation was key to the plastic bag levy’s success. Before its introduction, the Irish government used an outreach campaign (including television and billboard ads) to outline the value of the bag levy. It also explained how revenues would support environmental projects using the Environment Fund. The fund was a key component for public acceptability, as it was important that residents did not perceive the scheme as a tax-raising mechanism.



Retailers implemented the law by charging customers for SUP bags at checkout areas. The government integrated the tax on plastic bags into retailers' value added tax (VAT) collection systems to mitigate administrative burdens.¹² Alongside their plastic counterparts, citizens could purchase reusable bags at points of sale.¹³ This made it easier for consumers to opt for alternatives to SUP bags and avoid the levy.

Ireland's Revenue Commission managed the levy's enforcement on behalf of the Department of Communications, Climate Action, and Environment.¹⁴ The government required retailers to maintain a log of all bags sold. Authorities monitored retailer activities to ensure that they did not provide bags free of charge. Local officers frequently visited retailers to curb unfair practices. This system ensured that retailers were accountable and complied with the levy's rules.¹⁵

Authorities collected funds from the sale of bags every three months. Retailers that failed to transfer revenue to the authority paid a late fee.¹⁶ Revenues funded environmental activities, including waste recycling systems and beach litter cleanups.¹⁷

What behavioral tools are present in this initiative?

FINANCIAL MECHANISMS



Appealing to loss aversion: Research suggests that fees can be more effective than similarly sized rewards in deterring disposable bag use.¹⁸ The Irish government levied a small fee (EUR 0.15) to discourage the consumption of SUPs.

SYSTEM DESIGN MECHANISMS



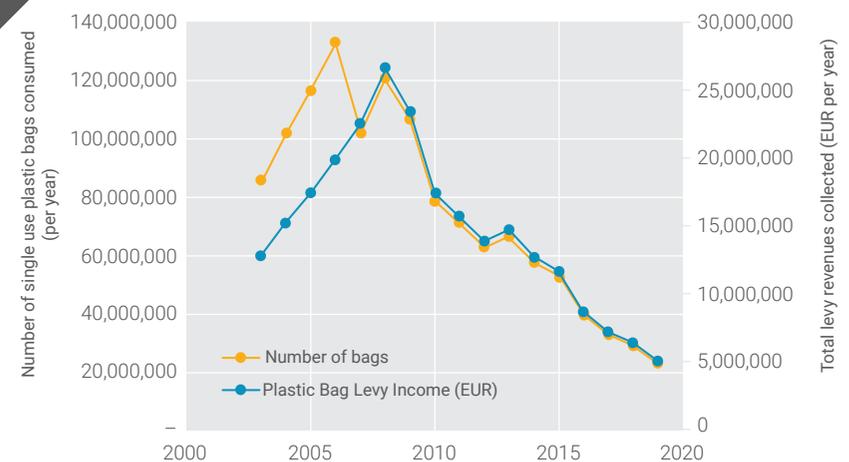
Simplifying behaviors and decisions: Introducing or removing small barriers can affect individuals' likelihood of engaging in certain behaviors.¹⁹ In the present case study, the levy imposed on SUP bags disrupted consumers' automatic tendency to rely on them. Additionally, residents could purchase reusable bags at points of sale. By placing reusable bags at convenient locations, retailers decreased barriers to their uptake.

Results

Stakeholders and the public embraced the plastic bag levy. It decreased SUP bag use by approximately 90 percent from the baseline in less than a decade.²⁰ Plastic bag usage had a slight rebound after the levy's introduction. However, the government's levy increase in 2007 prevented additional spikes and led to further declines in plastic bag consumption (Figure 17). Through 2014, per capita consumption decreased from 328 to 14 plastic bags annually.²¹ As plastic consumption lessened, plastic litter decreased alongside coastlines, from a peak of 17 bags to two bags per 500 m (2012).²² Nationwide, plastic bags decreased from 5 to 0.21 percent of litter as of 2014.²³ Over seven years, Ireland accrued revenues for the Environment Fund of up to EUR 117 million (approximately USD 152.4 million).²⁴ The plastic bag levy also led to spillover effects for other consumption behaviors. A nationwide survey suggested that over the past two years (2020–2021), 22 percent of residents attempted to cut down on their use of other SUPs.²⁵ Due to the scheme's success, the level of

FIGURE
17

Levies collected through the scheme (2003–2019)



Source: Department of Environment, Climate and Communications, Ireland.



enforcement needed by the Revenue Commission has significantly reduced. Some major retailers no longer provide SUP bags.

Following Ireland's experience, Wales, Northern Ireland, Scotland, and England all implemented similar plastic bag taxes in the 2010s.²⁶ Ireland recently introduced new Circular Economy Regulations in 2022. The regulations allowed the Minister of Environment to introduce new environmental levies.²⁷ The plastic bag levy's success provided the basis for this new framework. The first new levy comes into effect in 2023 and will apply to single-use coffee cups.²⁸



Complementary actions to consider

- » Governments looking to implement similar levies may consider complementing them with other behavioral strategies. For instance, research suggests that messages which leverage social and personal norms can decrease plastic bag usage.²⁹ Such strategies could help shift citizens' extrinsic (monetary) motivations to more intrinsic motivations, as the latter can be more robust to change.



Want to know more?

[Government of Ireland – Plastic Bags](#)



Endnotes

- ¹ Frisman, P. (2008). *Effect of plastic bag taxes and bans on garbage bag sales*. OLR Research Report. 2008-R-0685.
- ² Central Statistics Office. (2002). *Census 2002: Preliminary report*. Stationery Office, Government of Ireland. ISBN 0-7557-1251-X. Retrieved from <https://www.cso.ie/en/media/csoie/census/documents/2002preliminary.pdf>
Population in 2021: approximately 5 million. Source: Central Statistics Office. (2021). *Press statement population and migration estimates April 2021*. Government of Ireland. Retrieved from <https://www.cso.ie/en/csolatestnews/pressreleases/2021pressreleases/pressstatementpopulationandmigrationestimatesapril2021/>
- ³ Litter Pollution Act, 1997. The Ministry for the Environment and Local Government, Ireland.
- ⁴ The Litter Monitoring Body. (2003). *The National Litter Pollution Monitoring System – system result*. TES Consulting Engineers, Dublin. Retrieved from <https://www.litter.ie/docs/DoEHLG%20System's%20Results%20Report%20Final%202002.pdf>
- ⁵ Convery, F., McDonnell, S., & Ferreira, S. (2007). The most popular tax in Europe? Lessons from the Irish plastic bags levy. *Environ Resource Econ*, 38, 1–11. doi:10.1007/s10640-006-9059-2
- ⁶ Scottish Executive. (2005). *Proposed plastic bag levy – Extended impact assessment (Volume 2: Appendices)*. Appendix 1. Environment Group Research Report 2005/06. ISBN: 0-7559-2685-4. Retrieved from <https://www.webarchive.org.uk/wayback/archive/20150220061427/http://www.gov.scot/Publications/2005/08/1993259/33019>
- ⁷ Drury Research on Behalf of the Department of the Environment and Local Government. (2000). *Attitudes and actions: A national survey on the environment*. Drury, Dublin.
- ⁸ S.I. No. 605/2001 - Waste Management (Environmental Levy) (Plastic Bag) Regulations, 2001. The Ministry for the Environment and Local Government, Ireland.
- ⁹ Drury Research on Behalf of the Department of the Environment and Local Government. (2000). *Attitudes and actions: A national survey on the environment*. Drury, Dublin.
- ¹⁰ Convery, F., McDonnell, S., & Ferreira, S. (2007). The most popular tax in Europe? Lessons from the Irish plastic bags levy. *Environ Resource Econ*, 38, 1–11. doi:10.1007/s10640-006-9059-2
- ¹¹ Anastasio, M., & Nix, J. (2016). *Plastic bag levy in Ireland*. Green Budget Europe. Institute for European Environmental Policy.
Plastic bag environmental levy—Irish Tax and Customs. Retrieved from <https://www.revenue.ie/en/companies-and-charities/plastic-bag-environmental-levy/index.aspx>
- ¹² Watkins, E., ten Brink, P., Withana, S., Russi, D., Illes, A., Mutafoglu, K., Ettlinger, S., Anderson, M.S., & Pedersen, A.B. (2017). *Capacity building, programmatic development and communication in the field of environmental taxation and budgetary reform*. Final Report. European Commission.
- ¹³ Convery, F., McDonnell, S., & Ferreira, S. (2007). The most popular tax in Europe? Lessons from the Irish plastic bags levy. *Environ Resource Econ.*, 38, 1–11. doi:10.1007/s10640-006-9059-2
- ¹⁴ Luxembourg Publication Office for the European Union. (2021). *Ensuring that polluters pay: Ireland*. European Commission. doi: 10.2779/65452.
- ¹⁵ What is the plastic bag levy? Tipperary County Council. Retrieved from <https://www.tipperarycoco.ie/waste-services-faqs/what-plastic-bag-levy%3F>
- ¹⁶ Kelleher, M. (2008). *Bags for life*. Solid Waste and Recycling Magazine. Retrieved from <https://www.wasterecyclingmag.ca/feature/bags-for-life/>
- ¹⁷ Climate and Communications. (2020). *Environment Fund Account 2020*. Department of the Environment, Government of Ireland. Retrieved from <https://www.gov.ie/en/publication/f6b84-environment-fund-accounts/>
- ¹⁸ Homono, T. A. (2018). Can small incentives have large effects? The impact of taxes versus bonuses on disposable bag use. *American Economic Journal: Economic Policy*, 10(4): 177210.
- ¹⁹ Team, B. I. (2014). *EAST: Four simple ways to apply behavioural insights*. Behavioural Insight Team, London.
- ²⁰ Ten Brink, P., Lutchman, I., Bassi, S., Speck, S., Sheavly, S., Register, K., & Woolaway, C. (2009). *Guidelines on the use of market-based instruments to address the problem of marine litter*. Institute for European Environmental Policy and Sheavly Consultants. 60.
- ²¹ Department of the Environment, Climate and Communications—Plastic Bags. Government of Ireland. Retrieved from <https://www.gov.ie/en/publication/28528-plastic-bags/>
Organisation for Economic Co-operation and Development. (2022). *The circular economy in Ireland*. OECD Urban Studies, OECD Publishing, Paris. doi: 10.1787/7d25e0bb-en
- ²² Doyle, T. K., & O'Hagan, A. (2013). *The Irish 'plastic bag levy': A mechanism to reduce marine litter?* [Conference Presentation]. International Conference on Prevention and Management of Marine Litter in European Seas, Berlin.
- ²³ Litter Monitoring Body. (2015). *The National Litter Pollution Monitoring System*. Department of the Environment, Community and Local Government. Dublin.
- ²⁴ Frisman, P. (2008). *Effect of plastic bag taxes and bans on garbage bag sales*. OLR Research Report. 2008-R-0685.
- ²⁵ Environmental Protection Agency. (2022). *Plastics: Attitudes and behaviours in Ireland 2019–2021*. Circular Economy Programme. ISBN 978-1-80009-047-7. Retrieved from https://www.epa.ie/publications/circular-economy/resources/EPA_PlasticsReport2022_web.pdf
- ²⁶ DEFRA. (2022). *Single-use plastic carrier bags charge: Data for England 2021 to 2022*. Government of UK. Retrieved from <https://www.gov.uk/government/publications/carrier-bag-charge-summary-of-data-in-england/single-use-plastic-carrier-bags-charge-data-for-england-2021-to-2022#:~:text=From%2021%20May%202021%2C%20the.2021%20to%206%20April%202022>



Government Social Research. (2002). *Research into the sale and use of bags in Wales*. Welsh Government. Retrieved from <https://www.gov.wales/research-sale-and-use-carrier-bags-wales>

Zero Waste Scotland—Reducing carrier bag use. Retrieved from <https://www.zerowaste-scotland.org.uk/litter-flytipping/carrier-bags>

²⁷ Circular Economy and Miscellaneous Provisions Act, 2022. Retrieved from <https://www.oireachtas.ie/en/bills/bill/2022/35/>

²⁸ Circular Economy. (2022). *Consultation on draft regulations to introduce an environmental levy on single-use disposable cups*. Department of Environment, Climate and Communications. Retrieved from <https://www.gov.ie/en/consultation/7fb23-consultation-on-draft-regulations-to-introduce-an-environmental-levy-on-single-use-disposable-cups/>

²⁹ de Groot, J., Abrahamse, W., & Jones, K. (2013). Persuasive normative messages: The influence of injunctive and personal norms on using free plastic bags. *Sustainability*, 5(5), 1829–1844. doi:10.3390/su5051829



Getting people to generate less waste in the Philippines

Objective: Change consumption and production behaviors



Case summary

Local volunteers and NGOs in the Philippines conducted waste audits to understand which brands were disproportionately responsible for coastal plastic waste. They subsequently used a 'name and demand accountability' technique to publicize the identities of the companies responsible. In parallel, SUP alternative studies were carried out, identifying items that could easily be removed from circulation and replaced with reusable or biodegradable. The tactic was successful in accelerating companies' actions to address plastic waste and single-use packaging through recycling and reuse initiatives. Complementarily, waste audits encouraged local municipalities to similarly take action on single-use packaging. These waste audits aided the process that led to the introduction of a national EPR law.



Challenge statement

Consumer goods packaging were the most commonly littered items on Philippine lands, in rivers, and on beaches. Fast-moving consumer goods (FMCGs) brands responsible for the packaging did not take responsibility for the complete life cycle of their products or engage in large-scale product reuse schemes.

Context and description of challenges

The Philippines (2015 population: 100.98 million),¹ situated in the Western Pacific Ocean, has one of the longest coastlines in the world. Regulations, such as Republic Act No. 9003: Ecological Solid Waste Management Act of 2000, laid the foundation for a comprehensive SWM system.² However, their implementation was challenged by insufficient capacity and infrastructure to effectively address solid waste from generation to recycling and disposal.

In 2016, the country generated an average of 0.4 kg of MSW per capita per day,³ with higher rates in urban areas (approximately 0.7 kg per capita per day).⁴⁵ Of the total MSW, 10.6 percent was plastic waste,⁶ only 9 percent of which was recycled.⁷ Mismanaged plastic waste subsequently leached into the environment. As of 2015, the Philippines was the third largest contributor of mismanaged plastic waste released to the oceans (1.7 million tons annually).⁸

Residents' ingrained purchasing habits perpetuated plastic waste. They commonly bought piecemeal rations (termed '*tingi*') from neighborhood variety 'sari-sari' stores.⁹ Sari-sari store owners purchased a variety of products in bulk and then repackaged them in smaller portions for consumers who could not afford or had no need to buy larger quantities. Industries forayed into this market by introducing their products in small plastic packages ('sachets'), where they successfully penetrated even low-income markets. Consequently, sachet use became widespread throughout the Philippines.¹⁰ Coffee, shampoo, and condiments were commonly packaged in sachets. Citizens in urban areas used up to six sachets per capita per day. As their

small size complicated disposal and treatment, they became a common source of litter, amounting to 52 percent of total residual plastic waste.¹¹

Companies tried to find solutions for plastic waste pollution. Unilever Philippine created an incentivized community-based plastics collection program for sachets, plastic bags, and other single-use packaging.¹² Local governments and civil society organizations also attempted to tackle packaging waste through multistakeholder meetings and awareness campaigns targeted at households, schools, and businesses.¹³ However, the ubiquity of plastic packaging, its convenience, and the lack of economic incentives made it difficult to shift to alternatives. In response to the above situation, several organizations began conducting waste audits to bring attention to the pervasiveness of single-use packaging. These efforts are the focus of the present case study.

Decisions and actions

As waste audits became increasingly popular globally, local NGOs and international agencies extended their application to the Philippines. In 2017, Break Free from Plastic¹⁴ and local organizations¹⁵ conducted waste audits along Manila Bay's Freedom Islands. Volunteers examined beach litter to identify waste type and brand.¹⁶ This allowed the organizations to identify which brands were disproportionately responsible for plastic waste.

A string of similar Waste Assessments and Brand Audits (WABAs) were performed across the country in subsequent years. WABAs had twin goals: to call out brand owners whose products were littered and to push national or local legislators to pass laws to curb the production, distribution, and use of plastic packaging and items. Additionally, WABAs were used to encourage residents to limit the usage of disposable plastics wherever possible.

