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Why Integrated Solid Waste Management is so elusive – learning from Africa and Asia

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Abstract

Integrated solid waste management is an internationally recognised and favoured principle and approach to handle the whole life cycle of municipal waste. It encourages authorities to consider all practices, sources, streams, technologies, financial flows and actors involved or impacting on the generation, collection, transport, sorting, storage, treatment, recovery and disposal of solid waste. Yet, despite the vast body of knowledge and widespread support for this approach, cities from the Global South struggle with its implementation. Based on case studies from Pakistan (Karachi and Faisalabad) and Ethiopia (Addis Ababa), this paper explores the reasons underpinning this struggle. Our findings show that the challenges extend well beyond the availability of the requisite financial and human resources. Given the local authorities' inability to deal with the ever-increasing demand, residents in these cities have historically taken matters into their own hands. Reforming these waste

management systems will require the recognition of this work and the integration of established – and often highly effective – networks of informal providers. Furthermore, shifting these systems onto a path of sustainability will not simply hinge on legislative change and the deployment of new technological solutions. Waste management and waste work is inherently political. Without governance solutions connecting the various actors and acknowledging their traditions and expectations, technical solutions are likely to fail.

Introduction

Integrated solid waste management (ISWM) is widely recognised as the most effective way of dealing with urban waste. It can briefly described as a comprehensive approach or strategy to waste management that encompasses all waste sources and brings together all steps of the solid waste 'life-cycle', including generation, separation, collection, transport, transfer, sorting, treatment, recovery and disposal, as well as the various actors involved. It is generally understood to refer to municipal waste management systems that focus on reducing, reusing and recycling solid waste, ideally through partnerships between state and non-state actors (UN-Habitat 2010a). In the fast-growing cities of Africa and Asia non-state actors include not only formal private sector actors of various sizes (accepted as key in advanced economies), but also those involved in informal waste economies as service providers and as retrievers, collectors, buyers and sellers of waste. They include pickers who work on waste dumps and disposal sites, itinerant door-to-door buyers of recyclable materials, middle dealers who buy these items and the manufacturers of recycled products to whom they sell on.

ISWM is seen as improving the coherence and, therefore, the efficiency of municipal solid waste services. By connecting collection and disposal with recovery, recycling and reuse activities, it is also seen as contributing to environmental sustainability. But its benefits extend beyond the waste sector, as it also holds the potential to address urban poverty through employment creation (Medina 2007; Rouse 2006; Wilson et al 2006; Samson 2009). In connecting activities and actors, it promotes partnerships and as such holds out the promise of integrating informal actors in the formal waste economy. Our research aims at understanding the origins and evolution of the concept of ISWM from the 1990s, as applied to fast-growing cities of the Global South, characterised by increasing inequality and persistent poverty – and it seeks to explain why, despite its promoters, ISWM has been so difficult to implement in practice. Against a review of the concept and its general take up in developing countries, we assess ISWM in three case study cities.

One is Addis Ababa, Ethiopia, where government has shown enthusiasm for pursuing progressive trends and good practice in urban development policy, including a commitment to ISWM. The other two are Karachi and Faisalabad, in Pakistan. For the former cities, our research also revisits a quarter of a century on, two studies of municipal SWM undertaken in the 1990s, one in Karachi (Ali 1997) and the other in Faisalabad (Beall 1997a). Although both studies were undertaken at a time when ISWM was being vigorously advocated as an approach, neither used ISWM as a framework. However, as engineering and social science research respectively, both recognised the value of a multidisciplinary approach, not least because both studies were focused on the integration of municipal sweepers and informal waste pickers into official SWM systems.

In what follows, we trace the history of the concept of ISWM, locating it in the broader development policy literature and identifying some of the opportunities and challenges associated with its implementation. We draw on grey and academic literature, interviews with researchers, policy makers and practitioners as well as our own experience of engagement with the sector. We then provide overviews of our three case study cities assessing if and how well-meaning policy ideas result in tangible positive outcomes. We conclude the paper by reflecting on the challenges of implementation, in particular an approach to governance that over-emphasises the technical and managerial over social and political dimensions.

The origins of integrated approaches in development policy

International development policy dates back to the post-War era. Following a period where commitment to high modernism predominated, the 1970s saw the introduction of integrated approaches to development. Pre-eminent among them was integrated rural development (IRD). The World Conference on Agrarian Reform and Rural Development held in Rome in July, 1979 called for a 'frontal attack on poverty (…) by a deliberate policy of integrated rural development' (cited in Basler 1979). IRD referred to a strategy by which rural development policies would reinforce economic growth and modernisation, while simultaneously seeking social improvements for the rural poor. The best known and arguably most successful integrated rural development programme was that launched by the Government of India in 1978. It followed the success of the Green Revolution, which increased yields and improved productivity, and aimed to provide employment opportunities for the rural poor and improve their living conditions (Woodhouse and Muller 2017). This set in motion a number of other integrated approaches that aimed to address sectoral issues while at the same time integrating poor people into the solutions themselves.

Also relevant were efforts of the UN Water Conference at Mar del Plata, Argentina in 1977, the first intergovernmental meeting addressing water scarcity with the aim of ensuring an adequate and sustainable water supply into the future. In 1992 at the International Conference on Water and the Environment (ICWE) in Dublin the notion of integrated water resource management (IWRM) was first introduced. It was more ambitious than IRD because water often cuts across political and administrative boundaries, economic agglomerations and social and cultural groupings. As such, IWRM is a cradle-to-grave process that promotes the coordinated development and management of water, land and related resources and requires flexible and adaptive approaches to water management at a variety of scales, from watersheds to household taps (Woodhouse and Muller 2017).

The 'Dublin Principles' were controversial because while many saw access to clean water and sanitation[1] as a basic human right, these principles advocated market-based approaches to addressing water scarcity and environmental sustainability. At the time, the promise of cost recovery attracted many governments, although politicians later came to resist this in practice. At the World Summit on Sustainable Development in Johannesburg, South Africa in 2002, a more holistic approach to integration was adopted that saw IWRM as maximising both economic development and social welfare without compromising the environment (Asit 2004).

Given the close connection between safe and sustainable water supply and effective sanitation solutions, proponents of WASH (Water, Sanitation and Hygiene) tried to get sanitation included within IWRM. For example, the Bill and Melinda Gates Foundation supported comprehensive strategies towards an integrated sanitation approach that included faecal sludge and wastewater management.[2] These strategies addressed cross-cutting issues of human health, the environment, appropriate technologies, financial arrangements and economic viability, as well as enabling policy frameworks. While IWRM was embraced by proponents of the 'green' agenda, these so-called 'brown agenda' issues – normally associated with city authorities and not obviously linked to the global commons – were less attractive to many environmentalists and those who advocated the improved management of natural resources.

Planners and people themselves invariably prioritise water supply over environmental sanitation, which includes rainwater drainage, solid waste disposal, grey water (sullage) disposal and excreta disposal. If sanitation is the ugly sister of WASH then solid waste management (SWM) is its Cinderella. It is seen as the

[1] Sanitation is a somewhat ambitious concept, with definitions ranging from all activities and services related to drinking water, disposal and treatment of wastewater and the provision of a clean environment for the prevention of disease transmission, to the ones more specifically focused on treatment and disposal of human excreta and sewage.

[2] https://www.gatesfoundation.org/our-work/programs/global-growth-and-opportunity/water-sanitation-and-hygiene

least important service even though the different elements of urban water supply and sanitation are inextricably linked (Broadbent et al., 2006). For example, an improved water supply alone, can actually create new public health problems by increasing sullage and exacerbating wastewater disposal problems. Poor SWM as well as being a health hazard itself, can block drains and sewers so the efficient operation of all these services depends on reliable systems of SWM. Still, even with the presence of integrated policies and plans, citizens may prioritise one component of a basic service over another.

