SUCCESSFUL APPROACHES TO SOLID WASTE MANAGEMENT IN LOW- AND MIDDLE-INCOME COUNTRIES

BRIEFING PAPER

tearfund

SUCCESSFUL APPROACHES TO SOLID WASTE MANAGEMENT IN LOW- AND MIDDLE-INCOME COUNTRIES

BRIEFING PAPER

Authors: David Lerpiniere, Ed Cook, Carla Worth del Pino (Resource Futures) and Joanne Green (Tearfund)

Edited by: Joanne Green (Tearfund)

Acknowledgements

Thanks for information and insights to Sing Cho (World Bank), Harrison Kwatch (Welthungerhilfe), Crispian Lao (Philippine Alliance for Recycling and Materials Sustainability), Brian McCarthy (RWA), Lakshmi Narayan (SWACH), Dr Johannes Paul (GIZ), Prof David Wilson (CIWM and WasteAid), Mari Williams (Independent Consultant) and thanks to Rich Gower, Paul Cook and Julia Kendal (Tearfund) for helpful comments.

Cover photo: Hazel Thompson/Tearfund
Design: Wingfinger Graphics

For further information, email: **policy@tearfund.org**

This publication and others on waste and management are available at: learn.tearfund.org

Tearfund is a Christian relief and development agency working with partners and local churches to bring whole-life transformation to the poorest communities.

© Tearfund 2019

Published by Tearfund.
A company limited by guarantee.
Registered Charity No. 265464 (England and Wales)
Registered Charity No. SC037624 (Scotland)

EXECUTIVE SUMMARY

We are on the verge of an environmental and public health crisis caused by waste. Three billion people lack access to safe waste management and disposal, and waste streams are increasing rapidly around the globe. This paper demonstrates that we can effectively respond to this crisis, by scaling up approaches that are already delivering results.

The analysis showcases six heterogeneous case studies drawn from Africa and Asia, examining how they overcome the nexus of challenges associated with waste management in low- and middle-income contexts. These case studies give specific examples of how interventions can deliver four common 'ingredients for success':

1) Clarify the responsibilities of the different (government) agencies involved, and establish transparency and public accountability for agencies and contractors (especially in the case of efforts for system-wide reform).

2 Ensure all the right stakeholders are effectively engaged (government agencies, households, informal sector, formal sector) and coordinated, with careful attention paid to the incentives of each.

3) Deliver financial sustainability through innovative approaches to user fees and a recognition that some value can be generated from waste.

4) Invest in appropriate (often low) technology approaches and associated staff capacity building, with a view to facilitating easy replication, scale-up and integration into existing systems.

Whilst these four themes might appear straightforward, the beauty of each case study is its innovative approach to these common issues, unlocking sometimes transformational progress in an area that has been neglected for decades.

1 THE CASE FOR SOLID WASTE MANAGEMENT

Globally, two billion people live without any waste collection and three billion without any methods of safe disposal,[1] creating an environmental and public health crisis. In sub-Saharan Africa alone waste generation is predicted to triple by 2050.[2] Businesses and governments need to prevent waste generation but they also need to invest in solid waste management (SWM). Slowly, this is being recognised but still only 0.3 per cent of total Official Development Aid (ODA) is spent each year on addressing the problem. It goes without saying that as well as increasing aid to SWM, interventions need to deliver. Recent history is littered with examples of high-tech, centralised interventions that failed to increase collection rates and safe disposal. This paper is not an exhaustive review, but aims to contribute to drawing out lessons and finding what will deliver financially sustainable solutions for people in poverty and for their environments. To do so we draw analysis and conclusions from six case studies that have been broadly successful in achieving their aims in low- and middle-income countries.

2 CRITERIA FOR THE CASE STUDIES CHOSEN

We have chosen six case studies of what we deem to be successful SWM interventions that meet the following criteria:

- they have been delivered at scale – at least at town or city-wide levels or across several different locations and countries
- they have succeeded in substantially increasing collection and safe management of waste for people in poverty in an environmentally sustainable way
- they are financially sustainable.