First, in 2019, the Global Alliance for Incinerator Alternatives (GAIA) released a report showcasing the results of WABAs done by the Mother Earth Foundation (MEF) in 21 'barangays' (districts).¹⁷ Second, Interfacing Development Interventions for





Sacks full of plastic bottles for recycling in Aklan Province, Philippines. © Michael Wels, istock.com

Sustainability (IDIS), an environmental group based in Davao City, led WABAs in Davao City, specifically in Panigan-Tamugan Watershed in Baguio District in September 2020¹⁸ and wetlands of Gravahan, Matina, and Bucana in February 2021.¹⁹ The group used waste audit results to push for a city ban on SUPs and prompted the city mayor to declare the law's passage as urgent.²⁰ Third, in 2021, a study was conducted in mangrove areas of 14 municipalities around Cebu Island.²¹ Aside from categorizing the waste in accordance with the UNEP/Intergovernmental Oceanographic Commission (IOC) guidelines²² on litter typology, the brands of the plastic packages were also recorded and further classified into local and international labels. Lastly, in 2021, the World Bank funded a series of plastic waste surveys across three sites across each of the islands of Bohol, Siargao, and Siquijor.²³ Sites included marine protected areas and areas frequented by tourists and residents.

The design

In all the WABAs conducted, volunteers collected plastic waste and recorded the brand name, packaging type, and product producer.²⁴ Volunteers recorded the names and quantity of branded and unbranded packaging waste. Following the audits, the convening organizations released the brand names associated with plastic waste in the public domain. While audits held brands accountable for the waste generated, brands could also benchmark their performance against other companies included in the audit. Plastic waste surveys conducted in Bohol, Siargao, and Siquijor collected information on plastic leakage in rivers. Surveyors used quadrat sampling²⁵ for shoreline and beach sites and bridge surveys²⁶ or surface water sampling²⁷ to enumerate plastic waste in rivers. The collected waste was sorted and weighed based on category and brand. This information guided SWM efforts, including proposals for SUP alternatives. All audit results were widely publicized.

In addition to the above, local organizations partnered with seven municipalities across the Philippines to conduct household-level WABAs.²⁸ Fifty households were selected from each barangay to systematically assess waste generation and conduct an audit of branded and unbranded packaging. Municipal authorities and barangay leaders supported the audit. Participating households received information about the study and waste reduction and segregation. They also received two containers to store food and garden waste and four sacks to store each recyclable, residual, sanitary, and hazardous waste. Household waste consumption and disposal practices can become habitual. These audits made residents aware of the extent of their waste generation patterns. Households received insights on the characteristics of waste, especially SUP waste. Data collected from these audits informed national household waste generation patterns and in parallel increased household awareness on waste generation.²⁹



What behavioral tools are present in this initiative?

SOCIAL AND MOTIVATIONAL MECHANISMS



Creating accountability: Research suggests that making actions more observable can create pressure for actors to behave in a way that is more socially desirable.³⁰ In the Philippines, local activists denoted and publicized the brands which were disproportionately responsible for plastic pollution along Filipino beaches. In doing so, brands were forced to speed up their efforts in confronting the waste caused by their production of SUP packaging.

SYSTEM DESIGN MECHANISMS



Salience: Research suggests that individuals tend to focus on items that grab their attention.³¹ Waste audits made the practice of waste generation and plastic disposal more obvious. Households' waste audits allowed residents to pay more attention to their waste generation rates as well as the quantity of SUPs they were consuming. Similarly, at the end of the household waste audits, municipal leaders could see the cumulative impact of ingrained waste generation patterns.

Results

WABAs are a unique way to increase community and corporate attention on litter. During the first drive in 2017, Break Free from Plastic volunteers collected 54,260 pieces of waste, of which 36 percent was manufactured by four multinational brands.³² Similarly, in 2020, approximately 50 percent of recorded plastics was from three brands.³³ Plastic waste surveys conducted in 2021 on the islands of Bohol, Siargao, and Siquijor reported that 70 percent of the plastic waste identified was produced by global brands.³⁴

Waste audits prompted companies to actively participate in multistakeholder conversations and address SUPs.³⁵ Following the audits, 12 out of 15 brands that

were identified for their polluting practices launched recycling and waste retrieval programs.³⁶ For example, in 2019 Coca-Cola Beverages Philippines (CCBPI) and Indorama Ventures (IVL)—a Thailand-based producer of polyester products and polyester feedstocks—installed a PET recycling facility.³⁷ Unilever also ran a pilot refilling concept for its top haircare brands, entitled 'All Things Hair Refillery'.³⁸ Similarly, in 2020, Nestlé Philippines introduced a 'plastic neutrality' initiative where the company recovers the same amount of plastic generated from its packaging through waste management.³⁹ As of August 2021, the company recovered 24,494 tons of plastic waste.⁴⁰ The company also initiated public school IEC campaigns in partnership with the Department of Education and National Solid Waste Management Commission.⁴¹ In 2021, Nestlé reported that they had collaborated with refill and reuse projects across 12 countries, and 49 percent of their packaging was either recyclable or reusable.⁴² Other brands also introduced reusable or refillable alternatives.⁴³

Following WABAs, some barangays started working with local organizations to introduce reusable bags as SUP alternatives. As co-benefits, local entities similarly initiated efforts to curb plastic pollution. In Tawi-Tawi, for example, fruit and vegetable vendors switched to reusable woven baskets made from coconut leaves to transport and display their produce.⁴⁴ Likewise, a supermarket in Legazpi, Albay began to use banana leaves and abaca ties as wrappers for agricultural products.⁴⁵ These wrappers both minimized the consumption of SUPs and extended products' shelf life. In Metro Manila and surrounding areas, small-scale manufacturers introduced refilling stations. For example, in July 2019, Nutriasia introduced a pilot project, entitled 'Bring Your Own Bote (Bottle)', in which consumers could bring their clean and dry bottles to buy sauces and cooking oils.⁴⁶ The company also installed ultraviolet sanitizers for customers to sanitize their bottles.

These initiatives helped steer local government policy action. Public pressure from brand audits prompted the Davao City council to pass an ordinance against SUPs in March 2021.⁴⁷ WABAs also aided the process that led to the introduction of the EPR law in 2022.⁴⁸ The EPR law aims to address plastic packaging and other product waste.⁴⁹ Companies are required to recover or offset a certain percentage of their plastic product footprint generated during each preceding year, starting with a 20



percent target for 2023 that increases in the successive years.⁵⁰ The impact of this law is yet to be seen.

Brand audits are currently used in many countries (for example, in Indonesia and India⁵¹) to identify the most often littered waste items and brands and inform and support reform efforts by local and national governments.



Want to know more?

[Break Free from Plastic](#)



Complementary actions to consider

- » The convenience of SUP and the lack of suitable alternatives may complicate behavior change initiatives. Governing authorities could use surveys or interviews to understand the main drivers of residents' SUP consumption and barriers to using reusable alternatives (for example, its lack of availability, relatively higher costs, prevailing norms or attitudes). These data could inform plans to phase out SUPs.
- » WABAs are most impactful when used as an intermediary tool to validate or challenge companies' actions and set off discussions on policies and legislation. Parties that wish to conduct WABAs are encouraged to prioritize partnerships with brands to foster stakeholder collaborations against plastic waste.
- » The successful introduction of EPR schemes requires significant stakeholder involvement and behavior change. Should practitioners consider an EPR scheme, studies could determine which waste generator groups and waste handling practices should be prioritized. These data could also inform the design of behavior change programs and their rollout.



Endnotes

- ¹ Philippines Statistics Authority. (2016). *Highlights of the Philippine population 2015 census of population*. Republic of the Philippines. Retrieved from <https://psa.gov.ph/population-and-housing/title/Highlights%20of%20the%20Philippine%20Population%20%202015%20Census%20of%20Population>
Population in 2020: 109 million. Source: Philippines Statistics Authority. (2021). National Quickstat December 2021. Republic of the Philippines.
- ² Ecological Solid Waste Management Act No. 9003 of 2000. Republic of Philippines. Retrieved from <https://www.officialgazette.gov.ph/2001/01/26/republic-act-no-9003-s-2001/>
- ³ Kaza, S., Yao, L., Bhada-Tata, P., & Woerden, F.V. (2018). *What a Waste 2.0: A global snapshot of solid waste management to 2050*. Urban Development Series. World Bank, Washington, DC. doi:10.1596/978-1-4648-1329-0
- ⁴ Atienza, V. (2011). Review of the waste management system in the Philippines: Initiatives to promote waste segregation and recycling through good governance. In M. Kojima and E. Michida. (Eds.), *Economic Integration and Recycling in Asia*. Institute of Developing Economics.
- ⁵ In 2020, the country generated a total of 21.4 million kg of MSW, which translates to an average of 0.4 kg of MSW per capita per day, with higher rates in Metro Manila (approximately 0.7 kg per capita per day. Source: Mayuga, J. (2021, January 10). The Garbage Conundrum. *The Business Mirror*. Retrieved from https://www.denr.gov.ph/images/DENR_News_Alerts/DENR_News_Alerts_10_January_2021_Sunday.pdf
- ⁶ Environmental Management Bureau. (2018). *National Solid Waste Management Status Report (2008–2018)*. Department of Environment and Natural Resources, Quezon City, Philippines.
- ⁷ WWF Philippines. (2020). *EPR scheme assessment for plastic packaging waste in the Philippines*. WWF Philippines. Retrieved from https://wwf.org.ph/wp-content/uploads/2020/12/WWF_REPORT_EPR_Philippines_2020.pdf
- ⁸ Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L. (2015). Plastic waste inputs from land into the Ocean. *Science*, 347(6223), 768–771. doi: 10.1126/science.1260352
- ⁹ Ang, R. P., & Sy-Changco, J. A. (2007). The phenomenon of sachet marketing: Lessons to be learned from the Philippines. In J. Mohr & R. Fisher. (Eds.), *AMA Educators' Proceedings: Enhancing Knowledge Development in Marketing*, 18, 5–15. Retrieved from https://www.academia.edu/download/30988447/ARC_AMA_SUMMER2007.pdf
- ¹⁰ AMH Philippines, Inc. (2021). *Plastic survey and product alternatives analysis in the Philippines islands of Bohol, Siargao, and Siquijor - Field survey report*.
- ¹¹ Liamson, C., Benosa, S., Alino, B., & Bacongus, B. (2020). *Sachet economy: Big problems in small packets*. GAIA. Retrieved from https://www.no-burn.org/wp-content/uploads/Sachet-Economy_final.pdf
- ¹² Unilever. (2020). *Unilever and Linis Ganda renew ties for sachet collection program*. Unilever Philippines. Retrieved from <https://www.unilever.com.ph/news/press-releases/2020/unilever-and-linis-ganda-renew-ties-for-sachet-collection-program/>
- ¹³ Bünemann, A., & Brinkmann, J. (2019). *Legal framework study of extended producer responsibility*. Cyclos GmbH. Retrieved from https://d1kqvfsq8j7onh.cloudfront.net/downloads/framework_study_epr_cyclos_final.pdf
- ¹⁴ Break Free from Plastic (<https://www.breakfreefromplastic.org/>)
- ¹⁵ The partner organizations were: Greenpeace Philippines (<https://www.greenpeace.org/philippines/>), Mother Earth Foundation (<http://www.motherearthphil.org/>), GAIA (<https://www.no-burn.org/asia-pacific/>), EcoWaste Coalition (<https://www.ecowastecoalition.org/>), Healthcare without Harm (<https://noharm-asia.org/content/asia/philippines>)
- ¹⁶ Break Free from Plastic. (2018). BRANDED: In search of the world's top plastic polluters. Vol 1. Break Free From Plastic. Retrieved from https://www.breakfreefromplastic.org/wp-content/uploads/2020/07/BRANDED-Report-2018_compressed.pdf
- ¹⁷ Global Alliance for Incinerator Alternatives. (2019). *Plastics exposed: How waste assessments and brand audits are helping Philippine cities fight plastic pollution (Rep.)*. GAIA, Philippines. Retrieved from <https://www.no-burn.org/wp-content/uploads/PlasticsExposed-3.pdf>
- ¹⁸ Interfacing Development Interventions for Sustainability. (2020). *Environmental groups in Davao join global brand audit 2020*. IDIS, Philippines. Retrieved from <https://idisphil.org/wp-content/uploads/2020/10/Press-Release-on-Brand-Audit.pdf>
- ¹⁹ Interfacing Development Interventions for Sustainability. (2021). *IDIS conducts plastic Waste clean-up in Davao City wetlands*. IDIS, Philippines. Retrieved from <https://idisphil.org/wp-content/uploads/2019/02/Press-Release-on-Wetlands-Clean-up-and-Brand-Audit-1.docx>
- ²⁰ Llemit, R. L. G. (2021). *Mayor to certify single-use plastic ban ordinance as urgent*. SunStar/Davao. Retrieved from <https://www.sunstar.com.ph/article/1884585/davao/local-news/davao-city-mayor-to-certify-single-use-plastic-ban-ordinance-as-urgent>
- ²¹ Paler, M. K. O., Tabañag, I. D. F., Siacor, F. D. C., Geraldino, P. J. L., Walton, M. E. M., Dunn, C., Skov, M.W., Hiddink, J.G., & Taboada, E.B. (2022). Elucidating the surface macroplastic load, types and distribution in mangrove areas around Cebu Island, Philippines and its policy implications. *Science of The Total Environment*, 838, 156408.
- ²² Cheshire, A. C., & Adler, E. (2009). *UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter*. UNEP Regional Seas Reports and Studies, No. 186 IOC Technical Series No. 83. UNEP/IOC. ISBN 978-92-807-3027-2.
- ²³ AMH Philippines, Inc. (2021). *Plastic survey and product alternatives analysis in the Philippines islands of Bohol, Siargao, and Siquijor - Field survey report*.
- ²⁴ Break Free from Plastic. (2022). *Branded: Five years of holding corporate plastic polluters responsible*. Break Free from Plastic. Retrieved from <https://brandaudit.breakfreefromplastic.org/wp-content/uploads/2022/11/BRANDED-brand-audit-report-2022.pdf>



- AMH Philippines, Inc. (2021). *Plastic survey and product alternatives analysis in the Philippines islands of Bohol, Siargao, and Siquijor - Field survey report*.
- ²⁵ Quadrat sampling is a method where a 1 x 1 m² (quadrat) is set up using PVC pipes and the waste inside the quadrat is collected for characterization and quantification.
- ²⁶ A bridge survey method is conducted by dividing a bridge into 15 m segments and counting waste floating on the surface of the water from each segment for approximately 30 minutes. The width of the bridge and number of segments are recorded, followed by characterization of the identified waste.
- ²⁷ Modified surface water sampling is conducted by collecting the waste floating on the surface of water within a defined area of 5 x 50 m stretching along the length of a pavement (built in a port area), followed by characterization of the waste.
- ²⁸ Global Alliance for Incinerator Alternatives. (2019). *Plastics exposed: How waste assessments and brand audits are helping Philippine cities fight plastic pollution* (Rep.). GAIA, Philippines. Retrieved from <https://www.no-burn.org/wp-content/uploads/PlasticsExposed-3.pdf>
- ²⁹ Ibid.
- ³⁰ Ekström, M. (2012). Do watching eyes affect charitable giving? Evidence from a field experiment. *Experimental Economics*, 15(3), 530–546.
- ³¹ Kahneman, D., Slovic, S. P., Slovic, P., & Tversky, A. (Eds.). (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge university press. 192.
- ³² Break Free from Plastic. (2018). *Branded: In search of the world's top plastic polluters* (Volume 1). Break Free from Plastic. Retrieved from https://www.breakfreefromplastic.org/wp-content/uploads/2020/07/BRANDED-Report-2018_compressed.pdf
- ³³ Break Free from Plastic. (2020). *Branded: Demanding corporate accountability for plastic pollution* (Volume 3). Break Free from Plastic. Retrieved from <https://brandaudit.breakfreefromplastic.org/brand-audit-2020/>
- ³⁴ AMH Philippines, Inc. (2021). *Plastic survey and product alternatives analysis in the Philippines islands of Bohol, Siargao, and Siquijor - Field survey report*.
- ³⁵ Based on information received from Czarina Constantino-Panopio - National Lead of No Plastics in Nature Initiative, WWF Philippines (March 22, 2023).
- ³⁶ Lopez, E. (2021). *Are PH consumer goods companies doing enough to tackle plastic waste?* Philippine Centre for Investigative Journalism. Retrieved from <https://pcij.org/article/7332/are-ph-consumer-goods-companies-doing-enough-to-tackle-plastic-waste>
- ³⁷ Coca-Cola Philippines. (2022). *Our world without waste progress*. Retrieved from <https://www.coca-colacompany.com/content/dam/journey/us/en/reports/coca-cola-world-without-waste-report-2021.pdf>
- ³⁸ Unilever. (2019). *The all things hair refillery station*. Unilever Philippines. Retrieved from <https://www.unilever.com.ph/news/press-releases/2019/the-all-things-hair-refillery-station/>
- ³⁹ Nestlé Philippines. (2021). *Maintaining plastic neutrality: 18,000 metric tons and counting*. Nestlé Philippines. Retrieved from <https://www.nestle.com.ph/media/news/maintaining-plastic-neutrality#>
- ⁴⁰ Nestlé Philippines. (2021). *Year one of plastic neutrality: Recovering 27,000 tons of waste*. Nestlé Philippines. Retrieved from <https://www.nestle.com.ph/media/news/year-one-plastic-neutrality>
- ⁴¹ CNN Philippines. (2021). *'Kasambahay for the Environment': Nestlé PH tackles climate change, declares local commitments*. CNN Philippines. Retrieved from <https://www.cnn-philippines.com/lifestyle/2021/5/18/nestle-ph-tackles-climate-changes.html>
- ⁴² Nestlé—What is Nestlé doing to tackle plastic packaging waste? Retrieved from <https://www.nestle.com/ask-nestle/environment/answers/tackling-packaging-waste-plastic-bottles>
- Nestlé. (2021). *Creating shared value and sustainability report 2021*. Retrieved from <https://www.nestle.com/sites/default/files/2022-03/creating-shared-value-sustainability-report-2021-en.pdf>
- ⁴³ The Coca-Cola Company—*The Coca-Cola Company announces industry leading target for reusable packaging*. Retrieved from <https://www.coca-colacompany.com/news/coca-cola-announces-industry-leading-target-for-reusable-packaging>
- Mohan, A. M. (2019). *P&G designs 11 refillable, reusable products and packaging for loop shopping platform*. Packaging World. Retrieved from <https://www.packworld.com/news/sustainability/article/13376908/pg-designs-11-refillable-reusable-products-and-packaging-for-loop-shopping-platform>
- Cahiles-Magkilat, B. (2020). *Nutriasia wins award for 'Bring Your Own Bote' campaign*. Manila Bulletin. Retrieved from <https://mb.com.ph/2020/09/21/nutriasia-wins-award-for-bring-your-own-bote-campaign/>
- ⁴⁴ Philippine Coconut Authority. (n.d.) *Tawi-Tawi vendors use coconut leaves basket as alternative to plastic*.
- ⁴⁵ Conde, M. (2019). *Look: Albay supermarket uses banana leaves, abaca instead of plastic*. Rappler. Retrieved from <https://www.rappler.com/science/229215-albay-supermarket-uses-banana-leaves-abaca-instead-of-plastic/>
- ⁴⁶ Nutriasia. (2020). *'Bring Your Own Bote' and get refills for your pantry essentials*. ABS-CBN. Retrieved from <https://news.abs-cbn.com/advertorial/life/11/09/20/bring-your-own-bote-and-get-refills-for-your-pantry-essentials>
- ⁴⁷ Brand Audit, Break Free from Plastic. <https://brandaudit.breakfreefromplastic.org/about/>
- Sangguniang Panlungsod ng Dabaw (City Government of Davao). (2021). *19th City Council of Davao - 9th Regular Session (ZOOM Session) @ Tue March 2, 2021*. Retrieved from <https://www.facebook.com/100064682556901/videos/342777800368064/>
- ⁴⁸ Department of Environment and Natural Resources. (2022). *Environmental management bureau chief lauds enactment of law making firms responsible for plastic packaging*. Republic of Philippines. Retrieved from <https://www.denr.gov.ph/index.php/news-events/press-releases>