The management of solid waste stretches from when the materials are discarded through collection, transport, storage, sorting, and treatment (e.g., disposal, reclamation, recycling or reuse, da Cruz et al., 2012). It involves a range of social groups and cultural practices across time and place and affects high-, middle- and low-income communities, albeit differentially. Although solid waste is typically seen as a municipal concern, it can and does cross national borders as we have seen most recently through plastics discarded in one country and ending up on the beaches of another. As such, poor waste management puts the global commons at risk, in addition to negatively impacting local urban environments.

Integrated Solid Waste Management: the evolution of a concept

In the 1990s ISWM became widely advocated in a broader context of integrated approaches to development. Conventionally, solid waste was the purview of engineers who defined it as any waste 'that does not go "up the stack" or "down the drain"' (Lohani et al 1984:4). The management of solid waste was the responsibility of municipal authorities and from a management perspective waste was defined as 'matter in the wrong place' (Flintoff 1984:4). Both perspectives saw solid waste as a problem and the approaches developed grew very much out of this viewpoint.

SWM includes several interrelated activities: primary and secondary collection, transport to disposal sites and processing plants, as well as recycling activities and composting. These activities are highly interconnected, one stage relying on the next. It is not surprising therefore, that an early understanding of ISWM and one that has stuck, is a focus on the integration of the different stages of service delivery, as well as the technical mix of the various component parts of the system. ISWM expects that different disciplines will work together collaboratively. However, unlike many places in Europe where they are usually engineers, senior staff in municipalities responsible for SWM have tended to be medical doctors trained in public health and the control of communicable diseases (Ali 1997). Today most large SWM departments are staffed with engineers, with responsibility for the purchase and maintenance of waste collection vehicles and other equipment. In big cities they are assisted by further technical staff who pay attention to the development of environmentally safe methods of disposal, the design of sanitary landfill sites, and incineration and composting solutions (Wilson et al 2012).

In the fast-growing cities of Asia and Africa, household waste constitutes the vast bulk of municipal waste and this has been increasing at alarming rates. It became clear through the 1980s and 1990s that the technical solutions developed for industrialised economies were not always feasible in contexts where the content of waste was very different[3] (Coad 2005, CWG 1995, UN-Habitat 2010b). For example, the waste was often too wet for incineration plants and too heavy for compaction during transport. Supporting infrastructure was in short supply and imported vehicles were unsuitable. Other problems with imported solutions included lack of or poor maintenance, servicing, monitoring and shortage of spare parts. Furthermore, in cities where an average of fifty per cent of the urban population live in informal settlements with small or no roads, large vehicle access was difficult or impossible. Hence an important focus of ISWM was

[3] Recognising these differences, several international stakeholders, including The World Bank supported the Collaborative Working Group (CWG) on SWM in 1995.

to find appropriate technology solutions, with integration being driven primarily through an engineering lens (Coffey 2010; Rouse and Ali 2002).

The 1990s saw increased adoption of ideas from New Public Management in development policy and practice (Osborne and Gaebler, 1993). These sought to improve the efficiency of public services through the greater involvement of private actors and/or more business-like operational models. Under the rubric of New Public Management, the concept of ISWM was taken up as a modality of choice by a number of international agencies. The understanding of integration was extended to organisational elements such as efficiency and quality control and the integration of private providers and operators into waste collection and transportat services, with a further view towards cost recovery from users (Baudouin et al 2010, Bernstein 1991, Wilson et al, 2012).[4]

However, around the same period, it was recognised that waste separation and recycling were widespread in cities across Africa and Asia (Schertenleib and Meyer 1992). Studies emerged of pickers scavenging on dumpsites, itinerant buyers collecting waste house to house, middlemen, buying and separating waste and selling it on as raw material to recycling enterprises who turned it into new products (Bubel 1990, Poerbo, 1991, Venkateswaran, 1994). Solid waste was no longer relegated to the rather unfashionable 'brown agenda' confined to issues related to urban services and the local environment. Instead, recycling and reuse were increasingly regarded by environmentalists as contributing to a 'green agenda' concerned with mitigating the impact of cities on the world's natural resources (Beall 2009).

Understanding the extent and depth of informal waste economies built upon waste picking and recycling led to three changes. First, there was a shift in thinking away from seeing waste as a problem. The focus on reuse and recycling meant it was seen also as a resource. In this context, solid waste was defined as the organic and inorganic waste materials that have lost their value in the eyes of the first owner (Cointreau 1984). Put another way, what is left - garbage – is comprised of the scraps and leftovers after a process of separating the desirable from the unwanted, the valuable from the worthless (Scanlon 2005:15).

Second, waste picking, retrieval and recycling came to be seen not only as an environmental good but also as a social good, part of the livelihood strategies of the urban poor and an employment creation opportunity as well (Baud and Schenk 1994; Furedy 1984). A pioneer on the social aspects of waste recovery and recycling in Asia, Furedy (1989) criticised privatisation efforts that ignored informal waste economies, arguing that recognising and responding to informal activities would transform SWM far more impactfully than any technical innovations. She went on to identify a wide range of stakeholders involved in SWM from householders and community-based organisations taking control of their own waste management in areas poorly served by municipal providers (Furedy 1991, 1992), through to workers, supervisors, operators, municipal managers and elected politicians (Furedy and Shivakumar 1990).

Third, this approach, which recognised the different actors within any SWM system, meant ISWM was understood in terms of the integration and coordination of the different actors involved (GIZ 2010). It was a perspective that had a very great influence on engineers and planners. They argued that an integrated SWM system could make use of the strengths of various actors including municipal governments, the formal private commercial sector, informal actors and community organisations to improve and extend service provision Klundert and Lardinois (1995). This perspective also informed the thinking and advocacy of a number of international agencies at the time. A key proponent of ISWM seen in this way was the World Bank, which advocated for private solutions to SWM (World Bank 1991 and 1996). Within the World Bank SWM team there were those who recognised the possibility of incorporating informal waste economies into public-private systems of management (Cointreau-Levine 1994 and 2000).

Referring to our own earlier work in Pakistan at this time, both Ali (1996) and Beall (1997a) recognised that integration needed to go beyond technical and

[4] According to the 'polluter-pays' or 'user-pays' principles.

managerial perspectives to understand and include the informal waste economies and practices they identified and examined in their research. Ali (1996) adopted an actor-based approach to integrating the technical, managerial and social dimensions of SWM in Karachi and as well as systematically collecting information about waste quantities, types and prices separated by informal actors, went on to research and write about the role of municipal and private informal sweepers (Ali and Cotton 2001); waste pickers (Rouse and Ali 2001); community involvement in waste collection and removal (Ahmed and Ali 2006); and appropriate technology with waste workers in mind (Rouse and Ali 2002).

Beall (1997a) argued that it was important not to lose sight of Furedy's (1989) insistence that any reform to SWM should embrace wider social goals. For example, Beall (1997b) wrote on gender hierarchies in waste management, where women were always the most insecure and poorly paid workers in the informal waste economy; the role of households in SWM where waste work within them was gendered; and the relationship between gender, caste and class relations in SWM (Beall 1999). Beall (1997c) also explored the social capital embedded in the social relationships underpinning SWM systems; and how attitudes based on notions of contamination and pollution infused the social relations of SWM (Beall 2006).

Come the 21st century and the international policy environment was dominated by the eight Millennium Development Goals (MDGs) which aimed to halve poverty by 2015. There was no urban focus although Goal Seven sought to ensure environmental sustainability and included the target of halving the proportion of people without sustainable access to safe drinking water and basic sanitation. The Sustainable Development Goals (SDGs) superseded the MDGs and the Agenda 2030 is framed in such a way as to explicitly recognise urban issues. SDG 11 aims to make cities inclusive, safe, resilient and sustainable and indicator 11.6.1 is designed to specifically measure the 'proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated by cities' (United Nations 2021). While the SDGs are better at fostering an integrated mindset, as the articulation of the indicator on SWM demonstrates, a technical and managerial approach predominates. This is not surprising given the issues we identify in various efforts at implementing ISWM strategies in fast-growing cities over the last quarter century.