It has been difficult to find many detailed and documented good practice case studies. In particular, robust analysis of interventions in the solid waste sector is limited. This shows that we need to see more sharing of good practice, but also more examples of successful waste management interventions at scale. The case studies show different types of reforms across Africa and Asia in a spread of low- and middle-income countries. In the case of Morocco, Bo City in Sierra Leone, and Bayawan City in the Philippines, institutional donors have provided funding for interventions which have been led by local governments; whereas the cases of Pune in India, Integrated Resource Recovery Centres (IRRCs) in Asia, and Indonesian waste banks have been more bottom-up, community-based approaches in partnership with the local government. Drawing on these different experiences we aim to draw insights as to how four of the biggest challenges of SWM can be addressed:

1) governance
2) stakeholder engagement
3) financing
4) technology

…while being open about the challenges that remain. The big challenges of implementing successful SWM programmes are very much interlinked, a feature we hope comes through in our analysis. In brief the case studies are:

- multi-donor support for institutional reform in Morocco, which improved financial performance, created 1,000 jobs for waste pickers and significantly increased collection rates
- GIZ partnership with the local government of Bayawan City, which introduced a new waste payment system, increasing collection rates and reducing organic waste
- donor and NGO support to create whole system reforms in Bo City, which increased collection rates, reduced dumping and supported the creation of a recycling sector and improved public health

1 UNEP and ISWA (2015) 'Global Waste Management Outlook'. Available at: https://bit.ly/2eUsQiA
2 World Bank (2018) 'What a Waste 2.0'. Available at: https://bit.ly/2PEvs8J

© TEARFUND 2019

- a self-mobilised cooperative of waste pickers – SWACH – providing 3,000 dignified jobs for waste pickers and providing a much more cost-effective service than previously
- UNESCAP and NGO establishment of low-cost, low-tech community-based IRRCs across Asia
- Indonesian waste banks that began organically but have now been adopted by official government policy

3 CLARIFYING RESPONSIBILITIES AND ESTABLISHING TRANSPARENCY AND ACCOUNTABILITY

It is common for there to be a lack of clarity on responsibilities for waste management as functions tend to be split across local government departments (eg sanitation, transport and health) and between different tiers of government, and for the legislative framework on waste to be limited. This is often a key limitation to effective decision-making and action on SWM issues at the municipal level. For SWM to be successful, there needs to be clear responsibility for waste management services supported by effective regulation to prevent dumping and burning.

The World Bank has been involved in giving support to the Moroccan SWM sector since 2004 which evolved into two major loans. From 2013, the World Bank (alongside the German Agency for International Cooperation (GIZ),[3] the German development bank (KfW) and the Agence Française de Développement (AFD))[4] implemented two US$130 million development policy loan-funded programmes to support the Moroccan government with the implementation of phase two of the National Municipal Solid Waste Program. The programme involved strengthening governance through improved accountability, transparency, and citizen engagement by introducing:

- a 15-year national municipal solid waste programme (2008) which set out a framework for compliance with the law and for developing the waste management system and infrastructure
- a requirement for all contracts to be published on a website
- a new framework for monitoring and identifying offences and a system of penalties
- monitoring of the sector's social performance through citizen report cards

The project saw the economic performance of the municipal solid waste sector greatly improve, with arrears paid to contractors reduced by 20 per cent and over $44 million in revenue recovered through ecotaxes. Over 1,000 jobs were created for waste pickers. The environmental performance of the sector also improved, with regular inspections of all eight municipal solid waste landfills and a significant increase, from 32 to 53 per cent, of municipal solid waste collected through a formalised service.[5]

Overall, the programme evaluators strongly advocated future use of development policy loans for sector reform and identified that:

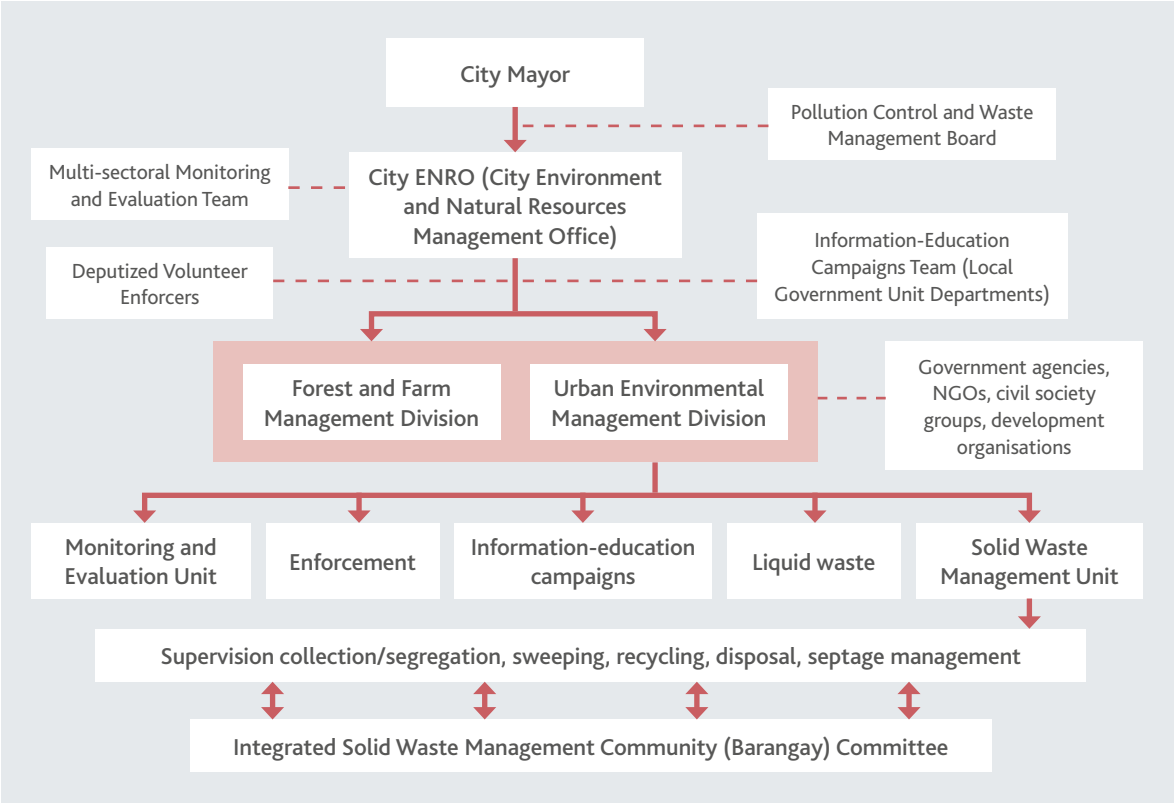
- the more aligned the reforms are with national government objectives, the greater the chance of success
- complex reforms take a long time to implement and stand a better chance of success if simpler reforms are already present. The process is iterative
- focusing on system reform, rather than training, appears to provide greater benefit to staff
- providing local governments with responsibility for and ownership of the entire municipal solid waste stream within its boundaries is important[6]

In **Bayawan City in the Philippines,** alongside GIZ technical assistance which was being given to establish a central waste management centre, the local government initiated a new organisational framework for SWM which included

3 GIZ (2013) 'Country report on the solid waste management in Morocco'. Available at: http://bit.ly/2tST0gF
4 World Bank (2014) 'Morocco: improving municipal solid waste management through development policy operations'. Available at: http://bit.ly/2HJfi6H
5 Independent Evaluation Group (2015) 'Implementation completion report review'. Available at: http://bit.ly/2DzgNlt
6 Ibid

an SWM unit (City ENRO) which 'supervises all functions and tasks for the implementation of the SWM program'.[7] This body reports directly to the city mayor who also chairs the local pollution control board. This framework established a system of reporting and coordinating all stakeholders to City ENRO (see Figure 1 below).

Figure 1 Organisational framework for Bayawan City's solid waste management



This change was considered one of the key factors in bringing about increased collection rates, a reduction in the generation of organic waste and a successful new payment scheme that continues to the current day (more detail in section 5).[8]

4 ADDRESSING STAKEHOLDER ENGAGEMENT THROUGH COORDINATION, PARTICIPATION AND INCENTIVES

As highlighted above, lack of coordination among agencies involved in delivering SWM is a key challenge, but closely related to this is the participation, coordination and management of key stakeholders. SWM schemes in low-capacity environments face a huge coordination challenge amongst different stakeholders. Municipal governments often don't have the capacity or finances to provide a service, and although it is possible to overcome this barrier by creating a model that is largely or entirely self-financing, it relies on households having the knowledge and motivation to separate their waste. Waste pickers and informal recyclers can easily be sidelined by new initiatives but often lack the organisation to effectively engage, and getting access to functioning markets for recycled products is another key determinant of success for a (partially or wholly) self-financing system. For waste and resource management services to be effective, it is essential that there is an opportunity for genuine participation but also an alignment of smart incentives so that all key stakeholders can play their part, including citizens, local and central government,

7 GIZ (2012) 'Economic instruments for solid waste management: case study Bayawan, Philippines'. Available at https://bit.ly/2SGUEd9
8 Ibid

© TEARFUND 2019

and the private and informal sectors. In particular, the informal sector plays a key role and must be proactively and positively engaged.