[leases/4344-environmental-management-bureau-chief-lauds-enactment-of-law-making-firms-responsible-for-plastic-packaging](#)

Senate of the Philippines 19th Congress. (2022). *Senate passes bill placing plastic wastes under producers' responsibility*. Retrieved from https://legacy.senate.gov.ph/press-release/2022/0131_prib9.asp

- ⁴⁹ Department of Environment and Natural Resources. (2022). *Environmental management bureau chief lauds enactment of law making firms responsible for plastic packaging*. Republic of Philippines. Retrieved from <https://www.denr.gov.ph/index.php/news-events/press-releases/4344-environmental-management-bureau-chief-lauds-enactment-of-law-making-firms-responsible-for-plastic-packaging>

- ⁵⁰ Senate of the Philippines 18th Congress. (2022). *Republic Act No. 11898 An Act Institutionalizing the Extended Producer Responsibility on Plastic Packaging Waste, Amending for This purpose Republic Act No. 9003, Otherwise Known as the "Ecological Solid Waste Management Act Of 2000"*. Retrieved from http://legacy.senate.gov.ph/republic_acts/ra%2011898.pdf

- ⁵¹ Break Free from Plastic. (2018). *Branded: In search of the world's top plastic polluters (Volume 1)*. Break Free from Plastic. Retrieved from https://www.breakfreefromplastic.org/wp-content/uploads/2020/07/BRANDED-Report-2018_compressed.pdf



Getting people to generate less waste and be more sustainable with their waste in Rwanda

Objective: Changing consumption and production behaviors



Case summary

In 2008, Rwanda implemented a ban on polyethylene bags (less than 100 microns thick).¹ The ban applied to entire supply chains. The government issued fines to individuals or organizations caught manufacturing, selling, using, or disposing of prohibited SUP bags. Rwanda accompanied its rollout with extensive community outreach. This multipronged approach was effective in redefining the country's social norms. The ban successfully decreased SUP consumption as well as littering and water pollution.

Challenge statement

The low-cost of polyethylene bags incentivized their use in Rwanda, which facilitated a convenience culture.² Opposition from stakeholders across the plastic supply chain undermined the country's transition to more sustainable alternatives.



Due to the ban on plastic in Rwanda, Kigali is one of the cleanest cities in Africa. © Wirestock Creators, shutterstock.com



Context and description of challenges

Rwanda (2008 population: 9,309,619)³ historically generated approximately 0.4–0.5 kg of MSW per capita per day.⁴ Ingrained consumption patterns revolved around plastic use and disposal. Residents frequently littered their plastic waste, which clogged drains and blocked water channels.⁵ A growing population, high waste generation rates, and low waste collection rates (49 percent in 2002⁶) exacerbated this situation.

Before 2004, few interventions targeted the improper disposal of SUP. The country relied primarily on community service (called Umuganda⁷) to clean up plastic litter.⁸ Further, the government did not have the capacity to develop infrastructure or systems to process plastic waste. In light of these constraints, Rwanda developed upstream SUP regulations. This initiative is the focus of the present case study.

Decisions and actions

The Rwandan government implemented an initial plastic ban in 2004. It received limited support from citizens and industries. In 2008, the government introduced a renewed ban on polyethylene bags. Having learned from experience, the renewed legislation included an improved enforcement strategy and a rigorous community outreach plan.

In parallel, the authorities asked citizens to contribute to two goals: (a) establish Rwanda as a 'Clean and Inviting' country and (b) make the capital city of Kigali 100 percent litter free.⁹ The plastic bag ban was the first step for Rwanda to become a pioneer in African environmental action. The government spent RWF 40 million (approximately USD 37,000) on inspections to ensure compliance with the plastic bag ban.¹⁰

In 2019, the country introduced a new law prohibiting the manufacturing, importation, use, and sale of all SUP items. This law was intended to control the unnecessary consumption and disposal of environmentally damaging SUPs.¹¹ The government

gave factories two years to shift their manufacturing processes to plastic alternatives such as paper and bamboo.¹²



REFERENCE CASE STUDY

Global plastic bag regulations

Policies to decrease SUP consumption have increased to deal with burgeoning volumes of plastic waste. Uganda, Myanmar, Argentina, Malaysia, and Papua New Guinea (among others) have introduced plastic bag levies and bans to mitigate their use and environmental threat. For plastic bag levies, retailers explicitly charge consumers to use bags (fees range from USD 0.015 in some Indonesian cities to USD 1.00 in parts of Texas). These policies have had a significant influence on SUP bag consumption. For instance, Danish residents (who pay approximately USD 0.39 per SUP bag) use four SUP bags per capita annually, while US residents consume 350 SUP bags per capita annually (in the presence of subnational regulations).¹³ Even small SUP bag levies can significantly influence consumer behavior. For instance, Chicago's plastic bag levy (USD 0.07) reduced disposal bag use by approximately 28 percent and doubled reusable bag use. This change persisted a year after implementation. Plastic bag levies appeal to citizens' desires to avoid losses—in this case, a loss of money. They also disrupt consumers' automatic tendency to receive SUP bags at retail stores.¹⁴

The design

The government introduced a legislative and institutional framework (Law No.57/2008) to penalize citizens or organizations found manufacturing, selling, or using prohibited polyethylene bags. Plastic bags used for medical purposes or for wrapping food in hotels were excluded from the ban.¹⁵ Citizens could request an exemption to use SUPs.¹⁶



The government conducted regular countrywide inspections to monitor illicit use, which ensured accountability. Violators paid the following fines:¹⁷

- *Fines for manufacturing:* USD 10,500
- *Fines for wholesale and retail:* USD 750 and 310, respectively
- *Fines for disposing of plastic items in private or unauthorized public places:* approximately USD 50.

Repeat offenders paid twice the fine. The government also required offenders to remove the trash and repair damage caused at their own expense.

Communications and outreach efforts accompanied the ban. The government used television, radio, social media, and print-based platforms to increase public awareness of plastic's negative environmental and public health impacts. For instance, the government launched a social media campaign and declared an annual National Environment Week to promote sustainable livelihoods. The capital city, Kigali, also organized monthly car-free days (now conducted fortnightly) and promoted the events as 'Beat Plastic Pollution Walks'.

Citizen-led initiatives supported the government's revitalization efforts. For example, citizens removed plastic bags from the street as part of their monthly Umuganda activities. They also organized meetings to discuss the harms of SUPs and ways to mitigate their use.¹⁸ Cleanup activities helped create a positive social norm around proper waste disposal.

The government implemented several measures to deter tourists from bringing plastic into Rwanda. Airlines made in-flight announcements and official tourism websites featured infographics to alert travelers of the country's plastic policies. Additionally, the government implemented stringent checks at all entry points.

Under the 2019 law, the government prohibited numerous items, including PET bottles, plastic straws, plates, and forks. The law excluded compostable plastic items or woven polypropylene. Additionally, the law imposed a levy on imported SUPs and

goods packaged in plastic. Individuals who manufactured prohibited items received an administrative fine of FRW 10 million (approximately USD 9,300). Individuals who imported such items were similarly fined 10 times the value of the plastic items.¹⁹ Anyone seeking exceptions had to apply for authorization in writing. The government only granted exceptions for Rwandan-made products if there were no plastic packaging alternatives and if the absence of plastic packaging affected the product's quality.²⁰ The Ministry of Environment supported the establishment of three plants, which helped manufacturers transition to plastic alternatives.²¹

What behavioral tools are present in this initiative?

SYSTEM DESIGN MECHANISMS



Timely messages: Finding convenient moments at which change is easiest can help promote behavior change.²² In this initiative, airlines made in-flight announcements before and during flights to Rwanda that stated: "please refrain from bringing plastic bags to Rwanda."



Salience: Research suggests that individuals are more likely to respond to stimuli in their environment that attract attention.²³ In this case, the government implemented various campaigns through the media, in-person activities, and roadside billboards. The campaigns increased the salience of the issue by appealing to community goals and portrayed plastic as an unwanted object.



Results

Rwanda was one of the first countries to implement an SUP ban. The ban successfully reduced plastic consumption and increased the use of alternatives. Following the ban, the import of polyethylene sacks, bags, and cones dropped from 1,092 tons in 2003 to 323 tons in 2016. Recent surveys suggest that plastic waste contributes 1.5 to 7 percent of total waste in Kigali.²⁴ Comparatively, plastic waste comprises 8.6 percent of the waste mix in other Sub-Saharan African countries.²⁵ As co-benefits, the plastic bag ban reduced water pollution, plastic bag litter, and street cleaning costs. The ban also shifted public opinion on and perception of plastic products.²⁶ Shifting perceptions galvanized community action. In 2015–2016, 91.3 percent of residents participated in Umuganda activities. These activities helped maintain neighborhood cleanliness.²⁷

The ban is not without downfalls. While paper bags replaced plastic for food packaging, small business owners struggled with their comparatively higher costs and low durability.²⁸ This led to illegal market for the import and use of SUP bags. Further, the government's enforcement strategies, lack of a participatory process developing the ban,²⁹ and hefty fines have been subject to criticism.³⁰ However, Rwanda has set a positive example globally for curbing SUPs. Based on Rwanda's experience, many African countries have implemented similar SUP initiatives.



Complementary actions to consider

- » Practitioners should be cautious about implementing bans, which may not be appropriate or accepted in all countries or contexts. Governments considering similar approaches may alternatively implement and test other regulatory approaches first—which can be informed by behavioral science—to change the general culture of SUP usage.



Want to know more?

[Rwanda Plastic Ban](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- 1 Defined by the law (Law No.57/2008) as, 'A synthetic industrial product with a low density composed of numerous chemical molecules (ethene)'.
- 2 Danielsson, M. (2017). *The plastic bag ban in Rwanda: Local procedures and successful outcomes - A case study on how Rwanda implemented a nation-wide ban on plastic bag*. Uppsala University.
- 3 Ministry of Health, National Institute of Statistics of Rwanda, and International Classification of Functioning, Disability and Health Macro. (2009). *Rwanda Interim Demographic and Health Survey 2007–08*. Calverton, Maryland, United States.
Population in 2021: 13,252,272. Source: National Institute of Statistics of Rwanda, Ministry of Finance and Economic Planning. (2012). *Fourth Rwanda Population and Housing Census*. Thematic Report: Population Projections. Republic of Rwanda.
- 4 Kaza, S., Yao, L., Bhada-Tata, P., & Woerden, F. V. (2018). *What a Waste 2.0: A global snapshot of solid waste management to 2050*. Urban Development Series. World Bank, Washington, DC. doi:10.1596/978-1-4648-1329-0
Kabera, T. (2020). Solid waste management in Rwanda: Status and challenges. In *Sustainable waste management challenges in developing countries* (287–305). IGI Global. doi: 10.4018/978-1-7998-0198-6.ch012
- 5 Rwanda Environment Management Authority. (2019). *Guidelines on procedures and conditions for eligibility to grant exceptional permission to manufacture, use, import, or sell single-use plastic items or pack goods in single-use plastics*. Republic of Rwanda.
- 6 United Nations Environment Programme. (2002). *Africa environment outlook: Past, present and future perspectives*. UNEP, Nairobi. ISBN 9280721011.
- 7 Under Umuganda, citizens are mandated to participate in 3–4 hours of community service on the last Sunday of each month. It is an integral part of Rwandan culture.
- 8 Danielsson, M. (2017). *The plastic bag ban in Rwanda: Local procedures and successful outcomes - A case study on how Rwanda implemented a nation-wide ban on plastic bags*. Uppsala University.
- 9 Behuria, P. (2021). Ban the (plastic) bag? Explaining variation in the implementation of plastic bag bans in Rwanda, Kenya and Uganda'. *Environment and Planning C: Politics and Space*, 39(8), 1791–1808. doi: 10.1177/2399654421994836
- 10 Clavel, E. (2014). Think you can't live without plastic bags? Consider this: Rwanda did it. *The Guardian*.
- 11 Xie, J., & Martin, J. (2022). *Plastic waste management in Rwanda: An ex-post policy analysis*. World Bank, Washington, DC.
- 12 Law No. 17/2019 Relating to the Prohibition of Manufacturing, Importation, Use and Sale of Plastic Carry Bags and Single-Use Plastic Items. Republic of Rwanda.
- 13 Sabiiti, D. (2019). *Rwanda finds alternative: What plastics do, paper and bamboo will do*. KT Press. Rwanda.
- 14 Matheson, M. T. (2019). *Disposal is not free: Fiscal instruments to internalize the environmental costs of solid waste*. International Monetary Fund.
- 15 Homonoff, T., Kao, L. S., Palmer, D., & Seybolt, C. (2018). *Skipping the bag: Assessing the impact of Chicago's tax on disposable bags*. NYU Wagner, University of Chicago-Energy and Environment Lab.
- 16 Hakuzimana, J. (2021). Break free from plastics: Environmental perspectives and lessons from Rwanda. *J Pollut Eff Cont*, 9, 276. doi: 10.35248/2375-4397.20.9.276
- 17 Guidelines on Use of Plastic Bags. Republic of Rwanda. Retrieved from: https://rema.gov.rw/fileadmin/templates/Documents/rema_doc/Publications_Updated/Guidelines%20on%20use%20of%20plastic%20bags_English.pdf
- 18 Behuria, P. (2021). *Ban the (plastic) bag? Explaining variation in the implementation of plastic bag bans in Rwanda, Kenya and Uganda*. *Environment and Planning C: Politics and Space*, 39(18). doi:10.1177/2399654421994836
- 19 Danielsson, M. (2017). *The plastic bag ban in Rwanda: Local procedures and successful outcomes - A case study on how Rwanda implemented a nation-wide ban on plastic bags*. Uppsala University.
- 20 LAW N° 17/2019 of 10/08/2019 Relating to the Prohibition of Manufacturing, Importation, Use and Sale of Plastic Carry Bags and Single-Use Plastic Items. Retrieved from https://elaw.org/system/files/attachments/publicresource/Law_relating_to_the_prohibition_of_manufacturing_importation_use_and_sale_of_plastic_carry_bags.pdf
- 21 Xie, J., & Martin, J. (2022). *Plastic waste management in Rwanda: An ex-post policy analysis*. World Bank, Washington, DC.
- 22 Afadhali, J. P. (2022). Rwanda banks on single-use plastic ban to tackle plastic pollution. *InfoNile*. Retrieved from <https://infonyle.org/en/2022/02/rwanda-banks-on-single-use-plastic-ban-to-tackle-plastic-pollution/>
- 23 Homonoff, T., Kao, L. S., Palmer, D., & Seybolt, C. (2018). *Skipping the bag: Assessing the impact of Chicago's tax on disposable bags*. NYU Wagner, University of Chicago-Energy and Environment Lab.
- 24 Chase, N., Dominick, G. M., Trepal, A., Bailey, L. S., & Friedman, D. B. (2009, December). "This is public health: Recycling counts!" Description of a pilot health communications campaign. *International journal of environmental research and public health*. Retrieved April 12, 2022, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2800327/>
- 25 Xie, J., & Martin, J. (2022). *Plastic waste management in Rwanda: An ex-post policy analysis*. World Bank, Washington, DC.
- 26 Kaza, S., Yao, L., Bhada-Tata, P., and Woerden, F. V., (2018). *What a Waste 2.0: A global snapshot of solid waste management to 2050*. Urban Development Series. World Bank, Washington, DC. doi:10.1596/978-1-4648-1329-0
- 27 Froidbise, A. (2015). *Behind the scenes of the plastic bag ban in Rwanda connections to culture, power and sustainability*. Lund University, Sweden.
- 28 Rwanda Governance Board. (2017). *Impact assessment of Umuganda 2007–2016*. Kigali. Retrieved from https://www.rgb.rw/fileadmin/user_upload/RGB/Publications/HOME-GROWN_SOLUTIONS/Impact_Assessment_of_Umuganda_2007-2016.pdf
- 29 Pilgrim, S. (2016, February 25). Smugglers work on the dark side of Rwanda's plastic bag ban. *Al Jazeera*. Retrieved from <http://america.aljazeera.com/articles/2016/2/25/rwanda-plastic-bag-ban.html>
- 30 Danielsson, M. (2017). *The plastic bag ban in Rwanda: Local procedures and successful outcomes - A case study on how Rwanda implemented a nation-wide ban on plastic bags*. Uppsala University.
- 31 Dsilva, E. (2019, December 24). Going surgical on plastics in Rwanda. *Down to Earth*. Retrieved from <https://www.downtoearth.org.in/news/waste/going-surgical-on-plastics-in-rwanda-68446>