Integrated Solid Waste Management: challenges of implementation

Social goals frequently slip off the agenda in favour of technical and managerial thinking in urban services and so although the concept of ISWM should have facilitated multi-disciplinary approaches, our review suggests that generally it has been biased towards technical and managerial considerations. The main reasons for this are the way municipal work was set up around 'engineering tasks' with delivery, measurement, verification and payments as preeminent and with little attention on wider social outcomes and participatory or deliberative processes. To this day, municipal staff are not trained or expected to carry out social impact analyses of their projects and this is reinforced by the priorities of politicians. There has generally been a lack of political support for integration. Cities in emerging markets and developing countries aspire to being modern through investment in large infrastructure and sophisticated technologies. Small-scale and agile service providers, earning livelihoods from micro-entrepreneurship and providing services to hard-to-reach settlements, were never part of these visions.[5]

Basic data and information about waste streams, their quality and quantities, are rarely collected in cities of the Global South. Most city governments have very little understanding of the extent of waste pickers activities, their numbers, the nature of their operation and contribution. As a result, integration is often rejected at an initial stage of discussion. Waste pickers and small-scale recycling entrepreneurs are

[5] For example, in Karachi, in 1994 a citizens' forum was hosted by the leading newspaper of the city. However, the mayor of Karachi rejected the idea that small- scale waste collectors and recyclers could be expected to play any role in an improved waste management system for the city.

not organised as cooperatives and so are not represented at the planning stage of discussions.

Social goals frequently slip off the agenda in favour of technical and managerial thinking in urban services more generally and, although the concept of ISWM should in theory have facilitated multidisciplinary approaches, it has not. Multi-disciplinarity is difficult in practice. The use of different datasets, objects of enquiry, specialist methods and varying conventions of professional practice, all result in different epistemic registers. Put another way (Beall et al 2019, 34):

> *It involves reconciling points of reference that see all technical knowledge and the material world as socially constructed, with one that requires us to determine at exactly what weight a bridge will collapse or a sewer will burst.*

This is perhaps why more recent literature on the social dimensions of waste (Gill 2010; Harriss-White 2019) has not fed directly into mainstream thinking on ISWM. Another reason is that recent commentators, with the exception of Samson (2009, 2015), have been less engaged with policy and planning of urban services as compared to those engaged with the social dimension of SWM in the 1980s and 1990s.

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During the last decade, integrated approaches and the role of informal activities in SWM continued to be documented. In some countries, integration was also written into national strategies and policies. For example, in the *Bangladesh National 3R Strategy* (2014), the focus on recovery includes sections on informal recycling that emphasise integration. In practice, however, municipalities found this challenging. In India, policies on Extended Producer Responsibility (EPR), encouraged large commercial brands and the private sector to use informal operators in the selective collections of recyclables from their waste streams (Government of India 2021). Within this context, SWaCH India and Banyan Nation were recognised by the government and users, as scalable models for integration.[6]

It is from the supporters of circular economy and EPR policies that the most recent interest in ISWM comes. Inclusive EPR is seen as a beacon of hope for sustaining and building the role of informal waste pickers and small-scale recyclers into integrated waste practices. In March 2022, the UN Environment Assembly signed a global agreement to work on a

[6] SWaCH India in Pune, considers itself to be the largest cooperative of waste collectors and recyclers in the country. It serves the city of Pune and is integrated within the official system. It covers 800,000 houses, integrates 3,500 waste pickers and recycles 70,000 tonnes of waste annually. It also makes substantial savings to Pune Municipal Corporation (SWaCH 2022).
Banyan Nation India is another innovative initiative that uses digital innovation to improve recycling rates and to integrate waste pickers with the rest of the waste value chain through mapping and mobile applications. Its innovation lies in efforts to tackle the three key challenges in plastics recycling: addressing the 'last-mile' of plastic waste aggregation through a digital network; developing a strategy for cleaning and sorting the plastic waste economically to ensure the creation of secondary-use pellets that are comparable to virgin plastic; and partnership with large state-wide entities and multi-national corporations for waste-to-product recycling, mainly for automobile plastic parts and consumer products packaging (including, for example, Unilever). Their proprietary plastic cleaning technology converts collected post-consumer and post-industrial plastic waste into high quality recycled granules – Better Plastic™ – comparable in quality and performance to virgin plastic. Their data intelligence platform integrates thousands of informal recyclers into their supply chain, and helps cities manage their waste more effectively. Banyan Nation won the 2018 Innovate Digital India Challenge 2.0 and the WEF/Dell Circular Economy People Choice Award, in 2018 (Banyan Nation 2022).

global treaty to reduce single plastics. This included the recognition of waste pickers.[7]

In what follows we trace two trajectories of implementation, which we have identified through our own professional experience as well as interviews conducted with practitioners. The first we identify is ISWM as a movement, pursued by people who are passionate about its the value, understood as not only the physical services but the inclusive integration of stakeholders as they interface at different stages of the waste system. The second approach is more technical and managerial and generally involves the institutionalisation of ISWM through toolkits, data collection and demonstration projects. We recognise this separation is a heuristic device and that there can be overlap between the two in intention and practice to achieve a common goal.

ISWM, loosely understood as a movement, was born of frustration that the basis of decision-making and investment came only from technical reports, leading in turn to isolated technical solutions. Companies tried to convince city decision-makers and ministries of the efficacy of their silver bullet solutions. Given the small budgets of SWM departments, waste system analysis and planning is often weak and, in such circumstances, is overridden. The approach is perhaps best described by one of its key advocates:[8]

> *Wherever we go there is a pile of technological reports on the mayors' desks and they may be fine, but they are about tech not systems. To address the paralysis of sector reform we have spent our professional lives trying to prevent bad decisions, holding the line, pushing the hard yards of nudging things forward. New politicians come into power and have to be educated. I'm faced with that on every project I do. I know their timelines for [investing in] the incinerator but just brush them off and push them towards primary collection.*

Such proponents of ISWM have witnessed the failures of introducing inappropriate technologies and have seen the benefits of careful and appropriate planning, and they find ISWM to be a useful process. It helps resist bad decision-making and pressures to invest in siloed, inappropriate, expensive, often imported systems. They are important advocates for small-scale recyclers and waste pickers, who they see as having a significant role in the improvement of waste management systems.

But ISWM has become associated with toolkits, developed and promoted by international donor organisations. Inevitably, scaling-out concepts such as ISWM requires the development of techniques, tools, skills and datasets to prepare plans and generate evidence (Van de Kludert et al 2001). The development of toolkits and training programmes for knowledge sharing follows, and applies whether in relation to a city level municipal waste system or for a single waste stream, such as plastics or packaging. Several international organisations have taken this route. It appeals because it does not create a direct confrontation with investors and suppliers and is potentially politically palatable. Tools and methods are developed, for example, to measure quantities of plastics going into the Oceans (UNEP 2019) and to assess future projections (Pew 2019).

One of the major proponents of this approach is the United Nations Human Settlement Programme (UN-Habitat) through Waste Wise Cities, a global programme that focuses on managing waste data and waste planning, as well as improving waste collection rates and livelihoods from waste. Projects under the Waste Wise Cities programme are being undertaken in several cities.[9]

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[7] The Guardian (2022), 'Global UN Treaty on Single Use Plastics and Inclusion of Waste Pickers. https://www.theguardian.com/environment/2022/mar/02/world-leaders-agree-draw-up-historic-treaty-plastic-waste

[8] Interview with Andy Whiteman, Founder and Director of the not-for-profit company Wasteaware, 27th August 2021.