In **Bo City, Sierra Leone**, some SWM-focused aid had been delivered between 2004 and 2013 (by One World Link, Warwickshire County and District Council in the UK) but activity was significantly ramped up with the start of a larger DFID-funded project delivered by Welthungerhilfe in partnership with Bo City Council. The project commenced with a £200,000 pilot and was scaled up in 2014 to a £3.2 million[9] four-year project to be delivered from 2014 to 2018. It has now been absorbed into a large water, sanitation and hygiene (WASH) project which extends to 2019. The project targeted the whole of the city's SWM systems, developing the institutional capacity, materials markets, the informal sector and regulatory effectiveness.

A key feature of the design and implementation of the initiative was the way leaders actively engaged a broad range of stakeholders and this played a central role in reform, change and achieving results. It included:

- a proactive approach to stakeholder engagement and strong buy-in and support from the local council and the local mayor. It is understood that the city contributed its entire waste management budget to the project[10]
- a long-term approach with the involvement of a number of partners with different perspectives (eg local government, NGOs and sector specialists)
- making use of capacity and expertise already present locally. For example, Klin Salone, an organisation that provides youth-based waste collection services in Freetown, assisted with the development of the collection scheme in Bo

As of 2017, the project had successfully established a waste collection system for 72 per cent of the city's population and had significantly reduced dumping of waste materials. A legal framework is in place and the city is raising revenue for waste management services. The project has also helped support and develop local businesses that recycle valuable materials and has mobilised a wide range of stakeholders. Overall, there has been a large decrease in incidence of water-borne and other vector-borne diseases. In 2013, 503,304 cases of cholera, diarrhoea, malaria and other water- and vector-borne diseases were recorded, but only 4,082 in 2016. It is likely that this was caused by a range of factors, including improvements in sanitation, but it is understood that improvements to waste management have played a key role in helping improve environmental health.[11]

There are also more specific insights to be shared from the different case studies related to how to engage with these different stakeholders (the informal sector, incentivising behavioural change amongst citizens and accessing local markets, ie the private sector, for secondary materials).

4.1 Working with the informal sector

There are at least 15 million waste pickers working globally;[12] it is a dangerous and precarious existence. In most societies, waste pickers are seen as the lowest of the low despite the essential role they play in collecting and recycling rubbish. Although there may be all sorts of barriers to local governments partnering with waste pickers, one of the biggest is that they tend to operate alone, hence a growing trend for waste pickers to cooperatise.

The example of waste pickers organising to secure a contract and provide waste collection services in **Pune, India** is a particularly positive example. In 2008, the poor state of SWM in Pune motivated a union of waste pickers (KPKKP) to create a worker's cooperative, SWACH (Solid Waste Collection and Handling), of whom approximately 80 per cent are women. In 2008, SWACH signed a Memorandum of Understanding with the Pune Municipal Corporation (PMC) to provide door-to-door collection services, a form of pro-poor public–private partnership.[13]

SWACH has helped provide sustainable livelihoods for over 3,000 waste pickers in Pune (more on its financing model in section 5 below). The formation of the workers' cooperative has demonstrated that door-to-door collection of waste and recyclables can be achieved by building on existing waste pickers' activities. The service has helped to secure waste pickers' access to valuable recyclables, improve their working conditions and income and enhance their status in society. SWACH has also established a school education programme.

9 DFID (2014) Funding approval letter. Available at: http://bit.ly/2FHtOPz

10 Fleet (2014) 'Bo city waste management project – a DFID investment in the future of Sierra Leone'. Available at: https://bit.ly/2MmoG5U

11 DFID (2017) 'Project completion review'. Available at: http://bit.ly/2FNP4PD

12 https://blogs.worldbank.org/taxonomy/term/17924

13 WIEGO (2012) 'Integrating waste pickers into municipal solid waste management in Pune, India'. WIEGO Policy Brief No. 8.

SWACH illustrates an effective model for bridging the gap between the informal sector and municipal waste management service needs. It has helped waste pickers transition from scavenging to service, improving their working conditions and legitimising their work. SWACH has delivered significant financial benefits to the city. It is estimated that the programme's activities have saved the municipality approximately $7.9 million a year.[14] However, it has faced challenges, including efforts by the municipality to privatise waste management service provision, requiring intense and ongoing efforts to secure government buy-in and support, and at times, the failure of the local government to honour commitments made.[15 16]

4.2 Incentivising source separation

Influencing citizens to separate their waste is key to successful recycling and financial sustainability, but it's also a difficult nut to crack. Often it can be achieved through continual awareness-raising and education but for **Indonesian waste banks**, it's built into their design.