Getting people to generate less waste in the United Kingdom

Objective: Change consumption and production behaviors



Case summary

In 2007, the UK-based NGO Waste and Resources Action Programme (WRAP) launched the Love Food Hate Waste campaign. The campaign's purpose was to prevent food from becoming waste at the household level. The campaign - spanning all four nations of the United Kingdom - partnered with retailers, government, businesses, and community groups to disseminate messaging. WRAP focused on both upstream and downstream determinants of avoidable food waste and collaborated with the food sector to decrease food waste across the supply chain. Jointly, it launched in-person initiatives and media campaigns to empower residents to adopt waste-reducing food habits. A decade after its launch, the campaign contributed to a 31 percent reduction in food waste.



Challenge statement

At the time of intervention, households in the United Kingdom disposed of one-third of food purchased annually. Costs amounted to GBP 420 (approximately USD 505) per person per year.¹ However, few residents tried to reduce their food waste. Many did not see it as an important issue, while others lacked the necessary skills.²

Context and description of challenges

In the 2000s, food waste became a prominent issue in the United Kingdom (2007 population: approximately 60,522,000).³ Most of the MSW at that time was landfilled (83 percent in 2000) and average municipal composting and recycling rates stood at merely 9 percent.⁴ In response, national governments initiated targeted waste policies⁵ along with food sector partnerships. A key milestone was the formation of the first Courtauld Commitment in 2005.⁶ Under this voluntary agreement, the Waste and Resources Action Programme (WRAP)⁷ brought together key players, including farmers, major retailers, brand owners, manufacturers, and suppliers. They entered into agreements that provided the framework for activities to tackle food waste across the supply chain. The UK governments and the food sector provided funding, while WRAP was tasked with implementation.⁸

In 2006, WRAP undertook research to understand the key drivers of food waste. It assessed consumers' food-related attitudes and practices. The research found that food waste was persistent across genders and social classes. Residents often bought and made excess quantities of food, relied heavily on expiration dates, and failed to consume existing food before making new purchases. Most residents were uninterested in reducing food waste, saw it as inevitable, and perceived it to be a

nonissue. The primary concerns of the residents who were bothered by food waste were related to the financial costs, a sense of wasting 'good' food, and a general sense of guilt. Residents were far less concerned about the environmental impact of food waste.⁹ By 2007, WRAP's research indicated that households disposed of nearly one-third (6.7 million tons) of food purchased (21.7 million tons), an estimated 0.7 kg per household per day. Most (61 percent) of this waste was avoidable (that is, edible food that could have been eaten at some point).¹⁰ Despite the scale of the issue, consumers were largely unaware of their disposal habits, which had become second nature.¹¹ WRAP's work provided a strong evidence base for their future programming, on which the current case study focuses.

Decisions and actions

In 2007, WRAP launched the *Love Food Hate Waste* campaign to engage residents on the issue of food waste. The campaign covered all four nations in the United Kingdom (England, Scotland, Wales, and Northern Ireland). The governments of these nations funded the campaign, which intended to galvanize public action on waste by articulating its consequences, explaining the benefits of reducing food waste, and making it easier for residents to follow through.¹² WRAP built the campaign on several years of research into consumers' food-related knowledge, beliefs, and behaviors. This research helped pinpoint the campaign's focus and messaging.¹³ *Love Food Hate Waste* formed a key component of the Courtauld Commitment which supports the United Nations Sustainable Development Goal 12.3. The goal sets a 50 percent per capita reduction target for food waste by 2030 relative to the UK's 2007 baseline. Over the next decade, WRAP undertook numerous initiatives under the *Love Food Hate Waste* banner. The case study highlights a selection of these.





REFERENCE CASE STUDY

Reducing food waste in Ohio

In 2020, the Solid Waste Authority of Central Ohio created the *Save More Than Food* campaign to decrease residential food waste. The campaign provided residents with resources and information on food waste prevention. The waste authority distributed outreach materials across community newsletters, social media, newspapers, and the campaign website. To understand the campaign's impact, the agency partnered with the City of Upper Arlington and Ohio State University. Partners measured household food waste volumes before and after distributing outreach materials. The authority quantified self-reported levels of food waste (N = 530 residents) and physically assessed curbside waste (N = 410 residents). Authorities contrasted the campaign's impact against two control groups. The control groups consisted of area households that did not receive materials (N = 217 residents) and households nationwide that were not privy to the intervention (N = 859 residents). Both control groups assessed self-reported levels of food waste. Food waste decreased by 23 and 21 percent in the self-reported surveys and curbside audits, respectively. Participation in the area's organic waste composting program also increased 40 percent post-intervention.¹⁴ Over 30 partners currently disseminate *Save More Than Food* campaign materials.¹⁵

The design

Due to the interrelated causes of food waste, WRAP took a multifaceted approach in its behavior change campaign. The campaign launched several complementary initiatives to give households the necessary strategies to shift behavior across all stages of waste (planning, buying, storage, and preparation). First, WRAP used a widespread media campaign to raise awareness of the issue.¹⁶ The campaign drew

heavily on humor - peppered with guilt - to connect with consumers.¹⁷ WRAP provided ingredient-specific recipe tips, guidelines on fridge settings, and food portion calculators.¹⁸ The campaign paid particular attention to the cost-saving benefits of better food habits, as this was the foremost motivator for waste reduction in consumers, and covered protecting the environment. The media campaign tried to create a positive social norm around waste reduction. For instance, it circulated posters of individuals accompanied by slogans like 'fish lovers hate waste'.¹⁹ As part of its outreach strategy, WRAP partnered with celebrity chefs, the local government, community groups, and the food industry to disseminate messages.²⁰

In 2021, WRAP launched Food Waste Action Week to highlight the issue of food waste in the media. Each Food Waste Action Week had a key focus and message. For example, the 2021 campaign focused on the links between food waste and climate change with the key message: 'Wasting food feeds climate change'. The 2023 campaign used the message 'Win, Don't Bin', again linking the issue of food waste to cost (Figure 18).²¹



The campaign framed using purchased food as a 'win' in terms of money and time saved. Source: WRAP.



Second, in parallel to media campaigns, WRAP launched several in-person initiatives. It recruited and trained volunteer 'Love Food Champions' to act as behavior change messengers. These champions taught fellow community members how to decrease food waste.²² In tandem, the campaign held social events such as cooking competitions,²³ food waste reduction challenges,²⁴ and cooking clubs to give residents the skills needed to make the most out of purchased food.²⁵

Third, WRAP worked on upstream food loss and waste through the Courtauld Commitment. WRAP co-led an industrywide roadmap called 'Target, Measure, Act'. The roadmap provided guidance to businesses to help them target, measure, and act on food waste. It encouraged businesses to address food waste in their own operations and through their supply chain partners. Businesses developed bespoke solutions. It covered manufacturing, retail, hospitality, and food service sectors.²⁶ For instance, businesses redistributed food to vulnerable groups²⁷ or converted it to animal feed.²⁸ WRAP also worked with retailers and manufacturers to change downstream food waste through food packaging and labeling.

As part of these changes, partners sold food in smaller packages, improved the clarity of storage guidelines, and shifted promotional tactics. For instance, retailers sold food at a discount instead of incentivizing shoppers to buy more products.²⁹ These changes ensured that residents only bought what they needed and stored food properly to maximize shelf life. WRAP created extensive manufacturer packaging guidelines which offered best practices on date labels as well as storage and freezing advice.³⁰ These modifications made it easier for consumers to interpret packaging instructions. They also mitigated unnecessary waste as misinterpretations around food labels had previously been a prominent contributor to food waste.³¹

What behavioral tools are present in this initiative?

SYSTEM DESIGN MECHANISMS



Simplifying behaviors and decisions: Streamlining messages and providing simplified steps makes it easier for individuals to conduct a behavior.³² The *Love Food Hate Waste* campaign demystified the issue of food waste by providing consumers with food waste facts, tips, and simplified information. These tactics decreased residents' uncertainty on how to mitigate wastage. In tandem, through the Courtauld Commitment, WRAP's partnership with the food sector changed food packaging, storage guidelines, and product promotions. These modifications made it easier for consumers to select, store, and use perishable items.



Salience: Since the environment is full of stimuli, only the most salient elements will grab one's attention.³³ The *Love Food Hate Waste* campaign used numerous media outlets (radio, television, billboards, social media)³⁴ to increase the salience of food waste and its scale.

SOCIAL AND MOTIVATIONAL MECHANISMS



Frame messaging to personal values, identities, or interests: How actors present an issue can influence an audience's interest in it.³⁵ Research by WRAP suggested that consumers' desires to mitigate food-related waste were initially primarily motivated by costs. With this knowledge, WRAP emphasized the cost-saving benefits of food waste reduction in its media campaigns. In doing so, the *Love Food Hate Waste* campaign connected with consumers on issues they were already concerned with, which helped uptake.

Results

The *Love Food Hate Waste* campaign empowered residents to improve how they shopped for, stored, prepared, and used food. Between 2007 and 2018, wasted food in the United Kingdom decreased by 31 percent per capita, as evidenced by waste composition studies. This decrease was partly attributed to the *Love Food Hate*



Waste campaign.³⁶ Its public-facing outreach initiatives led to wide-ranging benefits. In *Love Food Hate Waste*'s first three years, residents' meal planning, understanding of best-before dates, and intentional shopping increased 3, 9, and 6 percent, respectively.³⁷ Small-scale initiatives were also quite successful. For instance, the 'Love Food Champions' initiative reduced food waste by over 50 percent (from 4.7 to 2.2 kg per household).³⁸ After participating as champions, households' competencies related to meal planning, food storage, and using leftovers improved.³⁹ Similarly, the 'Food Waste Reduction Challenge' decreased food waste by 78 percent.⁴⁰

WRAP's work with the food sector has also been impactful. Between 2015 and 2018, the Courtauld Commitment led to a 7 percent reduction in food waste per capita (corresponding to 480,000 tons of food waste averted over that time frame).⁴¹ As of 2022, 176 organizations were signatories to deliver the Courtauld Commitment, which is now in its fifth phase.⁴² Complementarily, one-third of food businesses in the United Kingdom have committed to the 'Target, Measure, Act' roadmap.⁴³ While the roadmap is still in its early phases, it has already prevented food loss and waste. In 2021, both retailers (11 percent) and producers and manufacturers (1.4 percent) reduced their edible food waste compared to the baseline. In 2022, businesses collectively redistributed 86,000 tons of surplus food (205 million meals).

Following the success of *Love Food Hate Waste* in the United Kingdom, governments in Australia,⁴⁴ New Zealand,⁴⁵ and Canada⁴⁶ introduced like-minded campaigns.



Complementary actions to consider

- » The drivers related to food waste often differ among population segments (for example, young professionals, young families, and social renters). Practitioners deploying similar campaigns could target messaging and interventions specifically to different demographics. For each demographic, they could leverage data on the drivers of food waste to inform messaging.
- » Practitioners undertaking like-minded initiatives could target campaign tactics toward the most wasted food items. Campaign could work on both upstream (for example, supply chain and packaging) and downstream (for example, freezing, storing, and cooking guidance) solutions to empower residents to use these items before they spoil.



Want to know more?

[Love Food Hate Waste](#)