[9] An enthusiastic partner of Waste Wise Cities is the African Clean Cities Platform (ACCP). It was set up to share knowledge and contribute towards the Sustainable Development Goals (SDGs) through better waste management in Africa, the aim being for African countries to realise clean and healthy cities. ACCP was established in April 2017 as an initiative of the Ministry of the Environment of Japan, the Japan International Cooperation Agency (JICA), the

The introduction and implementation of ISWM through the role of international agencies and the use of toolkits and training materials can be helpful and have the advantage of being sufficiently technical to remain apolitical (World Bank 2017). However, without strong commitment to integrating social goals, as well as embedding of practice in local municipal planning departments and national urban policies, they remain contained exercises. One of our interviewees, Harrison Kwach, explained that ISWM as a model has helped in bringing out problems, introducing a business approach and the idea of public-private partnerships (PPPs) in the context of the circular economy. However, it has been unable to really extend services to the slums, grasp the nettle of embracing informality, and change household behaviours.

The same interviewee addressed the issue of governance and the problem of keeping systems running beyond the lifespan of donors' interest and investment. In a four-city programme in Sierra Leone, he set up integrated SWM departments where city authorities and private operators worked as a team. But the programme was threatened by poor governance arrangements. A national adviser position was created to coordinate the activities of the cities and streamline their interface with national government, alongside the structures to ensure the departments remained functional. It has succeeded in part due to local and media support and public education on the demand side. However, strains exist, for example a mayor wanting to spend resources earmarked for SWM on other things. To date, the strong PPP element and joint offices have prevented this, but the system is by no means yet embedded.[10]

Implementing Integrated Solid Waste Management: evidence from our case study cities

Karachi

Karachi is the capital of Sindh Province and the industrial primate mega-city of Pakistan. It has a population of approx. 16 million[11] as per the contested 2017 census, with some claiming it to be closer to 20 million.[12] The population increase, at a current rate of approximately 4.5 per cent, is due in part to in-migration, with almost 1.7 million being international migrants and refugees including Afghans, Bengalis and Burmese (Hassan 2015). It is estimated that almost 12,000 tons of solid waste is generated in the city every day and that only 8,000 tons reach the landfill site (Sabir et al, 2016).

Almost 60 per cent of the population lives in informal settlements, which may or may not have been granted the official documents for security of tenure (Hassan 2020). Despite this prominence, such settlements have high densities and only comprise about a quarter of the developed area of the city. They are mostly located in 'danger zones' where construction is prohibited, such as along natural creeks or *nalas*. These *nalas* now carry the sewage of the city[13] and many residents along them are being evicted due to urban flooding that occurred in the last two record breaking monsoon seasons. The fact that the *nalas* are choked with solid waste dumped by residents who do not receive a municipal waste collection service is the main cause of these disasters.

The land where the remaining 40 per cent of the population lives (formally developed areas) belongs to thirteen land-owning agencies with varying management controls, rules and regulations. They comprise middle and high-income groups, are relatively low in density, and are guaranteed SWM services. Consisting of former military cantonment areas converted fully or partially into civilian

United Nations Environment Program (UNEP) and UN-Habitat, as well as the City of Yokohama. Currently, 65 cities in 37 countries in Africa participate (https://africancleancities.org/about).

[10] Interview with Harrison Kwach, former head of SWM portfolio at UN-Habitat, 31st August, 2021.

[11] https://www.pbs.gov.pk/content/final-results-census-2017-0

[12] https://www.brecorder.com/news/484620

[13] https://www.dawn.com/news/1194490

residential areas, gated communities are a growing trend in the city. Here, services, including SWM, become the responsibility of the land-owning agency or a gated community's residents' union.

Over the last 25 years, Karachi has gone through a tremendous transformation in the institutional arrangements pertaining to SWM. A stable system in which permanently employed municipal sweepers provided formal and informal services through local bodies to formal areas in the city, has now eroded. A new centralized system has been set up under a provincial body, the Sindh Solid Waste Management Board (SSWMB), which as a management body, outsources the services to international private contractors. These private operators provide waste collection services from designated sites, using vehicles with limited human resource involvement. Door to door collection is seldom delivered by these contractors, and areas of operations are limited to certain districts and only formal areas. Given the gap in the service, primary collection has generally been taken over by informal Afghan waste collectors, pickers and recyclers.

Looking at the history of this transformation, it is possible to identify key inflection points. During the 1995-2001 period the KMC was the single body responsible for SWM in the city (Ahmed 2010). However, it covered only around 30 per cent of the city, in terms of direct responsibility as an operations and maintenance agency (Hassan et al, 2015), the rest going largely unserviced.

During this period, KMC's SWM employees belonged to minority groups, largely Punjabi-Christians, and some Hindus. Both SWM and sewage management came under the same department within KMC but, in 1996, sewage management and maintenance functions were moved under the Karachi Water and Sewerage Board. This eroded the human resource base of the KMC, further hampered by a ban imposed by the province on any new permanent employment. During this time, informal and formal service provision overlapped. Formally employed KMC sweepers deployed in the localities would provide informal door-to-door waste collection and other cleaning services to households. Waste pickers where Afghans who roamed city streets and worked at garbage dumps separating recyclable waste. Itinerant waste buyers would buy waste door-to-door to sell to middle dealers on a regular basis.

In 2001, the Sindh Local Government Ordinance (SLGO 2001) was introduced, leading to another change. This legislative reform empowered local government, providing both political backing and ample funding (Alam and Wajidi 2013). Between 2001 and 2009 the City District Government of Karachi (CDGK) was responsible for all major municipal services in the city, including the SWM. This period saw political harmony between local, provincial and federal government and service provision was coordinated and efficient. However, traditional ways of working continued, with minority communities as the main work force but with an additional workforce employed on a daily wage contractual basis, as needed.

Towards the end of this phase, while municipal sweepers continued to work informally door-to-door in their personal capacity during or after the official working hours, Afghans, who were a younger and cheaper workforce, were also hired for door-to-door collection services by gated communities and cooperative housing societies. The war in Afghanistan meant they were under strict surveillance and the confidence level of the locals was not high, so their role remained limited.

Between 2009-2013 SWM services in the city deteriorated. The city experienced political turmoil characterized by no local government elections, conflicts between political parties representing local and provincial governments respectively, political violence with targeted killings of political workers (Ud Din Ahmed 2016). The CDGK worked under province appointed administrators and was later dissolved as alternatives for a politically acceptable structure of the local government were explored. As formal SWM services declined, informal services grew. Afghan waste pickers and collectors expanded their services and grew into an effective alternative.

From 2014 onwards, the provincial control over municipal services increased further. The Sindh Local Government Act 2013 (SLGA 2013) was approved, which established more limited powers for local government compared to the 2001 Ordinance (Rid and Murtaza 2019). In 2014, the SSWMB was

formed,[14] which is now responsible for all SWM in the territory of Karachi. All SWM functions in the KMC were transferred to the SSWMB, along with some of the employees. The role of the KMC is now limited to providing street sweeping/cleaning on specific roads or where SSWMB is not delivering services.

The SSWMB distributes its work across Karachi's five District Municipal Councils, four of which entered in contracts with Chinese firms.[15] Chinese contractors provide waste collection vehicles which collect waste from machine operated bins at designated street points. In other jurisdictions, local sub-contractors, Afghans and others, offer door-to-door collection, charging a fixed monthly amount per house. These sub-contractors are responsible for delivering the waste from households or neighbourhood collection points to secondary storage sites from which the SSWMB vehicles collect the waste and take it to transfer stations or the dump site.