Waste banks (or *bank sampah*) are community-run centres where householders can deposit their waste and earn credits in an account held at the centre. The account balance can be periodically withdrawn and used by householders to offset the payment of costs such as school fees or even electricity payments. Waste banks have grown rapidly in Indonesia where they now form part of the Indonesia National Waste Programme.[17]

Waste banks are low cost to establish and operate. By reducing the quantity of materials requiring landfill, waste banks save the municipality money and also generate wider environmental benefits. They are also often located at other community-orientated locations which optimises logistics. Waste banks provide a cost-effective way to encourage recycling and also provide a valuable waste education function. Due to the community scale at which waste banks operate, they can actively and progressively change the waste management behaviours of local residents. Customers of waste banks can learn directly the best way to segregate their waste and are incentivised to do so (for example, learning which materials are most valuable and the importance of reducing contamination so as to maximise value).

However, there are questions as to how the waste banks affect and interact with informal sector recyclers. If material is diverted from these recyclers, there is a chance for competition or animosity between the two. The stability of the market for recycled materials also affects the effectiveness of waste banks.

4.3 Accessing local markets for secondary materials

Local markets are a key stakeholder in SWM programmes, but often too little attention is paid to understanding who they are and how they relate to the products being sold, and how to effectively market products to them.

IRRCs, a model supported and replicated in cities across Asia by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and Waste Concern, have gone some way to addressing this challenge. IRRCs are locally based, closed-loop systems operated by (former) informal sector workers in close cooperation with municipal government sanitation workers, processing between 2 and 20 tonnes of waste a day.[18] IRRCs provide an inclusive, market-based approach to waste management, offering safer and more lucrative employment for waste pickers (and others), as well as significant health and environmental benefits for the community. The IRRC intervenes along three axes:

- with households in the community to introduce regular (almost daily) waste collection and encourage waste separation at source
- with waste pickers to manage door-to-door collection and operate a community-based processing plant
- with consumers and downstream businesses to sell organic compost and recyclables[19]

14 https://openknowledge.worldbank.org/bitstream/handle/10986/30317/9781464813290.pdf?sequence=10&isAllowed=y

15 GAIA (2012) 'On the road to zero waste – success and lessons from around the world'. Available at: http://www.no-burn.org/wp-content/uploads/On-the-Road-to-Zero-Waste.pdf

16 SWACH outreach report, June 2018.

17 Temesi Recycling: http://bit.ly/2G55OFs

18 UNESCAP (2017) 'Sustainable development benefits of integrated waste management: integrated resource recovery centres'. Available at https://bit.ly/2GY2bmz

19 Gower R and Schroder P (2018) 'Cost benefit assessment of community based recycling and waste management in Pakistan', Tearfund and IDS. Available at https://bit.ly/2Rz425i

A partnership with local government cuts across these three axes. This often means establishing an IRRC on publicly owned land, which ensures that the IRRC is aligned with regional or national waste management policy. In addition, local government can encourage (or even legislate for) source separation by local businesses and households, working closely with the IRRC.[20] Achieving financial sustainability of IRRCs is central and this has led to a heavy focus on selling compost and other recyclables: 'the marketing of secondary materials in particular is considered from the initial phase of implementation when a business plan is developed that estimates operational efficiencies, cost and revenues'. This plan is updated 'depending on the quality and quantity of incoming waste and market conditions. In addition, the local government and the IRRC operators have to actively develop markets for selling the IRRC products to enhance cost recovery. For example, the IRRC can develop plant nurseries using its produced compost, or the local government can use the compost to improve urban green spaces. The electricity generated using the produced biogas in the IRRC can be sold to nearby home and markets.'[21] To protect the brand's quality, operators regularly test the quality of the compost. However, one of the main challenges still is that the compost has to be sold at a very low price to compete with national subsidies provided to chemical fertilisers. This is an issue which needs to be addressed through national policies.[22]

5 ACHIEVING FINANCIAL SUSTAINABILITY

Providing waste management services costs money, both in capital investment and operational terms. It is essential to have sustainable revenues in place (eg direct user fees, local taxation, material sales revenues, etc) to ensure that services can be delivered in the long term. While income for materials can be a valuable source of revenue, these streams typically only cover a proportion of operational costs. The main revenue sources for SWM services are from municipal sources or user fees, rather than material sales. There is an increasing focus on the development of innovative financing techniques for SWM services and infrastructure through approaches such as gradually improving cost recovery and using results-based finance techniques. Focusing on establishing these streams of revenue either directly via user charges (founded on careful consideration of willingness and ability to pay) or from indirect sources is likely to be a prerequisite for establishing sustainable SWM services at a municipal level.