CHOOSE ANOTHER
CASE STUDY

Endnotes

- ¹ Ventour, L. (2008). *Food Waste Report V2: The food we waste*. WRAP, United Kingdom.
 - ² Lyndhurst, B. (2007). *Food waste final report: Food behaviour consumer research - quantitative phase*. WRAP, United Kingdom. Retrieved from <https://wrap.org.uk/sites/default/files/2020-12/Food-behaviour-consumer-research-quantitative-phase.pdf>
 - ³ Office for National Statistics. (2007). *Population of the United Kingdom by country of birth and nationality tables*. United Kingdom. Retrieved from <https://webarchive.nationalarchives.gov.uk/ukgwa/20160107140907/http://www.ons.gov.uk/ons/taxonomy/search/index.html?newquery=&newoffset=400&pageSize=50&nscl=Population&nscl-orig=Population&content-type=Reference+table&content-type=Dataset&sortBy=pubdate&sortDirection=DESCENDING&applyFilters=true>
- Population in 2021: 67 million. Source: Office for National Statistics. (2022). *Population estimates for the UK, England, Wales, Scotland and Northern Ireland: Mid-2021*. ONS website, statistical bulletin.
- ⁴ Goodwin, L., & Barthel, M. (2013). Food for thought. In *Sustainable Consumption: Stakeholder Perspectives* (33–41). World Economic Forum, Geneva. Retrieved from http://www3.weforum.org/docs/WEF_ENV_SustainableConsumption_Book_2013.pdf
 - ⁵ Department of the Environment, Transport and the Regions. (2000). *Waste Strategy 2000 for England and Wales - Part 1*. Crown, London. ISBN: 0 10 146932 2.
 - ⁶ Goodwin, L., & Barthel, M. (2013). Food for thought. In *Sustainable Consumption: Stakeholder Perspectives* (33–41). World Economic Forum, Geneva. Retrieved from http://www3.weforum.org/docs/WEF_ENV_SustainableConsumption_Book_2013.pdf
 - ⁷ WRAP is a not-for-profit company in the United Kingdom created to deliver government policy on waste and resources. It was established in 2000. It helps individuals, businesses, and authorities reduce waste and recycle more, make better use of resources, and tackle climate change. WRAP's work covers all facets of the product life cycle and value chain.
 - ⁸ WRAP—History of the Courtauld Commitment. Retrieved from <https://wrap.org.uk/taking-action/food-drink/initiatives/courtauld-commitment/history-courtauld-commitment>
 - ⁹ Lyndhurst, B. (2007). *Food waste final report: Food behaviour consumer research - quantitative phase*. WRAP, United Kingdom. Retrieved from <https://wrap.org.uk/sites/default/files/2020-12/Food-behaviour-consumer-research-quantitative-phase.pdf>
 - ¹⁰ Ventour, L. (2008). *Food waste report: The food we waste*. WRAP, United Kingdom. Retrieved from <https://wrap.s3.amazonaws.com/the-food-we-waste.pdf>
 - ¹¹ Goodwin, L., & Barthel, M. (2013). Food for thought. In *Sustainable Consumption: Stakeholder perspectives* (33–41). World Economic Forum, Geneva. Retrieved from http://www3.weforum.org/docs/WEF_ENV_SustainableConsumption_Book_2013.pdf
 - ¹² Quested, T. E., Parry, A. D., Easteal, S., & Swannell, R. (2011). Food and drink waste from households in the UK. *Nutrition Bulletin*, 36, 460–467. doi: 10.1111/j.1467-3010.2011.01924.x
 - ¹³ Yamakawa, H., Williams, I., Shaw, P., & Watanabe, K. (2017). Food waste prevention: Lessons from the Love Food, Hate Waste campaign in the UK. *Proceedings of the 16th International Waste Management and Landfill Symposium* (2–6). Italy.
 - ¹⁴ Roe, B. E., Booker, A., Karetny, J., O'Keefe, K., Rees, K., Schroder, L., & Shu, Y. (2022). *Evaluating the effectiveness of the 'Save More Than Food' campaign in changing food waste awareness and behaviors in Upper Arlington, Ohio households*. SSRN. doi: 10.2139/ssrn.4157980
 - ¹⁵ Solid Waste Authority of Central Ohio. (2021). *From waste to resources: 2021 impact report*. SWACO, Ohio. Retrieved from <https://swacoimpactreport.org>
 - ¹⁶ Quested, T. E., Marsh, E., Stunell, D., & Parry, A. D. (2013). Spaghetti soup: The complex world of food waste behaviours. *Resources, Conservation, and Recycling*, 79, 43–51. doi: 10.1016/j.resconrec.2013.04.011
 - ¹⁷ Goodwin, L., & Barthel, M. (2013). Food for thought. In *Sustainable Consumption: Stakeholder Perspectives* (33–41). World Economic Forum, Geneva. Retrieved from http://www3.weforum.org/docs/WEF_ENV_SustainableConsumption_Book_2013.pdf
 - ¹⁸ Love Food Hate Waste. (<https://www.lovefoodhatewaste.com/>)
 - ¹⁹ Waste and Resources Action Programme. (n.d.) *An introduction to Love Food Hate Waste*. WRAP, United Kingdom. Retrieved from <https://www.eco-schoolsni.org/eco-schoolsni/documents/006520.pdf>
 - ²⁰ Goodwin, L., & Barthel, M. (2013). Food for thought. In *Sustainable Consumption: Stakeholder Perspectives* (33–41). World Economic Forum, Geneva. Retrieved from http://www3.weforum.org/docs/WEF_ENV_SustainableConsumption_Book_2013.pdf
 - Quested, T. E., Parry, A. D., Easteal, S., & Swannell, R. (2011). Food and drink waste from households in the UK. *Nutrition Bulletin*, 36, 460–467. doi: 10.1111/j.1467-3010.2011.01924.x
 - ²¹ WRAP—Food Waste Action Week. Retrieved from <https://wrap.org.uk/taking-action/citizen-behaviour-change/love-food-hate-waste/key-campaigns/food-waste-action-week>
 - ²² Falcon, J., Gray, S., & Virtue, N. (2008). *Love food champions: Final report*. WRAP and Women's Institute. Retrieved from <https://wrap.org.uk/sites/default/files/2020-12/Love-Food-Champions.pdf>
 - ²³ Quested, T. E., Parry, A. D., Easteal, S., & Swannell, R. (2011). Food and drink waste from households in the UK. *Nutrition Bulletin*, 36, 460–467. doi: 10.1111/j.1467-3010.2011.01924.x
 - ²⁴ Yamakawa, H., Williams, I., Shaw, P., & Watanabe, K. (2017). Food waste prevention: Lessons from the Love Food, Hate Waste campaign in the UK. *Proceedings of the 16th International Waste Management and Landfill Symposium* (2–6). Italy.
 - ²⁵ Waste and Resources Action Programme. (n.d.) *The impact of Love Food Hate Waste: Household food waste prevention case study*. West London Waste Authority, Recycle for London. Retrieved from https://wrap.org.uk/sites/default/files/2020-08/WRAP-West%20London%20LFHW%20Impact%20case%20study_0.pdf
 - ²⁶ WRAP—Food Waste Reduction Roadmap. Retrieved from <https://wrap.org.uk/taking-action/food-drink/initiatives/food-waste-reduction-roadmap>



- ²⁷ Waste and Resources Action Programme. (2021). *Whole chain food waste reduction plan*. WRAP, United Kingdom. Retrieved from <https://wrap.org.uk/sites/default/files/2021-06/WRAP-Sainsburys-Fullers-Foods%20-Lamb-Weston-Whole-Chain-Plan-Project-Case-Study.pdf>
- ²⁸ WRAP—Retail case studies. Retrieved from <https://wrap.org.uk/resources/food-waste-reduction-roadmap-case-studies/retail>
- ²⁹ Quested, T. E., Parry, A. D., Easteal, S., & Swannell, R. (2011). Food and drink waste from households in the UK. *Nutrition Bulletin*, 36, 460–467. doi: 10.1111/j.1467-3010.2011.01924.x
- ³⁰ Waste and Resources Action Programme. (2019). *Labelling guidance: Best practice on food date labelling and storage advice*. WRAP, United Kingdom. Retrieved from <https://wrap.org.uk/sites/default/files/2020-07/WRAP-Food-labelling-guidance.pdf>
- ³¹ Lyndhurst, B. (2011). *Final report. Consumer insight: Date labels and storage guidance*. WRAP, United Kingdom. Retrieved from <https://wrap.org.uk/sites/default/files/2020-12/Consumer-insight-date-labels-and-storage-guidance.pdf>
- ³² Solid Waste Authority of Central Ohio. (2021). *From waste to resources: 2021 impact report*. SWACO, Ohio. Retrieved from <https://swacoimpactreport.org>
- ³³ Service, O., Hallsworth, M., Halpern, D., Algate, F., Gallagher, R., Algate, F., Gallagher, R., Nguyen, S., Ruda, S., & Sanders, M. (2014). *EAST: Four simple ways to apply behavioural insights*. Behavioural Insight Team, London.
- ³⁴ Kahneman, D., Slovic, S. P., Slovic, P., & Tversky, A. (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge university press. 192.
- ³⁵ Andrews, A. C., Clawson, R. A., Gramig, B. M., & Raymond, L. (2013). Why do farmers adopt conservation tillage? An experimental investigation of framing effects. *Journal of Soil and Water Conservation*, 68, 501–11.
- ³⁶ Waste and Resources Action Programme. (2021). *Food surplus and waste in the UK: Key facts*. WRAP, United Kingdom.
- ³⁷ Quested, T. E., Parry, A. D., Easteal, S., & Swannell, R. (2011). Food and drink waste from households in the UK. *Nutrition Bulletin*, 36, 460–467. doi: 10.1111/j.1467-3010.2011.01924.x
- ³⁸ Participants quantified food waste by the proportion of a kitchen caddy that they filled each day with discarded food. Participants estimated their food waste at both the beginning and end of the initiative.
- ³⁹ Falcon, J., Gray, S., & Virtue, N. (2008). *Love food champions: Final report*. WRAP and Women’s Institute. Retrieved from <https://wrap.org.uk/sites/default/files/2020-12/Love-Food-Champions.pdf>
- ⁴⁰ Yamakawa, H., Williams, I., Shaw, P., & Watanabe, K. (2017). Food waste prevention: Lessons from the Love Food, Hate Waste campaign in the UK. *Proceedings of the 16th International Waste Management and Landfill Symposium* (2–6). Italy.
- ⁴¹ Waste and Resources Action Programme. (2020). *Courtauld Commitment Milestone Progress Report*. WRAP, United Kingdom. Retrieved from <https://wrap.org.uk/resources/report/courtauld-commitment-milestone-progress-report>
- ⁴² WRAP—Courtauld Commitment 2030 signatory gallery. Retrieved from <https://wrap.org.uk/taking-action/food-drink/initiatives/courtauld-commitment/courtauld-commitment-2030-signatory-gallery>
- ⁴³ More information on the roadmap and a toolkit for practitioners can be found at <https://wrap.org.uk/sites/default/files/2023-03/WRAP-Food-Waste-Measurement-Roadmap-Toolkit.pdf>
- ⁴⁴ Love Food Hate Waste (in NSW). Retrieved from www.lovefoodhatewaste.nsw.gov.au
- ⁴⁵ Love Food Hate Waste (in New Zealand). Retrieved from <https://lovefoodhatewaste.co.nz/>
- ⁴⁶ National Zero Waste Council. (2019). *National Strategy for Food Waste Reduction*. Federal Ministry of Food and Agriculture. Retrieved from https://www.bmel.de/SharedDocs/Downloads/EN/_Food-and-Nutrition/Strategy_FoodWasteReduction.pdf?__blob=publication-File&v=3



12345

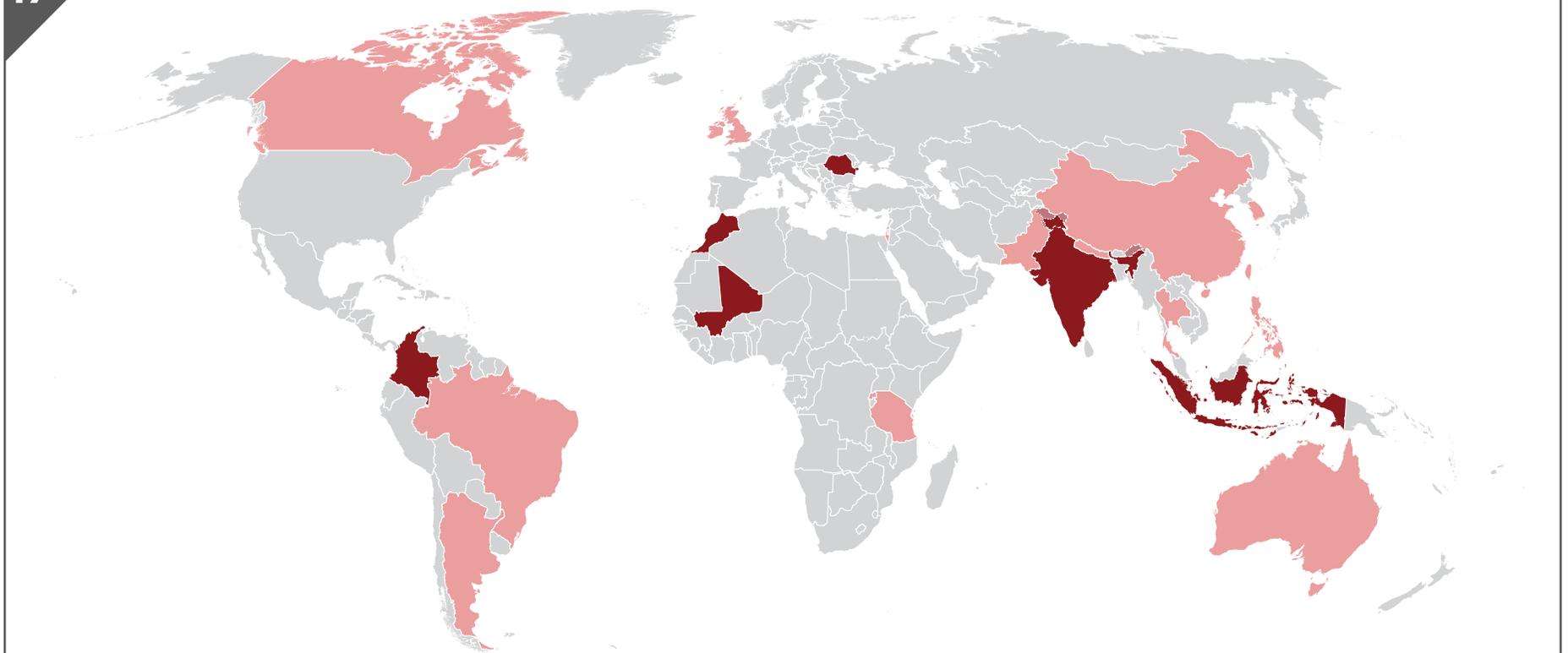
Discussion

The goal of this compendium is to provide a resource for practitioners to refer when designing their SWM interventions, based on selected case studies. The compendium provides a global snapshot of waste management interventions that show substantial promise in terms of future policy efforts. It specifically demonstrates how practitioners are currently and have historically engrained behavioral insights (either implicitly or explicitly) in waste management interventions. The cases targeted

diverse stakeholders and cultural and socioeconomic contexts. Case studies also spanned a range of settings and scales, including rural villages, schools, large cities, and whole countries. These cases applied a mix of traditional policy tools (for example, deposit refund scheme in Israel) and more nuanced approaches (for example, simplified messaging in Trelew, Argentina).

FIGURE
19

Map detailing countries from which the 30 case studies were sourced



Note: Deeper-dive cases are denoted in dark red, while briefs are highlighted in light red. In some instances, multiple cases were sourced from a single country.

Most of the selected case studies did not utilize impact evaluation designs, which makes it difficult to draw causal conclusions on the successfulness of their interventions. Additionally, while cases were analyzed from a behavioral lens, most cases did not explicitly integrate behavioral science in their design. Nonetheless, this compendium highlights promising examples conducted at scale that can inform future initiatives, namely cases including comprehensive public efforts to address SWM. In many of these case studies, the interventions applied are consistent with the experimental literature. For example, studies on littering, recycling, and source segregation in this compendium apply tools that have been attributed causally to changes in stakeholder behavior. For example, in Australia, government officials found that creating a guided pathway improved proper waste disposal by 51 percent. Likewise, in Canada, practitioners found that decreasing residents' distance to waste bins increased waste diversion rates between 70 and 147 percent.¹

While this compendium classifies the case studies as successful along some metric, it is worth highlighting the lack of robust evaluation methodologies. Robust impact evaluation is necessary to answer important questions about what role these initiatives play in changing behaviors and understanding the mechanisms behind these changes. This is particularly important in the context of initiatives where there are multiple components (for example, system design and communication elements, each of which might address different stages of the behavior change journey). As elaborated later, initiatives should be tested where possible to support the generation of robust evidence on impacts.

Targeting governments, private sector actors, and households or residents

Across case studies, the compendium includes tags for four categories of stakeholders: government () , private sector () , service providers () , and waste generators () . Most cases targeted households and individuals. Cases targeting this group addressed the full range of behavioral tools, including loss aversion, convenience, simplified information, material rewards, and messengers. For example, practitioners in England (Rotherham) used school-based education to increase

recycling. Students took the learnings and information on waste management home, where they educated their families on proper practices. Taking a slightly different approach, governments in Tanzania (Moshi), Hong Kong SAR, China, and India (Kumbakonam) installed networks of accessible waste bins and centers to increase proper disposal and boost waste diversion.

Cases targeting the private sector used rewards, regulations, and increased access to information and accountability to drive behavior change. For example, in Morocco, the government introduced a feedback mechanism for private sector service delivery. This mechanism allowed citizens to report on the state of SWM in their neighborhoods. The mechanism held private sector actors accountable, as their future contracts were tied to their performance on the feedback mechanism. In the Philippines, grassroots organizations conducted waste and brand audits to hold large corporations accountable for SUP waste.

Cases targeting governments often used social comparisons of local jurisdictions to generate changes in SWM practices. Through social comparisons like competitions, participating actors will often compare their performance relative to other actors that are performing better, which promotes competitive behavior.² For instance, in India, the national government devised the Swacch Survekshan Survey, which ranked ULBs on their SWM systems and public engagement initiatives. The ranking system encouraged local governments to establish door-to-door waste collection and source segregation initiatives. Other cases also used accountability mechanisms to drive government behavior change. For instance, Nepalese municipalities increased service provision through a results-based payment mechanism. Independent agents verified the performance of municipal SWM operations and collection services. Payments were disbursed only if the municipality reached a predefined level of service quality. This practice acted as a safeguard to ensure that SWM claims were not overinflated.

Service providers can be part of the government or the private sector depending on the case. Thus, cases targeting this stakeholder fall within those described in the two paragraphs above. Finally, some case studies involved initiatives targeting

multiple stakeholders simultaneously. In some cases, interventions targeting downstream effects, such as household composting or litter reduction, were sufficient. However, given the complexity of SWM systems that involve various actors, challenges required a multipronged focus. In the compendium, a group of cases targeted interventions to more than one type of stakeholder. In doing so, these cases targeted both upstream and downstream determinants of behavior. The former sought to change product design, create proper infrastructure, and improve service provision. The latter sought to improve how individuals interacted with systems and handled waste. For instance, in Jamaica, the intervention's results-based payment scheme incentivized service providers and waste generators, which were essential to neighborhood cleanliness. In the United Kingdom, the *Love Food Hate Waste* campaign primarily targeted its communications campaign and in-person activities to consumers. However, the WRAP also worked with the government and industry to update packaging and reduce food waste across other portions of the supply chain. These upstream tactics made it easier for consumers to change their behavior because doing the desired adjustment was also a convenient option. In Pakistan, the CGPM devised complementary programs for residents, cities, and schools to drive grassroots and top-down action on SWM. The above case studies highlight the benefit of taking a holistic view of behavior change initiatives.