For a number of reasons, the SSWMB has had limited impact on SWM. First, the services are provided by contractors with limited knowledge of the Karachi context. Second, the contractors are highly mechanised and vehicle dependent and are only responsible for transferring waste from designated bins at specific locations that allow for vehicle access. Third, door-to-door collection is in general not part of the service. Only formally developed areas such as PECHS or Gulshan-e-Iqbal are serviced. Lastly, there is no policy of waste segregation and recycling. As a result, a large quantity of solid waste ends up in the nalas, dumped on empty plots, or burned.

The gaps have been largely filled by informal service providers, with cooperative societies and gated communities hiring Afghans for door-to-door collection. They charge 150-200 Rs (0.65-0.85 GBP) per month per household, with further income coming from the sale of recyclable materials. Services are not provided in low-income areas where recyclable materials are limited. Since Afghans live on the outskirts of the city, they use *Qingqi* (pronounced Ching-chi), flat platforms connected to the back of motorcycles or three-wheelers, to collect solid waste. They dump the non-recyclable waste at the dumping sites and take the recyclable waste to sort at their localities. Afghan entrepreneurs have established recyclable waste shops and small factories in their residential localities. These actors buy recyclable waste from other door-to-door collectors and buyers of recyclable waste. The factories compact the waste and sell it on to operators in the recycling industry.

The following categories of Afghans are informally involved in SWM in Karachi.

- Contractor: influential individuals that through their connections get door-to-door collection contracts from Union Councils.[16] They then sub-contract the work to Afghan waste workers, deducting a monthly amount from what they receive from households. The waste workers earn on their own account by selling the recyclable waste they retrieve.
- Recycler: middle-tier recyclers, usually with *Qingqi* loaders that they lend under certain conditions, to collectors. The latter are bound to bring and sell the waste to the contractor or work on daily wage for them. The middle-tier recyclers are usually found along the nalas where they have sorting space and provide accommodation for their waste collectors/pickers as well.
- Waste picker: free floating individuals who carry bags through the streets and can be found at the *kachra kundi* (waste dumps) where they collect waste and sell it to the middle-tier recyclers. They may get accommodation at the recyclers yard or live freely in one of the two Afghan *basti* or neighbourhoods.
- Independent door to door waste collector/sweeper: these individuals inveigle their way into an area and start working, sometimes by paying a local influential

[14] http://www.pas.gov.pk/uploads/acts/Sindh%20Act%20No.IV%20of%202014.pdf

[15] Mansoor, H. 2017. Deal Inked with Chinese Company to Lift Garbage from Two Karachi Districts. Dawn 7th October. Available at https://www.dawn.com/news/1362175

[16] Union Council are the fifth and lowest tier of local government, which in rural areas would be defined as village councils.

person who ensures their access to a nearby *kachra kundi* and offers protection. They charge households and earn from selling recyclable materials.

Given this chaotic contest, integration in Karachi will not occur through policy decree. The SWWM board does not have policies on recycling or waste reduction, though it sometimes supports media or civil society campaigns. Furthermore, the board has limited responsibilities, mostly to transfer waste from designated bins to the transfer stations and then the city's dump site. Apart from a small area of the city, there is no focus on primary collection.

There are some initial signs of integration at lower levels of governance. For example, some Union Councils are piloting door-to-door collection and the SSWM Board is providing *Qingqi* to waste collectors to extend better coverage to low-income areas. However, they are doing so without looking at and learning from existing services. This has led to reports of conflicts between the SSWMB and Afghan workers.

Most of the informal waste collection and recycling activities run in parallel and in areas where municipal services are not available. Informal activities in Karachi have expanded and advanced technologically without any support from government. As such the opportunity to include informal services in the SWM system and to benefit from positive recycling efforts has not been taken up.

Faisalabad

Faisalabad, located in Punjab Province, is a major urban centre and the third largest industrial hub in Pakistan with a population of just over three million (Pakistan 2020). The District of Faisalabad is spread across an area of around 195 square kilometres (Urban Unit, Punjab 2018) located between the Chenab River to the northwest and Ravi River to the southeast. The city started off as a planned settlement, established by the British between 1882 and 1886 as a railway link for the subcontinent (Javed and Qureshi 2019). It was restructured and given city district status under the 2001 Local Government Ordinance (LGO). Today Faisalabad is an industrial centre with good road and rail connections, accommodating railway repair yards, engineering works, and textile mills, as well as factories producing processed sugar, flour and oil seed (Rasool, et al., 2017). The textile industry with its reported sixty thousand power loom factories, is famous for producing fine cotton products so that Faisalabad has been dubbed 'the Manchester of Asia' (SECOM 2012, 4). The city also has a major dry port and an international airport and is the third largest contributor to Pakistan's Gross Domestic Product (GDP) after Karachi and Lahore.

As is in other fast growing Asian cities, household waste in Faisalabad constitutes the bulk of municipal waste. The Faisalabad Waste Management Company (FWMC) has been operational since 2013 and faces multiple issues in relation to waste collection. These include the non-collection of waste from peripheral areas and poor vehicle access to low-income areas. Additional issues include insufficient vehicles and problems relating to their maintenance, and a final disposal site that is not yet operational. An estimated 30 per cent of waste produced is not transferred to final disposal or dump sites, with significant negative environmental impact. An additional problem is there is no recycling policy, and no practice of waste separation at source. This falls to the informal waste economy, with no consideration of occupational safety for waste workers. In governance terms, the FWMC is overseen directly by the Punjab Province and is dependent on the province for annual funding, with restrictions on it being able to operate at full capacity.

The FWMC, was set up to enable public-private partnerships, replacing the Faisalabad Municipal Corporation (FMC) in the delivery of SWM services. The FMC formerly held responsibility for SWM through a department working under the City District Government of Faisalabad (CDGF). Responsibility was transferred to the FWMC along with all FMC assets and employees involved in SWM. The FWMC is now fully operational and has taken over the functions of waste management for the entire city. The FWMC operates under a Board of Governors, comprised of professionals from various fields, with only the CEO of the Company being an elected Member of the Pakistan Parliament. As such there is far less political interference in its daily operation. This is a significant achievement as previously municipal operations were hindered by political influence. For example, hiring and firing workers could not take place without the consent or

approval of politicians. Even the municipal sweepers previously employed by the FMC had to report to the local councilors.

The Company has improved efficiency in the collection and transfer of solid waste and claims, unlike Karachi, that only collects 30 per cent, to have a collection rate success of about 80 per cent.[17] No fee is yet charged for the provision of Company services, although this is under consideration. As a result, the Company relies almost completely on funding from provincial government, raising questions over the Company's financial viability and its sustainability long-term.

The FWMC has had better success with technological changes, notably the introduction of mechanical waste collection systems and the placement of containers at transfer stations where previously waste was lying in the open. An average of 1,500 tonnes of waste is now being collected daily from the city and a landfill site has been identified although is not yet operational. The FWMC has also established a system for logging complaints and is efficient in addressing these. An emergency and disaster response team has been established, which works towards the desilting of small drains that get choked because of solid waste dumping. FWMC is also working on awareness campaign for solid waste disposal.

Like all other cities in Pakistan, Faisalabad does not have any integrated strategy for solid waste management. Technical integration is lacking. The final disposal site is also a bone of contention because of lack of coordination between the various responsible agencies, being Punjab Province, Faisalabad Municipality and the FWMC, resulting in inappropriate landfill site selection and the shortage of land (Ahmad & Mahmood, 2015). The matter is still not resolved at the provincial or local government levels (Randhwa, 2020). Recycling at source or at the disposal site has not yet been explored by the Company. Furthermore, the Company does not collect Industrial and Hospital waste, which again raises the question of improvement of the larger environment. These limitations lead to further environmental degradation.