As mentioned in section 3, GIZ gave technical assistance in 2007 to the local government in **Bayawan City in the Philippines** to develop a waste management and recycling centre. One particular indicator for the project specified that 'in at least five cities the operation costs for waste management are financed by a system of waste fees that cover at least 30 per cent of the local budget for waste management'.[23] Acting on the above requirement, the city implemented a pay-as-you-throw (PAYT) scheme based on the use of prepaid stickers. Householders must purchase one sticker for each 40-litre bag of residual (ie non-recyclable) waste. Also, those householders without space for home composting of biowaste must also purchase a sticker for a bag for this material. The stickers are sold at authorised shops around the city and cost approximately £3.50 each.

The PAYT scheme is understood to have been accepted by the community and now generates revenue for the city. Quantities of waste collected have reduced by 23 per cent as more materials are diverted for recycling via local buyers and junk shops. The quantity of biowaste requiring disposal has also decreased from 78 per cent in 2003 to 57 per cent in 2010. These reductions have extended the expected life of the city's sanitary landfill site.[24]

The project has not been without its challenges. Some householders attempt to use stickers for larger bags than allowed and others attempt to dispose of waste illegally, through open dumping and burning. A scheme that charges directly for waste disposal requires careful regulation and enforcement. But recent reports indicate that the PAYT scheme continues to operate successfully.[25]

20 Ibid

21 UNESCAP (2017)

22 Storey D et al (2013) 'Decentralized and integrated resource recovery centers in developing countries: lessons learnt from Asia-Pacific.' Paper presented at the 2013 ISWA Congress. Available at https://bit.ly/2LXcmGC

23 GIZ (2012)

24 GIZ (2012)

25 Ibid

In the **SWACH case in Pune,** a much more decentralised model was adopted in keeping with the means of collection. Initial funding and in-kind support was provided by PMC. Some local philanthropists supported specific activities and provided equipment and covered training costs. However, funding is generated mostly through operational costs. Householders pay a monthly fee of between R10 ($19) and R30 ($56). Thirty per cent of households in Pune cannot afford to pay user charges so in these cases PMC subsidises the cost of waste collection. The workers supplement this fee income with revenues from recyclate sales. SWACH takes a 5 per cent administration fee and also receives an operational grant from PMC to provide back-office staff for data monitoring and customer service, and to pay for health insurance for workers. This financial model provides a stable income for workers, substantially above the typical income of autonomous waste pickers.[26] Moreover, the cost to PMC per household is much lower than the cost of providing a door-to-door collection service in any other city in India. Despite lapses in financial contribution by PMC towards operational and administrative expenses, collections have never stopped, partly because the main source of revenue is citizens paying user charges for collection services directly to waste pickers.[27]

6 INVESTING IN APPROPRIATE TECHNOLOGY AND TECHNICAL CAPACITY

In a low-income country context in particular, the technical capacity of municipalities to deliver SWM services is often very limited. SWM is often the responsibility of staff who have other duties and no formal training in waste and resource management issues.

Technical solutions need to be appropriate to the context. Complex, capital-intensive technologies require advanced technical expertise that is not available in many contexts. Building this technical capacity and creating an enabling environment for technically advanced waste reprocessing technologies is a long-term process. Appropriate technology that suits the local context in terms of the nature of the waste stream (eg level of organic content and recyclables), the availability of spare parts/equipment and sufficient local technical capacity is vital to ensure that systems can be developed, operated and maintained effectively in the long term.

Interventions that seek to build and sustain technical capacity on SWM can focus on municipal capacity (the institutional level at which SWM services are normally delivered) or on the wider community (eg micro and small enterprises, the informal sector, the private sector and community organisations).