The cost of waste management interventions

Intervention costs varied greatly and were generally correlated with the level of service and country income levels. Financing sources also varied, ranging from state funding and financial support from local and international donors to voluntary contributions. The compendium incorporated both case studies where officials implemented low-cost solutions and those cases that employed cost-intensive interventions to drive change. Case studies from high-income countries usually relied on an established network of legal, financial, and technical resources to develop interventions. Low- and middle-income countries often depended on donor support as well as voluntary schemes spearheaded by NGOs and social change actors to improve their technical and financial capacity to improve SWM service delivery holistically. While all cases benefited from the political will and support of local governing authorities, in the case of LIC/LMICs like India, Pakistan, Rwanda, and Morocco, political will at the national level enabled the implementation of large-scale programs through nationally authorized budgets. Grassroots action driven by local citizens and workers, described in cases like the Philippines, Indonesia (Waste Banks), India (Pune) exemplify how systems can be improved through low-cost initiatives driven by social contribution. Cases based in Canada, Argentina, and the Solomon Islands displayed how simple and low-cost design changes can lead to positive changes in user behavior.

TABLE
4

Examples of cases with low and medium to high costs

Low cost

1. Convenience

Canada The case did not require new investments and yielded positive results by changing bin placement.

2. Simple equipment

Nepal/*Suiro hook* The case used a unique yet simple tool to foster citizen engagement and reduce littering

Thailand The municipality encouraged citizens to develop their own home composting units (Sa-wians), preventing the cost of distribution of composting bins and alleviating the need for frequent waste collection services.

India/Pune Waste workers used nonmotorized pushcarts to collect waste that prevented large investments required for transporting waste.

Colombia The intervention required one-time capital investment for distribution of specialized bins, as well as a pre-treating material, to the local populace. The operating costs were lower than treatment at a central composting facility.

3. Social intervention

Argentina The municipal strategy to nudge citizens through direct messaging proved to be a cost-effective method of promoting waste segregation.

Indonesia/Surabaya Although the case required donor support to undertake program activities, the SGC initiative focused primarily on promoting low-cost, community-led solutions for reusing, recycling, and composting waste.

Mali The commune created grassroots waste management associations to oversee and improve MSWM at a low cost.

4. Other

Indonesia/Waste bank The model allows for a low-cost method for waste deposit. It was driven by local communities and provides direct returns to those operating the bank.

Brazil In the absence of a large financial budget, the municipality of Curitiba developed a mutually benefitting mechanism which allowed for regular collection of waste and provision of food for low-income groups.

Tonga The SWM fee was jointly billed with the electricity bill, which prevented the expenditure of costs required to introduce a new billing system.

Moderate to high costs

1. Results-based payment

Jamaica The case relied on international donations to improve SWM infrastructure in municipalities. Results from the case prove the significance of robust infrastructure in improving citizen engagement with SWM services.

Nepal Through the support of subsidies funded by international donors, municipalities were able to improve their technical and financial capacity.

2. EPR

Israel The national government designed a comprehensive taxation mechanism which required infrastructure developments, supervisory activities, and community outreach.

TABLE
4

Examples of cases with low and medium to high costs (cont.)

Moderate to high costs (cont.)

3. Incentive scheme

China/Nanjing	The Green Account Scheme necessitated incentive payments and the development of an SWM information system which required extra investments apart from the costs incurred during daily SWM operations.
Hong Kong SAR, China	The development and maintenance of different types of recycling centers, equipped with multiple facilities, required large investments. The introduction of a novel point-based system required technical and financial support.

4. PAYT

Korea	The national volume-based waste fee system required extensive infrastructure upgrades, designated waste bags, and a monitoring system.
-------	--

5. Social intervention

Pakistan	The CGPM was initiated at the national level and required the development of a website and app to facilitate the intervention leading to moderate to high costs.
India/Swachh Survekshan Survey	The intervention was conducted nationally, which necessitated funding allocation. Municipalities received financial support to undertake the activities of the survey, in accordance with the population in the region.
England/ Rotherham	The program entailed outreach activities in 39 schools conducted over 4 to 6 weeks, requiring funding for design and implementation of the program. It was financed through a collaboration between the local municipality and donor organizations.

6. System redesign

Romania	The capital costs of distributing bins, conducting outreach, and upscaling infrastructure required moderate to large investments. Daily SWM operations were financed through the SWM fee revenue, EPR scheme, and profits from recyclables to finance SWM operations.
Morocco	The PNDM program was introduced for a 15-year period, implemented over three phases, which included the development of infrastructure and technical expertise. While the national government allocated a large budget for the program, it was also aided by external donors.
Tanzania	The bylaw introduced in Moshi intended to decentralize SWM operations that could aid in reducing costs in the future. However, introducing the bylaw required extensive community outreach as well as infrastructure improvements which were financed by the municipality.

7. Ban/levy

Ireland	Ireland introduced a legal levy on usage of plastic bags. The tax required central funding for the purchase of reusable bags and modification of retailer computer systems.
Rwanda	The ban required extensive community outreach and development of checkpoints to monitor the use of plastic bags.

Application of behavioral tools across cases and mechanisms

The social and motivational, financial, and system design mechanisms underpin patterns of decision-making and behavior change. They are meant to coalesce. Accordingly, the majority of cases utilized behavioral tools from at least two mechanisms. Further, interventions often used several behavioral tools together.

Messengers and material rewards were most frequently used to drive behavior change. In behavior change, the identity of the individual communicating information can matter just as much as the information being communicated. The compendium drew on cases that leveraged both influential figures and change agents as messengers. For instance, in Tonga and Romania, influential figures such as priests spoke to their congregations about waste management and incorporated waste-related topics into their sermons. Complementarily, in England and Romania, practitioners educated children, who then brought messages and information home and instructed their families on proper waste management behavior.

Reward systems can provide positive feedback that encourages actors to continue performing the desired behavior. Profiled case studies used both physical cash and material rewards such as equipment and food products to incentivize behavior. For instance, residents in Brazil exchanged recyclables for fresh produce. Similarly, residents in Indonesia could deposit their recyclables at waste banks in exchange for money. Lastly, the government in India (Kumbakonam) rewarded residents with gold coins for properly segregating their waste. While material and monetary incentives were popular in the compendium, practitioners should apply them sparingly and cautiously. External rewards like money can crowd out the intrinsic motivation for performing a behavior, such as morals.³ Their long-term effectiveness may ultimately be limited. In cases like China (Nanjing), residents initially participated in organic source segregation because of rewards, but these rewards were not the primary reason for long-term behavior change.

Altering the context in which decisions are made can encourage more sustainable behaviors. For instance, inaccessible waste infrastructure can be an impediment to recycling. Most studies within the system design mechanism category used accessible services to increase household participation rates. This tool included both conveniently located waste disposal bins and convenient waste services, like door-to-door collections. For instance, authorities in Colombia and Romania collected all or a subset of solid waste generated directly from households. If door-to-door waste collection programs are cost prohibitive, practitioners may consider increasing the number of waste collection points, as in Hong Kong SAR, China, Brazil, or India (Kumbakonam). Each case study provided a network of collection points for organic or recyclable waste. Several case studies, such as Jamaica and Tanzania, successfully used both tactics.

Behavior change across challenges

Getting people to use waste services

Access to waste services does not guarantee that residents will use or pay for prescribed services. Rather, practitioners may need to supplement services with other tactics to improve their uptake. Cases in the accountability category fostered accountability among governments, citizens, and private sector actors. The mechanisms and incentives used to modify the behavior of each target group were necessarily different. In Mali, grassroots neighborhood SWM associations consistently monitored residents' disposal practices, which fostered accountability and shifted SWM disposal away from opening dumping. These accountability safeguards also increased resident's willingness to pay for waste services. Meanwhile, Jamaica used a results-based incentive scheme to target both service providers and environmental wardens. The former received an in-kind incentive—a waste collection truck—if it met a predefined level of service quality, while wardens received cash bonuses. This case study reiterates the need to tailor interventions to specific groups.

To increase willingness to pay, governments in Tanzania and Pune collaborated with non-state actors and informal workers, respectively, to ensure adequate waste collections. For instance, Pune formed an agreement with an informal worker

cooperative to provide waste collections. In exchange, informal workers collected and retained fees from households. Workers' regular engagement humanized the process of waste collections; their exemplary services led to a near 100 percent fee

recovery rate. Meanwhile in the Kingdom of Tonga, the waste authority used a joint electricity-waste bill system to increase the ease with which residents could pay for waste services.

BOX
3

Behavioral tools used in the 'Getting people to use waste services' category

How were tools used in this challenge?

The cases in this category used a variety of behavioral tools to increase use of waste services. This box highlights the tool used frequently in this category, tools that were experimentally evaluated, and recommendations on how practitioners might increase user engagement. However, these data do not indicate that countries implemented the best tools.

Behavioral targets

- » Increasing willingness to pay and empowering people to improve accountability

Highlighted tool

- » *Accountability*: Holding individuals responsible for their actions

How was the highlighted tool used?

- » In Moshi (Tanzania), Jamaica, and Korea, citizens reported other residents for improper waste disposal
- » In the Swacch Survekshan Survey (India) and Morocco, governments used citizen feedback to hold actors accountable for adequate service provision

- » In Pune (India) and Tonga, governments visited households that failed to pay waste fees
- » In Tonga and Sălacea (Romania), governments identified and reprimanded residents who improperly disposed of their waste

Recommendations

- » Highlight the recycling efforts of an individuals' peers⁴
 - For example, highlighting what others are doing can increase willingness to pay for waste services
- » Focus communication on the practical benefits of registering for waste services⁵
 - For example, more frequent waste collections mean cleaner business areas, which can attract customers

Relevant research

- » [Using social comparisons to increase willingness-to-pay](#)

Getting people to be more sustainable with their waste disposal

Moving up the *waste hierarchy* and toward circular economy requires active participation of waste generators to segregate their waste so that it could be reused, recycled, composted, and so on. New practices such as waste reduction, waste separation at source, reduced littering, and reuse of products and materials require that residents change their ingrained practices from disposing of commingled waste, littering, or using single-use containers (old behaviors) to environmentally more

sustainable practices (new behaviors). SWM programs can only fulfill their goals if residents actively participate. Accessibility and ease of participation are two primary determinants of engagement with SWM programs.⁶

Case studies took different approaches to encourage lower waste generation rates. Romania's five-part source segregation scheme deterred residual waste disposal by issuing smaller bins, charging residents higher fees for unsegregated waste, and

holding residents accountable for open dumping. Collectively, the town reduced residual waste collection by 55 percent. In Australia, smoking areas that appealed to residents' sense of pride and ownership, created a positive social norm, held smokers accountable for littering, or guided smokers to bins led to a 53 percent improvement

in proper disposal. Australia's experimental approach also uncovered the importance of engaging with smokers and understanding their needs to induce more sustainable waste behaviors. Such findings have since given rise to anti-littering guidelines and new programs.

BOX
4

Behavioral tools used in the 'Getting people to be more sustainable with their waste disposal' category

How were tools used in this challenge?

The cases in this category used a variety of behavioral tools to increase sustainable waste behaviors. This box highlights the tool used frequently in this category, tools that were experimentally evaluated, and recommendations on how practitioners might increase sustainable waste behaviors. However, these data do not indicate that countries implemented the best tools.

Behavioral targets

- » Increase reusing and recycling, source segregation of organic and other waste, and proper disposal of cigarette butts

Highlighted tool

- » Material rewards: Receiving cash or in-kind incentives for performing the desired behavior

How was the highlighted tool used?

- » In Curitiba (Brazil), Kumbakonam (India), Sălacea (Romania), Indonesia (waste banks), Cajicá (Colombia), and Nanjing (China), residents received in-kind incentives or monetary rewards for engaging in source segregation or recycling
- » In Israel and Solomon Islands, residents received a deposit refund for returning used containers

- » In Jamaica, environmental wardens and CBOs received performance bonuses for mobilizing residents to engage in SWM activities. Complementarily, service providers received collection trucks for proficient service quality.

Tools that have been tested:

- » *Simplifying behaviors and decisions*: In the Canada case study, decreasing the distance to recycling and composting bins increased waste diversion rates by 70–147 percent.
- » *Social norms*: In the Australia case study, redefining littering norms led to a 58 percent cigarette butt binning rate

Recommendations

- » Increase the perceived convenience to boost diversion rates
 - For example, Canada increased the convenience of waste disposal bins
- » Simplify and chunk information to make it easily understood
 - For example, Argentina grouped similar information together and simplified the presentation of information

Relevant research

- » [Using prompts to increase organic waste source segregation](#)
- » [Installing waste bins to increase proper disposal](#)
- » [Using behavioral science to decrease plastic litter](#)

Getting people to generate less waste

Waste generation continues to increase in almost all country income groups. It is correlated with economic growth and urbanization. Few countries have managed to tangibly decouple their waste generation rates from economic growth, Korea providing the most notable example. Decreasing waste production by both consumers and producers has historically been difficult.⁷ This includes buying products with less packaging, avoiding purchases and changing consumption patterns, and reducing edible food waste.

Case studies took different approaches to encourage lower waste generation rates. In Korea, authorities charged residents progressively more for increasing residual waste disposal rates. This tactic increased recycling rates and led to further upstream changes.

The government's progressively increasing regulations on single-use items and introduction of eco-labeling schemes has shifted producer and consumer behavior toward reusable alternatives. Collectively, these activities have successfully decoupled the country's economic growth from its waste generation rate. Conversely, grassroots organizations in the Philippines targeted producers outright and publicized the brands disproportionately responsible for SUP waste to increase producer accountability. Notably, the United Kingdom's *Love Food Hate Waste* campaign combined producer and consumer-oriented approaches. The campaign provided residents with concrete tips and actionable strategies to improve waste reduction. Complementarily, it also collaborated with the food industry to decrease food waste across all aspects of the supply chain and improve product packaging. These tactics contributed to regional decreases in avoidable food waste.

BOX

5

Behavioral tools used in the 'Getting people to generate less waste' category

How were tools used in this challenge?

The cases in this category used a variety of behavioral tools to decrease waste generation. This box highlights the tool used frequently in this category, tools that were experimentally evaluated, and recommendations on how practitioners might decrease waste generation rates. However, these data do not indicate that countries implemented the best tools.

Behavioral targets

- » Changing production and consumption behaviors

Highlighted tool

- » *Saliency*: This means making aspects of one's environment more obvious, for instance, through communications campaigns

How was the highlighted tool used?

- » Case studies such as the United Kingdom, Ireland, the Solomon Islands, Hong Kong SAR, China, and Rwanda used eye-catching communications campaigns. Cases used a myriad of mediums (for example, radio, television,

billboards, and social media) to increase the noticeability of waste generation and how residents could reduce their footprint

Tools that have been tested:

- » *Material rewards*: In the Solomon Islands case study, providing monetary incentives and discounts to students decreased SUP usage between 46 and 100 percent

Recommendations

- » Make the targeted behavior more attractive
 - For example, in the Solomon Islands, school children received a reward for using and returning reusable lunch containers
- » Make the targeted behavior easier to accomplish⁸
 - For example, change the default so that plastic straws are not automatically dispensed with beverages

Relevant research

- » [Using framing to decrease single-use plastic bag consumption](#)
- » [Changing the default to reduce plastic straw use](#)

Spillover effects

Across case studies, some interventions led to positive impacts beyond the targeted behavior. For instance, in the Solomon Islands, an intervention to eliminate single-use lunch containers led to decreases in other types of SUPs that were not targeted as well as decreases in SUPs sold by vendors. In Korea, the volume-based fee system provided the basis for subsequent producer and consumer shifts to reusable products. In Thailand, composting provided a gateway to other SWM behaviors, like the segregation of recyclables and hazardous waste. Lastly, in India, the Swacch Survekshan Survey fostered better participation of individuals in the lesbian, gay, bisexual, transgender, queer and questioning, and two spirit (LGBTQ2S+) community within SWM activities.

The deeper-dive cases

The deeper-dive cases provided a diverse snapshot of how behavioral insights can support waste management programming. These cases spanned geographic regions, country income levels, types of government, and intervention foci. They also included a range of behavioral tools across financial, social, and system design mechanisms.