In terms of integrating informal waste workers and the recycling sector, while the former is dominated by Punjabi Christians and *Changars* and *Deendars*, who are formerly low-caste tribal communities, now nominally Muslim, the *kabari*[18] shops and middle-tier recycling businesses are mainly run by Afghans. The senior and junior management of the Company are unaware of the extent to which these various informal waste workers dominate primary collection and the recycling sector in Faisalabad. Company employees see them simply as people who help at the dump sites to load and unload garbage in return for being able to retrieve recyclable materials. However, there is an integrated and well-established informal economic network embedded in the management of Faisalabad's solid waste.

There are also issues of governance. The FWMC claims to address the entire city of Faisalabad, but private gated compounds and some Faisalabad Development Authority (FDA) developed areas do not fall in its jurisdiction and organise their own informal private waste collection. Low-income and peripheral areas are not well served at all. Waste collection does not happen in low-income areas due to the narrow lanes preventing easy vehicle access. FWMC workers also avoid collecting waste from these settlements for other reasons. The sewerage system is often blocked in these areas, resulting in drain water overflow into the lanes. As a result, the waste is wet and difficult to collect. Further, as waste workers in the FWMC get extra income from gratuities in high income areas, they prioritise collecting waste there.

As for the sweepers who have been working in SWM for the last twenty years or more, little improvement has been seen to livelihoods due to these reforms. Most of the sweepers in the focus group discussion conducted by the NED team came from the Essa Nagri and Waris Puray areas and claimed not to own their houses, suffer long working hours doing heavy physical labour, especially around festivals,

[17] This is calculated from figures provided by Randhwa (2020) and Rana Usman, senior manager at FWMC.

[18] *Kabaris* are the informal waste dealers who usually specialise in purchasing and selling particular materials from pickers and other waste collectors.

and long commutes from their area of residence.[19] They are also exposed to unhealthy working conditions and no occupation health standards are followed. The older employees, who have been passed on to the Company from the Faisalabad Municipal Corporation (FMC) are employed as permanent members, but all new appointments are employed on a daily wage basis.
The FWMC sweepers, the old guard who are mainly Punjabi Christians and the new daily wage workers who are largely *Changar* or *Deendar* by origin, complained of the threat posed by Afghan recyclers and their employees. They created problems in the workplace by spearing open the waste bags in order to retrieve recyclable items. Not only did this increase the workload of sweepers, but also deprived them of additional income from collecting and selling off recyclable materials. They also claimed that some of the Afghans have started door-to-door collection from houses.

The introduction of the FWMC has constituted a positive step in terms of improving the efficiency of waste collection in the city and the transition has been handled with a degree of sensitivity. The FWMC took over existing equipment while adding new technology, and did not displace existing workers, while introducing new and less favourable terms for new workers. To be truly efficient and effective, the Company needs to expand its operation to low-income and peripheral areas and to incorporate recycling into its purview. In part this requires greater funding, ideally through some form of cost recovery and the involvement of informal waste economy actors.

To implement a recycling stream, the FWMC needs to venture into solid waste separation at source, to reduce time and money spent in separation at the transfer stations. Informal waste workers operating at various locations are an intrinsic part of the recycling system. Similarly informal waste collection services by employees of the FWMC and others, if acknowledged as part of an integrated system, could contribute to the effectiveness of the system, charging a cost recovery fee for services as they already do, while at the same time relieving the Company of some of the challenges of rolling out primary collection citywide.

Addis Ababa

Addis Ababa is the capital city of Ethiopia, one of the fastest growing cities on the continent, and a poster child for rapid state-led development (Goodfellow 2017). It is the site of massive urban expansion with major projects driven by the state through partnerships with international investors and lenders (Ejigu 2014). With its current structure, the city has three administrative layers: City administration itself, a second administrative stratum comprising 10 sub-cities, and about 120 third stratum districts (*woredas*). Central government takes a strong interest in infrastructural investment in the capital and the fast expansion of Addis Ababa has meant that the capital's administrative and political jurisdiction is directly linked with the surrounding Oromia region at the structural level. The institutional arrangements that dictate the relationship between the Oromia region and Addis Ababa are politically contentious and deeply embedded in ethnic political arrangements at the national level (Terrefe 2020).

Rapid population growth and the physical expansion of the city has meant the provision of urban services has not kept up with demand, aggravated by insufficient financial and human resources (Cirolia et al 2021). The management of solid waste is one of the services presenting a major challenge. The newly revised policy framework for ISWM provides an aspirational 'zero waste strategy' with a motto of 'reduce, reuse, and recycle' (Addis Ababa City Administration 2019). However, the actual implementation of the strategy is negotiated with both local and national actors as well as international interests, all with differing priorities and at times, competing interests.

SWM problems in the city include illegal dumping in a city vulnerable to flooding risk from blocked drainage lines; poor occupational health and safety and lack of proper sanitation facilities and protective equipment for waste workers; the absence of the best technological practices and specially designated facilities for hazardous and demolition wastes;

[19] See the paper for the current project by Haris Gazdar and Hussain Bux Mallah (2021) *Traditional Sweepers in Faisalabad and Karachi* for further information on sweepers.

insufficient vehicles and other equipment; and a shortage of available land for local recycling facilities and landfills (Desta 2022).

To meet these challenges, the organisational structures for SWM were decentralised from city to sub-city level, where cleaning of streets and roadsides, footways, public places, public drains were integrated into the SWM system through decentralisation. This has assisted in improving service provision in sub-cities and districts for waste collection and transport, some aspects of small-scale composting, reuse and recycling and addressing public complaints.

In addition, the city recently formed cooperative associations with unions of micro- and small enterprises (MSE). This is part of a proactive policy framework by the government both at national and city levels to create job opportunities within the capital's SWM system.

Integration with the Addis Saving and Credit Micro Finance Institute has improved SWM by facilitating ease of payment of the workers' monthly salaries based on the amount of waste collected and transported to the dumping sites. A participatory approach was adopted at sub-city level for door-to-door collection and street cleaning, involving the mobilisation of citizens as well. At present, micro- and small entrepreneurs collect waste from 707,817 households (Desta 2022).

Previously, households did not pay service fees for SWM. Sanitation taxes were imposed only on businesses, based on the volume of waste collected. Otherwise, municipal SWM was entirely financed from the general revenue of the City, being allocated only one per cent of the total City government budget. However, a new payment system has been established along with the water consumption bill in order to sustain a desired level of service through an integrated cost-recovery system. Almost all households get a collection service, with a direct service charge.

Private companies are now contracted as well, as part of the new working arrangements in a revised SWM system. Private companies are used for secondary collection, transport, and disposal as well as waste management for institutions (Hirpe and Yeom 2021). There are about 52 private waste management and cleaning companies and 72 MSE Unions for house-to-house collection services. There is now some sort of integration for private sector participation in collection, storage, recycling, composting, and disposal (Desta 2022). Practical training and demonstration in compost production to selected school communities has supported vegetable growing and gardening activities and creative works from discarded wastes.

UK and Chinese firms successfully negotiated with national government and the City administration to establish a waste-to-energy incineration plant in the city. It was inaugurated in June 2018 at a cost of 120 million USD (World Economic Forum 2018). The plant failed to live up to expectations. It continues to operate with limited capacity while the parties involved try to settle their disputes through legal and administrative measures.

A more positive example relates to piloting new technologies to treat leachate and methane generated at the Reppie landfill. The rehabilitation project, primarily financed by JICA and UN-Habitat at the cost of two million USD was successful. The City government contributed technical and human resources as well as 100,000 USD. The Fukuoka method pioneered by Japanese professionals helped to rehabilitate the landfill site by constructing 50 gas venting systems to reduce the drastic impact of methane gas using aerobic decomposition, installed around 190 meters of drainage pipe system to collect polluted water and constructed a polluted water treatment pond (180 cubic meter capacity). The project significantly reduced the reoccurrence of deadly landslides and ensured technological and skill transfer for local operators.