The IRRC model, adopted across urban environments in Asia, has been designed in such a way as to be adaptable and replicable in different circumstances. While the IRRC model has not yet been piloted in Africa, it has been successfully adopted across urban environments in Asia, in countries and cultures as different as Pakistan, Vietnam and Sri Lanka. UNESCAP argues that this is at least in part because the design is modular and is easy to replicate as populations grow, to scale up as waste streams increase and to integrate with existing facilities.[28] UNESCAP provide a helpful series of diagrams to demonstrate this (see figures 2, 3 and 4).[29]

26 https://swachcoop.com
27 http://swachhbharatstorage.blob.core.windows.net/auxcontent/25/Involving%20waste-pickers%20to%20improve%20door-to-door%20collection.pdf
28 UNESCAP (2017)
29 Ibid

Figure 2 Scaling up

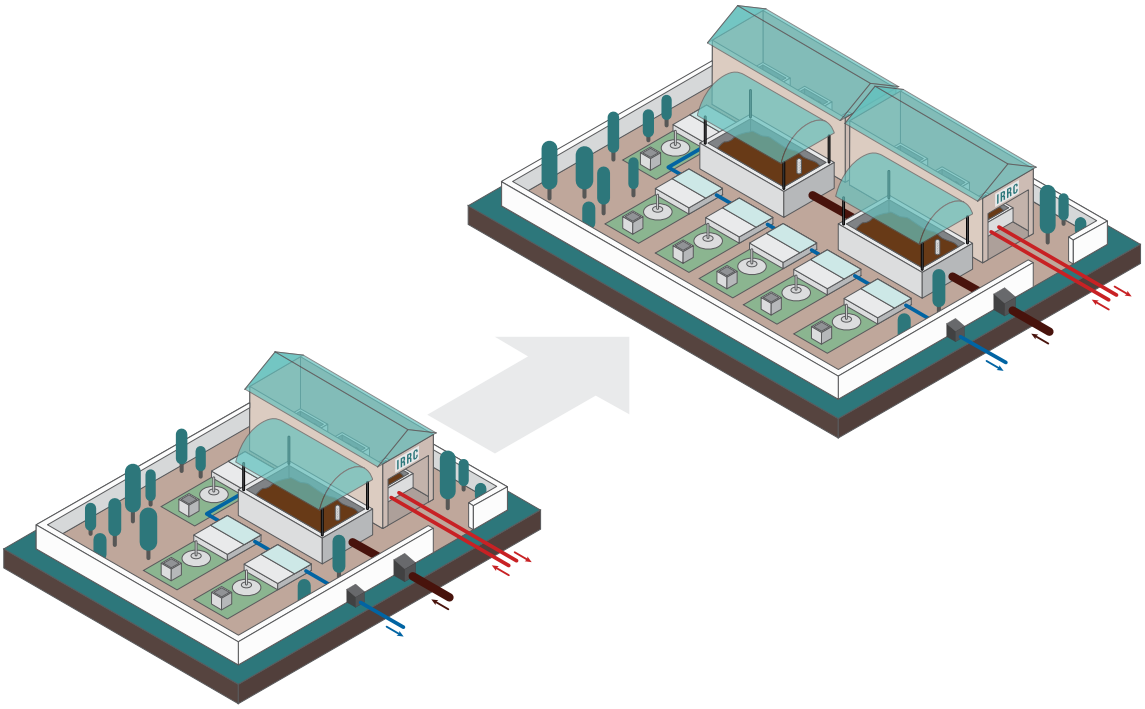


Figure 3 Replication

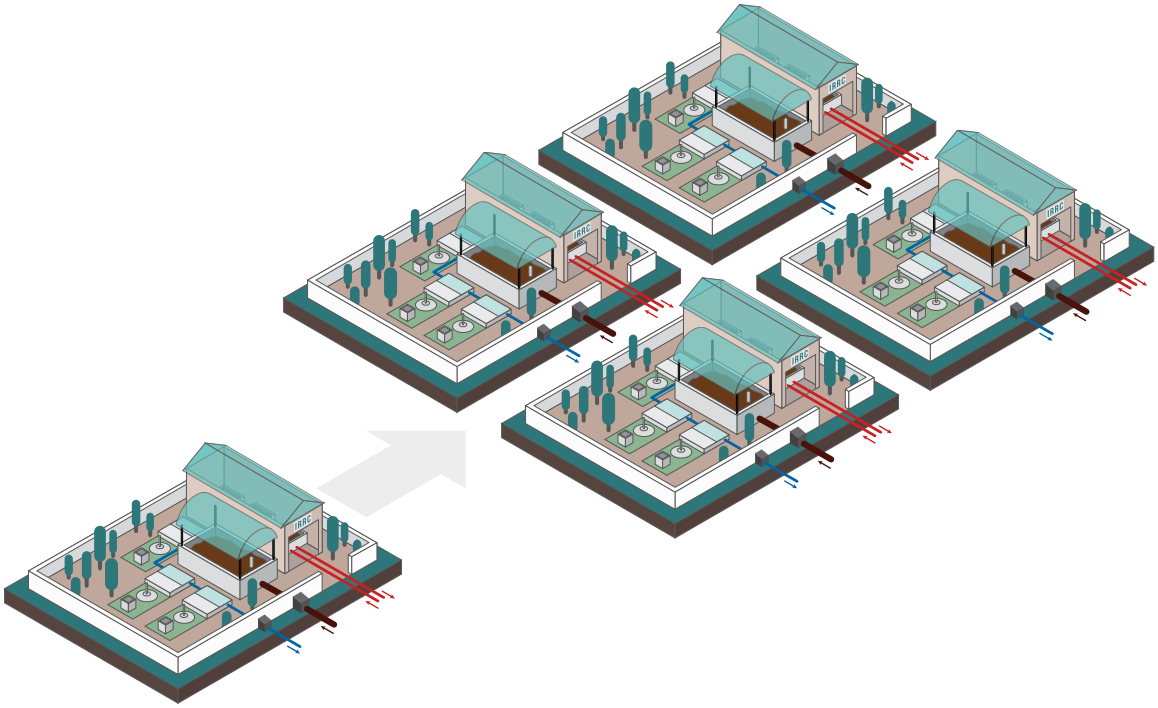
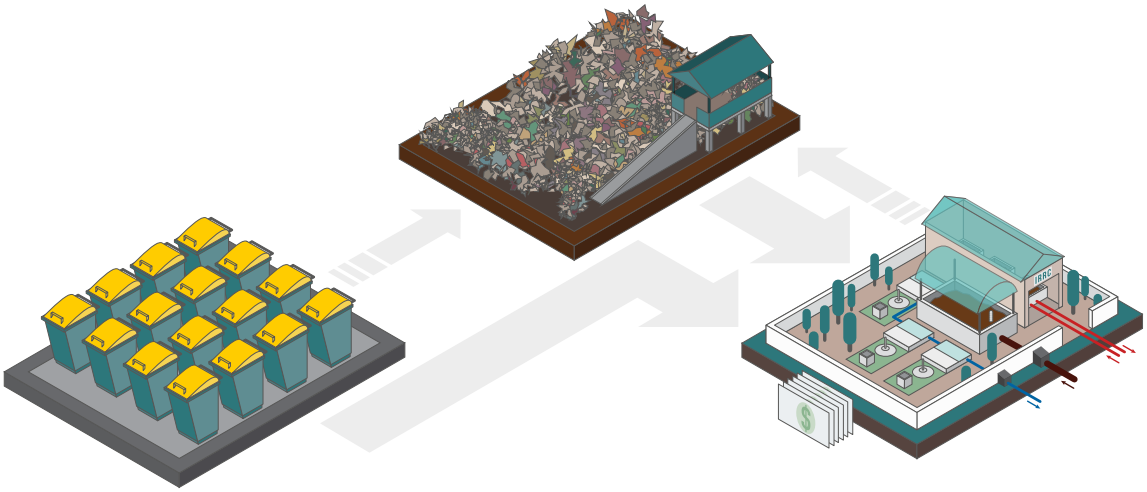


Figure 4 Integration



IRRCs rely on simple technologies such as biogas and composting, which help to keep costs low and are relatively easy to maintain.

CONCLUSION

Despite challenging circumstances and seemingly overwhelming waste problems, these case studies show that we can significantly increase collection rates and safe management of solid waste. Political commitment, long-term collaboration between donors and developing countries, valuing the contribution and addressing the incentives of stakeholders, being open to different financial models and applying low-cost, simple technologies are all critical ingredients of an effective and efficient response. We hope this paper is a helpful resource and call to action as high-, middle- and low-income country governments support and implement reforms in the SWM sector.

© TEARFUND 2019

‘The Spirit of the Sovereign Lord is on me, because the Lord has anointed me to proclaim good news to the poor. He has sent me to bind up the brokenhearted, to proclaim freedom for the captives and release from darkness for the prisoners.'

ISAIAH 61:1

tearfund

learn.tearfund.org

100 Church Road, Teddington TW11 8QE, United Kingdom
T UK +44 (0) 20 3906 3906 **E** publications@tearfund.org

Registered office as above. Registered in England 994339. A company limited by guarantee.
Registered Charity No. 265464 (England & Wales) Registered Charity No. SC037624 (Scotland)

32100–(0419)