The deeper-dive cases demonstrate that government commitment at both the national and municipal levels is important for waste-related behavior change interventions. Tonga and Morocco illustrated how political will at the national level allows for smooth and transparent disbursement of resources and funds. The municipalities of Colombia, Romania, and Indonesia (Surabaya) mobilized financial resources and actively undertook activities to defeat local preconceptions around waste management. The Romanian mayor personally visited schools and other common gathering points to demonstrate source segregation practices.

The cases also highlighted the power of accountability and feedback. Morocco created accountability metrics to drive behavior change of operators and generators.

Citizens provided feedback on private sector service quality, which local administrations used to drive changes in existing systems. In India (Pune) and Tonga, officials visited households that continuously failed to segregate, monitored illegal dumping, and hand-delivered payment notices. In Romania and Tonga, officials tracked down and mailed litter to offending residents. This consistent practice dissuaded residents from improperly disposing of their waste.

The deeper-dive cases demonstrated the benefit of incorporating informal workers into SWM activities. India (Pune) is an excellent example of integrating informal pickers with the formal system. SWaCH bridged the gap between municipal service delivery and household needs. It is also a testament to how the informal sector can provide sound services to a large city. Morocco similarly integrated waste pickers' roles in waste management operations.

Behavior change does not happen instantaneously. Often, behaviorally informed interventions require extensive citizen engagement to drive more sustainable behaviors. The deeper-dive cases show the importance of citizen engagement across geographic regions and income levels. For instance, the local government in Colombia launched the GCP in 2008. Over a decade later, Cajicá continues to provide ongoing training on source segregation. The government employs full-time trainers to visit households bimonthly to distribute composting material and continuously engage with the population.

Lastly, the deeper-dive cases show the importance of complementary bottom-up and top-down action. For instance, in Mali, grassroots organizations shepherded SWM activities to promote user-driven changes in SWM behavior. These organizations helped the municipalities overcome financial gaps by promoting community action and sustained pressures of a conflict-prone environment. Likewise, in Indonesia, the SGC initiative relied on bottom-up community activities. Various levels of community leaders worked with environmental cadres and NGOs to oversee and guide residents' waste management practices.

12345

Recommendations

Considerations before designing waste management interventions

Across cases, behavioral tools did not exist in isolation. Crucially, cases often contained factors that provided a necessary foundation and enabling environment for behavior change. Behavioral tools built on this foundation. These factors included the following:

Government support. Policy initiatives may be short-lived if they do not have sufficient government support. Across case studies, the compendium demonstrates the value of dedicated officials in driving more sustainable behavior. It also demonstrates the value of prioritizing a long-term vision of SWM and the government's commitment to deploy several iterations of an intervention. In Korea, the government invested time and resources into the volume-based waste fee system to decrease residual waste generation. Complementarily, it created appropriate infrastructure to support broader and sustained change. Similarly, the mayor of the Brazilian municipality of Curitiba created a progressive vision of SWM and introduced a series of programs to increase waste diversion and community cleanliness. These programs were responsive to and evolved in line with changing conditions.

Decentralization. When the governments placed service delivery close to waste generators, interventions led to more participatory approaches and better results. Decentralization gave local officials greater autonomy to tailor SWM operations to local needs. This included creating a strong policy environment, such as SWM regulations and SUP bylaws. For instance, in Tanzania, each ward created bespoke SWM services and channeled waste collection fees into local activities. Residents could

see how their money was being spent and the improvements generated, which reinforced their willingness to pay.

Predisposition to change. A hurdle with any novel intervention is that individuals must want to change or adopt new behaviors. Targeting interventions to stakeholders who are already keen to adopt new approaches can lead to better outcomes. For instance, in China (Nanjing) and Thailand, officials first introduced the intervention to groups that were motivated and eager to participate. In Thailand, officials asked village heads to participate in the CRZW initiative. They started with a few early adopters that were already keen to participate. Once a subset of village heads agreed to participate in the sa-wian competition, interest in the competition spread and other village heads similarly signed on. In China, the Nanjing government introduces a pilot organic waste-sorting scheme to 23 communities, a portion of which were already keen to upgrade their SWM systems.

Adequate SWM services and infrastructure. Behavioral interventions operate within a preexisting system. Infrastructure works with and supports softer, social interventions. Research shows that positive waste management attitudes do not necessarily translate to actions. Rather, the physical context like limited recycling facilities may

stymie optimal waste-related behaviors.⁹ Residents may be disinclined to adopt a new system if they feel that their efforts are in vain, or if the result will not change. For instance, residents may not participate in source segregation programs if the municipality does not have separate waste processing facilities. For these reasons, having the proper services and infrastructure is important before implementing an intervention. For instance, in Romania, waste authorities upgraded core infrastructure to handle and process segregated waste, such as organic waste. Residents could confidently participate in the system, knowing that other actors were doing their part. Residents could also hold waste collection agents responsible for infractions. Conversely, several case studies struggled with interventions due to limited capacity, funds, and infrastructure. The timing of communication campaigns and the application of behavioral tools should complement the rollout of basic infrastructure improvements for maximum effect.

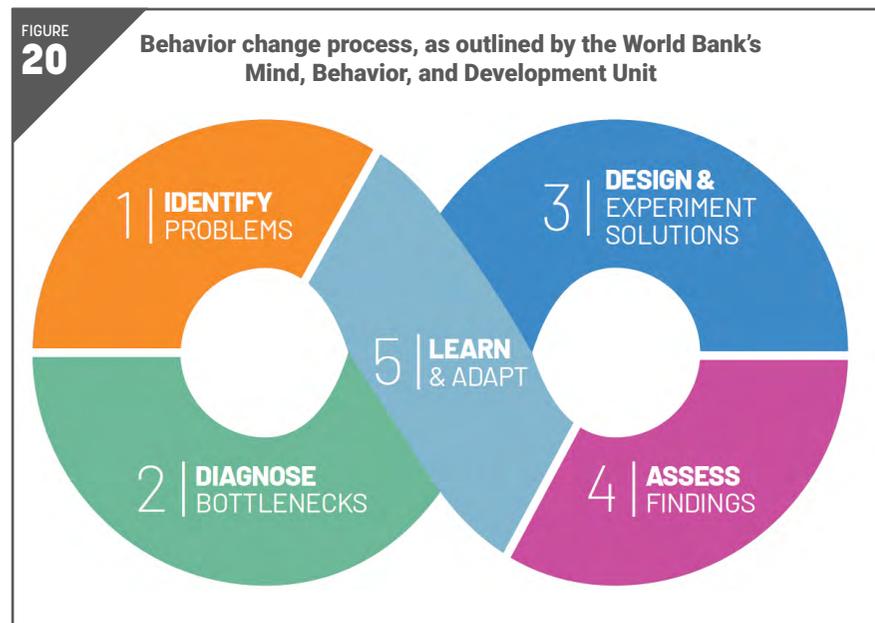
Community engagement. SWM interventions require the buy-in and cooperation of communities in which they are embedded. Ideally, interventions should be designed and implemented with the support and inclusion of communities and their residents. Efforts to engage communities must be responsive to cultural, social, and gender considerations. Government authorities, village leaders, change agents, community-based associations, and religious leaders are examples of actors that can support this aim. In practice, the most appropriate actor will depend on the intervention, community context, and target audience. Governments may find it helpful

to engage local or hyperlocal counterparts to shepherd change. The compendium is replete with examples of successful community engagement. Influential figures in Romania held community consultations before introducing a source segregation system, while mayors in Thailand worked with local village heads to encourage the construction and use of home composters. Further, SHGs, university students, and women's groups supported intervention uptake in India (Kumbakonam), Indonesia (waste banks), and Nepal (*suiro hook*), respectively.

Multistakeholder collaboration. The scope and scale of waste management interventions often means that it is impractical to implement them without assistance. Cases brought together diverse actors, including residents, CBOs, NGOs, educational institutions, the private sector, and several levels of government. Multistakeholder collaboration was a salient theme across cases, including in the Solomon Islands, Argentina, Tanzania, the United Kingdom, Romania, Indonesia (Surabaya), and Pakistan. In the Solomon Islands, Indonesia, and Argentina, local governments collaborated with international actors. When conducting interventions with multiple actors, each stakeholder group may have slightly different needs. Identifying and understanding stakeholder priorities is important when developing behaviorally informed interventions.

Implicitly, the absence of one or more of the aforementioned factors may undermine the success and sustainability of SWM interventions. Behavioral tools do not offer silver bullet solutions nor can they supplant a strong enabling environment. For instance, waning support from government agencies or insufficient financial and human resources would significantly endanger the long-term persistence of interventions. Further, the long and often protracted timelines over which behavior change takes place underscore the need for program continuity. As noted above, interventions in Indonesia (Surabaya) took several years before SWM practices started to shift. The authors cannot comment on the long-term sustainability of the profiled interventions but have included factors that offer ripe conditions for change and provide guidance on the implementation of behavior change interventions.

How can practitioners successfully use behavioral science?



Practitioners may benefit from considering several factors before applying behavioral insights. These factors have been condensed into a checklist for convenience (see below). This checklist incorporates and builds on the enabling environment outlined above.

Consider context. In the described case studies, practitioners achieved positive outcomes with behavioral tools. However, the same approach may not be appropriate in all circumstances. Some behavioral tools may work well in one country or region but not another. To drive sustainable behavior change, practitioners must first understand the target behavior and the environmental, social, and cultural contexts in which the behavior occurs. For instance, certain interventions may work better in individualist versus collectivist societies. Social context may also vary within a

region. For instance, in the Solomon Islands case study, the age of school children influenced which interventions were successful.

Avoid assumptions. When designing interventions, it is important to avoid making assumptions about which tactics will be most effective. For example, traditional policy instruments like fines are often used to deter improper SWM behavior. However, there are limitations to such approaches, particularly if the threats of enforcement actions are not viewed as credible. The Australia case study found that fines worked if enforcement officers were present. However, they had a limited impact on long-term littering rates. In some cases, fines may be effective deterrents to unwanted behavior. It is important to understand the drivers of behavior first. Similarly, access to accurate and reliable information is important to guide behavior. Informational campaigns alone may be insufficient to drive behavior change. This is especially true if lack of knowledge is not the sole or primary barrier to engaging in a behavior. Before the profiled interventions, governments in Morocco and Ireland historically used awareness-raising campaigns. These campaigns had minimal effects on waste management practices.

Understand the behavior. Before implementing an intervention, it is important to identify the target audience and the behavior. The target audience is the specific group to whom the intervention is targeted. For example, practitioners may discover that households do not compost their organic waste. Before trying to change this behavior, practitioners may first wish to understand what factors prevent household composting. That is, do residents lack the appropriate space or equipment? Are they deterred by odors or pests? Are they following the influence of individuals around them? It is imperative that practitioners do not make assumptions on the underlining barriers or drivers of change. Focus groups, interviews, and surveys can help understand the target audience. To understand how this works in practice, practitioners can refer to case studies in Australia, Argentina, and the United Kingdom. Practitioners in these cases used surveys, interviews, focus group discussions, and direct observations. These findings helped them understand the behavior (for example, source segregation, littering, and food waste), barriers to change (for example, lack of infrastructure), and motivations to change (for example, cost savings). Research allows

practitioners to embed behavioral insights at the beginning of an intervention, rather than in retrospect. They can design their own interventions in response to prevailing barriers and motivators. Creating projects with behavioral insights in mind can improve project outcomes, save time, and mitigate costs.

Consider who must change their behavior. When designing an intervention, it is useful to consider the end user. Policy makers should not assume that individuals will make decisions based on full and accurate information. The easier practitioners make it for residents, public officials, or private entities to do the right thing, the more likely the target group is to follow through. Questions to be asked include the following: What will the end-user need to conform with the intervention? Is it possible to provide them with resources to increase the ease of adoption? For instance, the presence of recycling labels and information may alone be insufficient to increase recycling rates. To properly recycle, residents must pay attention to recycling information, understand the information, and act on it. However, in practice, individuals are often confused by and misinterpret recycling labels and do not attend to the information during disposal.¹⁰ To increase recycling rates, practitioners must also grapple with these barriers.

Ensure infrastructure and systems are in place. Infrastructure and systems are extremely important for SWM, as structural constraints can translate into low levels of the desired behavior, such as recycling.¹¹ Residents may want to engage in the SWM system but may be deterred by inaccessibility. Behavioral interventions cannot supplant core infrastructure needs, like recycling or organic waste processing plants. For instance, before the described intervention, insufficient waste infrastructure discouraged residents in Hong Kong SAR, China from segregating their waste. In response, Hong Kong SAR, China first improved its network of recycling centers. Then, it introduced a gamified incentive scheme to increase the residential use of recycling centers. Ultimately, both infrastructure and behaviorally informed interventions are needed. Studies like Argentina also show that infrastructure is important but is not the only prerequisite for good SWM behavior. In this case, despite the city's investment in source separation plants and separate collection schedules, residents continued to dispose of mixed waste.

Prepare to test and retest. The compendium underscores the agile nature of implementing public policy interventions. It also reinforces the iterative approach to behavior change. Many cases featured examples where officials tried several approaches to improve waste management before and during the described case study. For instance, in Tonga, officials introduced several modalities to improve the cost recovery of waste management fees before they found the best vehicle. For this reason, practitioners may consider piloting one or more approaches in a small region before scaling up. Several cases used pilot programs to understand a program's effectiveness before expansion. Pilots also allow practitioners to understand what does not work, which can save time and money. For instance, a local educator conceptualized the idea of waste banks in Indonesia. Initially, the country had only a single waste bank. However, after the concept was successful, additional cities tailored the approach to their own needs. Practitioners can also refer to the Argentina, Colombia, Pakistan, Korea, China, Thailand, and India (Pune) case studies. In each case, officials tested a prescribed approach on a subset of the population before scaling it up to a larger portion of a city, a large area, or the whole country.

Plan to evaluate. Within each challenge and objective, the compendium includes multiple different behavioral tools and tactics, but it cannot forecast which tactic will be most effective in certain cities or municipalities. An impact evaluation can help practitioners determine whether an intervention influenced waste management practices (that is, source segregation rates) and whether they can attribute that impact to the intervention. Impact evaluations generally require at least two groups: one that receives the intervention (the treatment group) and one that does not (the counterfactual).

A strong evaluation plan provides evidence-based results. Causal evidence is essential to help practitioners understand what works and for whom. Without causal evidence, one cannot ascribe the result to the intervention or any behavioral tool. For example, a municipality might multiply the number of community waste bins to increase the convenience of waste disposal. However, the government discovers that littering continues to be rampant after their installation. Without experimentally evaluating the intervention, they cannot know *why* the intervention was unsuccessful,

what *would have happened* in the absence of the intervention, and *what* they can do to improve subsequent interventions. In the process, governments may waste valuable fiscal resources, time, and manpower.

Practitioners can refer to several cases to see how these types of project designs work in practice. For instance, in Argentina, the municipality used a randomized controlled trial to investigate the impact of an intervention on source segregation and waste disposal. The intervention had five treatment groups—each of which received different behavioral tools—and one control group, which did not receive any intervention. The government subsequently compared source segregation rates among treatments and between the treatment and control groups. The intervention's structure allowed the municipality to generate causal evidence about which interventions were most effective. Practitioners used these results to decide which intervention to scale up to a larger section of the municipality.

Behaviorally informed interventions do not offer silver bullet solutions to SWM. Rather, they work in concert with other public policy initiatives to drive changes in waste management. In the absence of strong governance, willing stakeholders, and necessary infrastructure, behavioral insights may have limited effectiveness. Practitioners may consider seeking the input of behavioral science experts at any or all stages of their intervention.

Additional resources for practitioners:

[Behavioral Science Toolkit for Climate Related Projects](#)
[World Development Report: Mind, Society, and Behavior](#)

BOX
6

A checklist for practitioners to use before applying behavioral insights

Practitioners should consider the following before implementation:

What is the behavior challenge? Before implementing a solution, it is important to identify the core issue at play and the barriers that might currently be impeding change. This includes, for example, identifying who (households, businesses, government actors, and so on) and what (the specific behavior) one is seeking to change. Taking time to understand these factors up front will ultimately save time and money in the long term.

- » Example: A local government notices rampant littering in public parks. Before it implements an intervention, the government conducts focus groups and surveys to understand the drivers of littering, the impediments to proper waste disposal, predominant types of litter, and the demographics of litterers.

Is it possible to embed behavioral insights early on? Behaviorally informed public policy is most effective and efficient when applied at the outset of a policy intervention, as opposed to retrospectively applied to an existing policy.

- » Example: A municipality upgrades its recycling infrastructure. Several years later, after recycling rates fail to improve substantially, the municipality investigates behaviorally informed solutions. Ideally, the municipality should have incorporated behavioral insights into the design and rollout of waste management upgrades.

Is adequate infrastructure in place? Hard interventions (like infrastructure) and soft interventions (behavior change initiatives) support one another. Interventions that focus solely on one of the two components will likely be less sustainable than those that include both elements.