The integration of the private sector and the unions has led to some improvements, including effective private sector involvement in collection, resource recovery and recycling activities. Waste processing activities are now in practice for metal, glass, bottles, paper, plastics, rubber products and the promotion, organisation and support of broader informal recyclable material collectors is underway. There are still challenges at the household and community level to reduce the volumes of waste through sorting, recycling, and composting. However, the promotion of community-based plastic recycling schemes and the encouragement of small-scale entrepreneurs to venture into plastic waste recycling have been

successful. Collecting plastic bottles and their containers is a common practice as some people are paying for and reusing them. This is in part due to the City's promotional activities and in part down to some national and Chinese companies buying plastics wastes from individual collectors.

Despite these efforts and some evident improvement, the efficiency of service provision has not yet reached a desired level. Only around 85 per cent of the city's solid waste is collected, the rest being illegally dumped in undesignated areas. Addis Ababa currently has 74 waste transfer stations and one open disposal site. In 2018 the City administration decided to close down the Reppi/Koshe landfill site, which had served Addis Ababa for 45 years and opened a new landfill site on the city's outskirts. The new landfill cost one billion ETB (approximately 48 million USD) and was partially financed by the French government. However, it was forced to stop operation in July 2015 after only seven months. Farming communities in the vicinity, directly affected by the presence of the landfill site, expressed their anger and vandalised the machinery, feeding into political protests that engulfed the Oromia region at that time and forcing the closure of the landfill site.

The Addis Ababa City Administration has good intentions but not a coherent and joined-up SWM master plan or strategy. The city administration has encouraged and organized the youth and women in community organisations and MSEs and with national government involvement, private sector operators now actively participate in waste management. This has greatly improved the service and satisfied residents. However, the decentralised approach has not articulated with City wide imperatives and national government intentions, due to a lack of inter-organisational integration. Furthermore, the existing management system has not been assessed and evaluated citywide.

The case of Addis Ababa shows that some integration has been achieved at the level of primary collection and recycling, but this remains unconnected to secondary collection and final disposal of solid waste where challenges remain. ISWM is being pursued in a context where there are competing interests among multiple actors (national and local government, local and international private actors, donors and the community), with differential social and economic status and political influence.

Conclusion: politics and governance the missing middle

Our review of current global trends and lessons, as well as findings gleaned from our three case study cities in Pakistan and Ethiopia, demonstrate that SWM is an enduring and growing problem in fast-growing cities everywhere and ISWM generally remains elusive. Decoupling waste generation from economic development is challenging in the Global North but virtually impossible in a globalised South. As improvements to SWM are made, so demand increases as populations grow and informal settlements expand. In all three of our cities, large quantities of generated waste remain uncollected, the cities' drains are perennially clogged, leading to flooding and the attendant health risks. In all three of our case study cities, as elsewhere, final safe disposal and recycling have not been achieved, despite good intentions. In other words, there is no doubt that SWM, often regarded as the Cinderella of urban services, is of vast importance. This was particularly evident during the recent pandemic where uncollected waste and flooding and existing health risks combined to increase ill-health in toxic combinations with COVID-19.

In terms of integrated approaches to SWM our research confirmed that these are very difficult to implement in practice, even to entertain as an idea. The reasons boil down to two key factors, evident across our three city case studies. First, politics matter. In our earlier research, undertaken during the 1990s, although governance was an important focus for us, we largely viewed it through an urban management lens. In trying to understand the enduring challenges facing ISWM, our research clearly shows that power, exercised through people, political systems and resource allocation, plays and important role at all levels.

Second, our research shows that cities are too important to leave to city governments alone. In all three of our case study cities, either provincial or national governments have intervened to address the issue of solid waste management. In Pakistan, Karachi has long been a politically unstable, sometimes violent, city and although Faisalabad has

been less volatile, even there it has been run at times by centrally appointed administrators, in what constitutes a long history of central government engagement in and sometimes takeover of local government functions.

Karachi, the only mega-city in our study, saw Sindh Provincial Government wrest control from the Karachi Municipal Corporation and formed the SSWMB, with the aim of having this Board coordinating SWM and contracting private waste management companies to provide secondary collection. However, primary collection and recycling operate largely in the hands of informal actors who operate in strongly networked communities to ensure continued access to work and waste. Because the majority are from weak minority communities, and with limited access to equipment and transport, they have been easily displaced by Afghan newcomers. They have entered the city's informal waste economy through waste retrieval to now largely control the recycling sector.

In Faisalabad, it was also provincial government that stepped in. The Province of Punjab relieved Faisalabad Municipal Corporation (FMC) of its responsibility for SWM and passed this over to a government-owned company, the FWMC. Greater care has been taken not to disrupt relations with trade unions and existing Punjabi Christian workers, while at the same time introducing less favourable conditions of work for the newly employed, most of whom are now low status Muslims. Secondary collection and disposal are relatively efficient although a promised landfill site has not materialised. A positive outcome is that primary collection is being managed, although cost recovery for household and neighbourhood collection remains with municipal and informal waste workers, rather than the company. This suggests a lack of sustainability, unless the informal waste workers are recognised and integrated into the system. The inclusion of recycling into an ISWM approach will be more difficult, however, as it is nowhere in the Company's current plans and, as in Karachi, is firmly in the hands of a robust and sharp elbowed community of Afghan entrepreneurs.

In Addis Ababa, the City administration actually decentralised SWM responsibilities to the sub-city and woreda levels and organised both citizens and unions of waste worker cooperatives to change behaviours and collect waste through the contracting of micro- and small enterprises, but also informal workers. More than an operator, the role of the Addis Ababa Cleaning Management Agency is akin to that of a regulator and coordinator of the many actors involved in waste management in the city, including from the private and informal sectors (though the responsibility for overseeing the recycling sector lies with a separate entity, the Addis Ababa City Recycling and Disposal Office). However, this was not without the involvement of the Federal Government in the engagement of international contractors for technology and infrastructure investments and in navigating the complex relations with the surrounding Oromia Region in struggles over where to house a new landfill site.

Waste workers and recyclers are as everywhere, at the bottom of any social hierarchy. However, they are also numerous and can be an influential or at least useful basis of political support. This is less evidently the case in Pakistan where some, notably Christians and Hindus, come from under-represented and voiceless minority populations, although this may change with the increase in the number of Muslims entering waste jobs, often with the support of political elites and brokers.

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References

Addis Ababa City Administration (2019) Addis Ababa City Solid Waste Management Policy (revision). Addis Ababa City Administration.

Ahmed, N. (2010) 'From development authorities to democratic institutions: Studies in planning and management transition in the Karachi Metropolitan Region', Commonwealth Journal of Local Governance, 7, 120-134.

Ahmed, S.A. and S.M. Ali (2006) 'People as partners: Facilitating people's participation in public-private

partnerships for solid waste management', Habitat International, 30(4) pp. 781-796.

Ahmad, S. R. and K. Mahmood (2015). 'GIS based Landfill Site selection for Faisalabad City'

International Journal of Scientific & Engineering Research, 6:4, 67-72.

Alam, M. and M.A. Wajidi, (2013) 'Pakistan's Devolution of Power Plan 2001: A brief dawn for local democracy?' in G. Sansom and P. McKinlay (eds) New Century Local Government: Commonwealth Perspectives, 44-57.

Ali, S.M. (1997) Integration of the Official and Private Informal Practices in Solid Waste Management. PhD Thesis, Loughborough University.

Ali, S.M. and A. Cotton (2001) The Sweeping Business. A guide to promote small scale business in waste collection. Water Engineering Development Centre (WEDC) Loughborough University.

Asit, K.B. (2004) Integrated water resources management: A reassessment, Water International, 29:2, 251.