- » Example: Two municipalities seek to increase household source segregation rates. The first municipality creates a behaviorally informed communication campaign. However, this municipality does not have the infrastructure to accommodate separate waste collection or processing, so all waste is commingled at pickup and people get frustrated. The second municipality upgrades its waste management infrastructure to collect and process separate waste streams. However, it does not conduct adequate outreach in advance nor empower residents to participate. In both examples, the municipalities focus exclusively on one element (infrastructure or soft interventions) at the expense of the other.

Has the context been considered? The referenced interventions were constructed in response to specific policy issues. The context (including local culture, norms, and values) in other regions may differ from those described in case studies. Contextual differences may affect the impact of interventions to change behavior.

- » Example: A local municipality wants to use behavioral insights to increase proper waste disposal. To do so, it asks residents to appeal to their own future self. This tactic has been successful in behavior change campaigns in other countries. Unfortunately, the municipality does not consider the local culture. In this country, appealing to self-interests is seen as selfish. Rather than increase proper waste disposal, the intervention backfires and rates of open dumping instead increase.

Is there local buy-in? Ownership of the initiative by government officials and local stakeholders is essential. It is also helpful to implement an intervention when there is already a willingness to change.

- » Example: A national government seeks to implement an organic waste diversion program across local municipalities. Several actors must be on board with this new program in each municipality for it to succeed. For instance, the waste collection authority must be willing to collect and process segregated waste; the mayor must be willing to champion the program and invest necessary resources; government officials must be willing to conduct sustained outreach and engagement; vendors must be willing to purchase compost; and residents must be willing, able, and empowered to engage in source segregation.

Is an evaluation plan in place? It is difficult to assess the effectiveness of behavioral tools if one does not evaluate their impact. There are several experimental or quasi-experimental designs that one can adopt to do so.¹²

- » Example: To quantify the efficacy of an intervention to reduce SUP usage in schoolchildren, one could choose two similar schools and introduce the intervention in one school but not the other. One would then measure the use of SUPs before and after implementation.

Endnotes

- ¹ State of New South Wales and the Environment Protection Authority. (2019). *Identifying effective strategies to reduce cigarette butt litter findings from the NSW EPA-led Cigarette Butt Litter Prevention Trial*. EPA, Sydney. ISBN 978 1 925987 04 1. Retrieved from <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/litter/19p1840-butt-litter-trial-report.pdf>
- DiGiacomo, A., Wu, D. W. L., Lenkic, P., Fraser, B., Zhao, J., & Kingstone, A. (2018). Convenience improves composting and recycling rates in high-density residential buildings. *Journal of Environmental Planning and Management*, 61:2, 309–331. doi: 10.1080/09640568.2017.1305332
- ² Kilduff, G. J., Elfenbein, H. A., & Staw, B. M. (2010). The psychology of rivalry: A relationally dependent analysis of competition. *Academy of Management journal*, 53(5), 943–969.
- ³ Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological bulletin*, 125(6), 627.
- ⁴ Czajkowski, M., Zagórska, K., & Hanley, N. (2019). Social norm nudging and preferences for household recycling. *Resource and Energy Economics*, 58, 101110.
- ⁵ Anie, A. (2020, October 19). Changing behaviour: Lessons in community waste management in Ghana. UNDP Accelerator Lab Ghana. Retrieved from <https://www.undp.org/ghana/blog/changing-behaviour-lessons-community-waste-management-ghana>
- ⁶ Martin, M., Williams, I. D., & Clark, M. (2006). Social, cultural and structural influences on household waste recycling: A case study. *Resources, conservation and recycling*, 48(4), 357–395.
- ⁷ Whitmarsh, L., Seyfang, G., & O'Neill, S. (2011). Public engagement with carbon and climate change: To what extent is the public 'carbon capable'? *Global Environmental Change*, 21, 56–65. doi: 10.1016/j.gloenvcha.2010.07.011
- ⁸ Mundt, D., Carl, S., & Harhoff, N. (2020). A field experiment on reducing drinking straw consumption by default. *Frontiers in Psychology*, 11.
- ⁹ Whitmarsh, L. E., Hagger, P., & Thomas, M. (2018). Waste reduction behaviors at home, at work, and on holiday: What influences behavioral consistency across contexts? *Frontiers in Psychology*, 9, 2447.
- ¹⁰ Waste and Resources Action Programme. (2020). *Banbury, on-pack labelling and citizen recycling behaviour*. Prepared by Emitihana Barker (Intern Research Analyst).
- ¹¹ Barr, S., Guilbert, S., Metcalfe, A., Riley, M., Robinson, G. M., & Tudor, T. L. (2013). Beyond recycling: An integrated approach for understanding municipal waste management. *Applied Geography*, 39, 67–77.
- ¹² Experimental designs include both treatment groups (which receive an intervention) and control groups (which do not receive an intervention). Having control groups helps account for factors other than the intervention that might account for the observed change. In this design, individuals are randomly assigned to either treatment or control groups. A randomized controlled trial is an example of an experimental design. Quasi-experimental designs also include one or more treatment groups and often also use control groups. However, individuals are not randomly assigned to these groups, either for ethical or practical reasons. Regression discontinuity and difference-in-difference are examples of quasi-experimental designs. The goal of both designs is to attribute causality - that is, to determine the change in an outcome (for example, changes in recycling rates) that is attributable to a defined intervention.

12345

Glossary

Category	Behavioral tool	Implication for behavior change	Relevant research
Social and motivational (soft) mechanisms	 Frame messaging to personal values, identities, or interests	The way choices are framed and presented influences our decisions. ¹ People identify with norms that closely match one's immediate setting, situation, and circumstances. ²	Chandra (2020): Using framing to deter single-use plastic bag consumption
	 Social comparison	Academic literature suggests that social comparison tools such as rankings can lead to behavior change. When an organization or community is ranked high in comparison to others, their behaviors tend to adjust to maintain their social status. This may also be mediated by a phenomenon called 'self-fulfilling prophecy' where people behave according to their expectations. ³ Rankings may also serve as a motivation when they highlight the desirable social norm.	Nomura et al. (2011): Drawing on neighborhood comparisons to increase organic waste diversion
	 Social Norms	Much of an individual's behavior is determined by social norms. The expectations and actions of one's peers and one's social identities influence behavior. ⁴ Social norms are one way of overcoming the feeling that our individual actions do not make a difference by highlighting that others are also contributing.	Dorn and Stöckli (2018): Using social norms to improve uptake of reusable takeout containers
	 Creating accountability	People are drawn to show their best image to others to maintain their self-interest and social status. Allowing a system that makes people's behaviors visible will influence the decisions people make toward those behaviors that are socially accepted.	Alpizar et al. (2008): Using accountability to foster pro-environmental donations
	 Emotional appeals	Appealing to an individual's emotions (such as hope, pride, joy, shame, and anger) in different contexts can help connect with relevant audiences ⁵ and promote better waste management behavior. ⁶ Positive emotions tend to be better predictors of pro-environmental behavior than negative emotions.	Schneider et al. (2017): Leveraging pride to increase pro-environmental behavior
	 Feedback	Feedback can help individuals track their progress toward a goal. Providing feedback among peers can provide a point of social comparison for individuals to gauge their own behavior. ⁷ In certain contexts, feedback can be an effective tool to promote positive waste management behaviors. ⁸	Schultz (1999): Using written feedback to increase recycling rates
	 Messengers	Individuals are greatly influenced by who conveys information. Messengers can be either regular members of society or influential figures. In the former, individuals or groups within a community can help mobilize change by providing a positive example of proper behavior or instilling proper practices in others. ⁹ In the latter, figures of influence or authority (for example, religious figures) are used. Studies on social influence show that individuals are more likely to internalize the claims or opinions of those perceived as credible and to comply with those of perceived legitimate authority. ¹⁰	Cotterill et al. (2009): Using change agents to increase recycling rates
	 Gamification	Game-like and playful activities can motivate people to engage with and persist with relevant behaviors. ¹¹ Game schemes include competition and social comparison elements as well as feedback and symbolic rewards.	Magista et al. (2018): Using gaming elements to improve waste-related behaviors in youth
	 Nonmaterial rewards	Positive symbolic incentives can be used to motivate an individual to perform an action and can be an effective mechanism for behavior change. ¹² Incentives like social recognition may both target and enhance intrinsic motivation to change. ¹³	Handgraaf et al. (2013): The impact of social rewards on energy conservation

Category	Behavioral tool	Implication for behavior change	Relevant research
Financial mechanisms	 Material rewards	Some studies show that people can change their behavior toward waste management in relation to material or monetary incentives. ¹⁴ However, incentives should be used with caution as they can crowd out internal motivation. ¹⁵ The way these rewards are implemented can increase their effectiveness. For example, several studies suggest that lotteries can be effective, since people tend to focus on the size of the prize over weighing their probability of winning. ¹⁶	Diamond and Loewy (1991): Using lottery schemes to increase recycling
	 Negative Incentives	Disincentives (for example, fines and penalties) may have great impact, but they are difficult to design to avoid unintended results. ¹⁷ Creating a negative incentive based on behavioral insights might increase its effectiveness and avoid backfiring. It is important to make sure that the incentive is designed to reinforce or undermine relevant psychological mechanisms that can influence the targeted behavior.	Khawaja and Shah (2013): Experimental effects of fines on littering
	 Appealing to loss aversion	People have a greater sensitivity to losses than to equivalent gains. ¹⁸ This tool is often applicable in financial contexts (for example, when individuals may avoid incurring a monetary loss).	Homonoff (2018): The Impact of a tax on disposable bag use
	 Regulations	Rules and regulations can guide behaviors by indicating what is permissible (or not) within a given system. It also communicates norms and responsibilities for different actors. ¹⁹	Adeyanju et al. 2021: Systematic review of regulations to curb plastic bag usage

Category	Behavioral tool	Implication for behavior change	Relevant research
System design mechanisms	 Defaults	Default options are selected courses of action that take effect if nothing is specified by the decision-maker. Usually, when people do not have a preference or cognitive resources to spend in a course of action, they opt for the default option, this being the one readily available.	Mundt (2020): Changing the default to decrease plastic straw usage
	 Salience	For things to reach our consciousness, they need to attract our attention. Since the environment is full of stimuli, only the most salient elements will grab our attention. ²⁰ Communications campaigns implemented in different formats such as the media, in-person activities, and roadside billboards have diverse impact in different contexts. Different studies have shown that campaigns can more effectively motivate change when they harness or address the biases, heuristics, and emotions that dominate our decision-making. ²¹	Takahashi et al. (2018): Increasing salience and visual appeal of environmentally friendly products
	 Physical cues	Signs in the environment can elicit specific behaviors. Adding features to the environment can help promote sustainable behaviors.	Kallbekken and Sælen (2013): Using smaller plates to reduce food waste
	 Simplifying behaviors and decisions	To promote the uptake of programs and activities, it helps to make the desired behavior easier (or alternatively, to make the undesired behavior more difficult). ²² Access to information must also be presented in easy and concrete terms.	Cong et al. (2013): Promoting recycling by reducing the hassle
	 Timely messages	Finding timely moments at which change is easiest can help promote behavioral outcomes. These messages are generally both specific and actionable and are placed in close relation to when an individual would conduct a behavior. ²³	Shearer et al. (2017): Using prompts to increase organic waste segregation
	 Accessible services	Access to convenient waste collection infrastructure and services can be a strong determinant in whether an individual performs a given behavior. ²⁴	Flanagan et al. (2021): Increasing the convenience of waste disposal infrastructure
	 Foot in the door	Individuals are more likely to agree to a more substantial action if they first agree to a small commitment.	Souchet and Girandola (2013): Using foot-in-the-door to increase environmental behavior

Endnotes

- ¹ Balz, J., Sunstein, C., & Thaler, R. (2013). Chapter 25. Choice architecture. In E. Shafir (Ed.), *The behavioral foundations of public policy*, 428–439.
- ² Reese, G., Loew, K., & Steffgen, G. (2014). A towel less: Social norms enhance pro-environmental behavior in hotels. *The Journal of Social Psychology, 154*(2), 97–100. doi: 10.1080/00224545.2013.855623
- ³ Sauder, M., & Lancaster, R. (2006). Do rankings matter? The effects of US News & World Report rankings on the admissions process of law schools. *Law & Society Review, 40*(1), 105–134.
- ⁴ Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. *Advances in Experimental Social Psychology, 24*, 201–234. doi: 10.1016/S0065-2601(08)60330-5
- ⁵ Ibanez, L., & Roussel, S. (2021). The effects of induced emotions on environmental preferences and behavior: An experimental study. *PLoS ONE, 16*(9), e0258045. doi: 10.1371/journal.pone.0258045
- ⁶ Alpizar, F., & Gsottbauer, E. (2015). Reputation and household recycling practices: Field experiments in Costa Rica. *Ecological Economics, 120*, 366–375. doi: 10.1016/j.ecolecon.2015.04.003
- ⁷ Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive and reconstructive power of social norms. *Psychological Science, 18*(5), 429–434.
- ⁸ Timlett, R. E., & Williams, I. D. (2008). Public participation and recycling performance in England: A comparison of tools for behaviour change. *Resources, Conservation and Recycling, 52*(4), 622–634. doi: 10.1016/j.resconrec.2007.08.003
Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic and Applied Social Psychology, 21*(1), 25–36. doi: 10.1207/s15324834basp2101_3
- ⁹ Hargreaves, T. (2011). Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change. *Journal of consumer culture, 11*(1), 79–99. doi: 10.1177/1469540510390500
- ¹⁰ Milgram, S., & Gudehus, C. (1978). *Obedience to authority*. Harper Collins Publishers.
- ¹¹ Gibovic, D., & Bikfalvi, A. (2021). Incentives for plastic recycling: How to engage citizens in active collection. Empirical evidence from Spain. *Recycling, 6*(2), 29. doi: 10.3390/RECYCLING6020029
- ¹² Gneezy, U., Kajackaite, A., & Meier, S. (2020). Incentive-based interventions. In M. S. Hagger, L. D. Cameron, K. Hamilton, N. Hankonen, & T. Lintunen. (Eds.), *The Handbook of Behavior Change* (523–536). Cambridge University Press, New York, NY. doi: 10.1017/9781108677318.036
- ¹³ Neckermann, S., & Bruno S. F. (2008). *Awards as incentives* (SSRN Working Paper No. 1021208). Institute for Empirical Research in Economics.
- ¹⁴ Harder, M. K., Woodard, R., & Bench, M. L. (2006). Two measured parameters correlated to participation rates in curbside recycling schemes in the UK. *Environmental Management, 37*(4), 487–495. doi: 10.1007/s00267-004-0124-8
- ¹⁵ Bryce, W. J., Day, R., & Olney, T. J. (1997). Commitment approach to motivating community recycling: New Zealand curbside trial. *Journal of Consumer Affairs, 31*(1), 27–52. doi: 10.1111/j.1745-6606.1997.tb00825.x
- ¹⁶ Wan, J. (2010). The incentive to declare taxes and tax revenue: The lottery receipt experiment in China. *Review of Development Economics, 14*(3), 611–624. doi: 10.1111/j.1467-9361.2010.00577.x
- ¹⁷ Rare and The Behavioural Insights Team. (2019). *Behavior change for nature: A behavioral science toolkit for practitioners*. Rare, Arlington, VA.
- ¹⁸ Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211*(4481), 453–458.
- ¹⁹ Thøgersen, J. (2003). Monetary incentives and recycling: Behavioural and psychological reactions to a performance-dependent garbage fee. *Journal of Consumer Policy, 26*(2), 197–228.
- ²⁰ Kahneman, D., Slovic, S. P., Slovic, P., & Tversky, A. (Eds.). (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge University Press. Pg. 192.
- ²¹ Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211*(4481), 453–458. doi: 10.1126/science.7455683
Laibson, D. (1997). Golden eggs and hyperbolic discounting. *The Quarterly Journal of Economics, 112*(2), 443–478. doi: 10.1162/003355397555253
Rabin, M., & Thaler, R. H. (2001). Anomalies: risk aversion. *Journal of Economic perspectives, 15*(1), 219–232. doi: 10.1257/jep.15.1.219
- ²² Service, O., Hallsworth, M., Halpern, D., Algate, F., Gallagher, R., Algate, F., Gallagher, R., Nguyen, S., Ruda, S., & Sanders, M. (2014). *EAST: Four simple ways to apply behavioural insights*. Behavioural Insight Team, London.
- ²³ McKenzie-Mohr, D., & Schultz, P. W. (2014). Choosing effective behavior change tools. *Social Marketing Quarterly, 20*, 35–46. doi: 10.1177/1524500413519257
- ²⁴ Prime Minsiter's Strategy Unit (2002). *Waste Not, Want Not: A strategy for tackling the waste problem in England*. Crown, Great Britain.