Banyan Nation (2022), 'Banyan Nation Website'. https://banyannation.com/

Basler, A. (1979) The concept of integrated rural development, Intereconomics, Verlag Weltarchiv, Hamburg, 14:4, 190-195.http://dx.doi.org/10.1007/BF02924277

Baud, I. and H. Schenk (eds) (1994) Solid Waste Management, modes, assessments, appraisals and linkages in Bangalore, New Delhi: Manohar Publishers.

Baudouin, A., C. Bjerkli, Y. Habtemariam and Z.F. Chekole (2010) 'Between neglect and control: Questioning partnerships and the integration of informal actors in public solid waste management in Addis Ababa, Ethiopia', African Studies Quarterly, 11:2&3, 29-43.

Beall, Jo, Zegeye Cherenet, Liza Cirolia, Nuno da Cruz, Susan Parnell and Philipp Rode (2019) 'Understanding Infrastructure Interfaces: Common ground for interdisciplinary urban research?', Journal of the British Academy, 7(s2): 11-43.

Beall, Jo (2009) 'The Brown Agenda' in R. Kitchen and N. Thrift (eds) International Encyclopedia of Human Geography, Oxford: Elsevier, pp. 365-361.

Beall, Jo (2006) 'Dealing with Dirt and the Disorder of Development: Managing Rubbish in Urban Pakistan', Oxford Development Studies, 34(1) March, pp. 81-97.

Beall, Jo (1999) 'The Role of Households and Livelihood Systems in the Management of Solid Waste in South Asia' Waterlines, Vol. 17, No. 3, January, pp. 13-14.

Beall, J. (1997a) Households, livelihoods and the urban environment in Faisalabad, Pakistan: Social development perspectives on solid waste management. PhD Thesis, London School of Economics and Political Science.

Beall, Jo (1997b) 'Thoughts on Poverty from a South Asian Rubbish Dump: Gender, Inequality and Waste' IDS Bulletin, Vol. 28, No. 3 July, pp. 73-90.

Beall, Jo (1997c) 'Social Capital in Waste: A Solid Investment?' Journal of International Development, Vol. 9, No. 7, November-December, pp. 951-961.

Bernstein, J. (1991) 'Alternative approaches to pollution control and waste management: Regulatory and economic instruments', Discussion Paper, Urban Management and the Environment, Urban Management Programme Paper No. 3.

Bjerkli, C.L. (2015) 'Power in waste: Conflicting agendas in planning for integrated solid waste management in Addis Ababa, Ethiopia' Norsk Geografisk Tidsskrift – Norwegian Journal of Geography, 69:1, 18-27.

Broadbent, J., Ball, A., Jarvis, T., (2006) 'Waste management, the challenges of the PFI and "sustainability reporting"', Business Strategy and the Environment, 15:4, 258-274.

Bubel, A.Z. (1990) 'Waste-picking and solid waste management' Environmental Sanitation Reviews, No. 30, December.

Butt, W.H. (2020) 'Waste Intimacies, Caste and the unevenness of life in urban Pakistan' American Ethnologist, 47:3, pp. 234-248, August.

Cirolia, L. T. Hailu, J. King, N. da Cruz and Jo Beall (2021) 'The governance of infrastructure interfaces: Decentralised Sanitation in Addis Ababa', Environment and Planning C: Politics and Space, 39:7, 1606-1624.

Coad, A. (2005) Private sector involvement in solid waste management – avoiding problems and building on successes, Germany: GTZ. www.gtz.de.

Cointreau, S.J. (1984) 'Integrated Resource Recovery. Recycling from Municipal Refuse', World Bank Technical Paper No. 5, Washington DC: World Bank.

Cointreau-Levine, S. (2000) Guidance Pack – Private Sector Participation in Municipal Solid Waste Management, Switzerland: Skat available online from http://rru.worldbank.org/Toolkits/SolidWasteManagement/

Cointreau-Levine, S.J. (1994) Private sector participation in municipal solid waste services in developing countries Volume One, the formal sector, Washington DC: World Bank Books.

CWG (1995), Collaborative Working Group on Solid Waste Management for Low and Middle Income Countries. Factsheet; https://skat.ch/wp-content/uploads/2017/01/CWG_FactBox.pdf

da Cruz, N.F., Marques, R., Simões, P. (2012) 'Economic cost recovery in the recycling of packaging waste: the case of Portugal', Journal of Cleaner Production, 37, 8-18.

Desta, H. (2022) 'An Overview of Solid Waste Management Systems in the City Administration of

Addis Ababa: Past to Present', Rubbish, Resources and Residues - Field Report 01, LSE Cities.

Ejigu, A.G. (2014) 'History, modernity, and the making of an African spatiality: Addis Ababa in perspective' Urban Forum 25:3, 267-293.

Flintoff, F. (1984) 'Management of Solid Wastes in Developing Countries', New Delhi: World Health Organisation (WHO) Regional Office, South-East Asia.

Furedy, C. (1984) 'Socio-political aspects of the recovery and recycling of urban wastes in Asia', Conservation and Recycling, 7, 167-173.

Furedy, C. (1989) 'Social Considerations in Solid Waste Management in Asian Cities', Regional Development Dialogue, 10:3, 13-36.

Furedy, C. (1991) Emerging concepts of citizen participation, cooperation and education for responsive solid waste management in Asian cities, Ontario: York University.

Furedy, C. (1992) 'Garbage: exploring non-conventional options in solid waste management', Environment and Urbanization, 4:2, 42-61.

Furedy, C. and Shivakumar, M.S. (1990) Reforming Solid Waste Management, perspectives of concerned citizens, The Hague: International Research Centre. Available online at https://www.ircwash.org/sites/default/files/343-90RE-14511.pdf

Gill, K. (2010) Of Poverty and Plastic, scavenging and scrap trading entrepreneurs in India's urban informal economy, Oxford: Oxford University Press.

Goodfellow T. (2017) 'Taxing property in a neo-developmental state: The politics of urban land value capture in Rwanda and Ethiopia' African Affairs 116:465, 549-572.

GTZ (2010) The Waste Experts: Enabling conditions for informal integration in solid waste management: Lessons learned from Brazil, Egypt and India, https://www.giz.de/en/downloads/gtz2010-waste-experts-conditions-is-integration.pdf last accessed 16th August 2021

Harriss-White, B. (2019) 'Waste, social order and physical disorder in small-town India', Journal of Development Studies, posted 26 February https://doi.org/10.1080/00220388.2019.1577386 last accessed 16th August 2021.

Hasan, A. (2015) 'Land contestation in Karachi and the impact on housing and urban development', Environment and urbanization, 27:1, 217-230.

Hasan, A. (2020) 'The changing nature of informal settlements in the megapolis in South Asia: the case of Karachi, Pakistan' in P. van den Broeck, A. Sadiq, I. de Hiergens, M. Q. Molina, H. Verschure and F. Moulaert (eds), Communities, Land and Social Innovation, Land Taking and Land Making in an Urbanising World. Edward Elgar Publishing, pp. 91-108.

Hasan, A., N. Ahmed, M. Raza, A. Sadiq, S.U. Ahmed and M.B. Sarwar (2015) Karachi: the land issue, Karachi: Oxford University Press.

Hirpe, L., Yeom, C. (2021) 'Municipal solid waste management policies, practices, and challenges in Ethiopia: a systematic review', Sustainability, 13, 11241.

India, Government of (2021) Draft Extended Producer Responsibility Policy, Ministry of Environment, Forest and Climate Change (MoEFCC), 6th October, 2021.

Javed, N. and N.N. Qureshi (2019) 'City Profile: Faisalabad, Pakistan', Environment and Urbanization Asia, 233-254.

Klundert A. V. D. and Lardinois I. (1995) 'Community and Private (Formal and Informal) Sector Involvement in Municipal Solid Waste Management in Developing Countries', Background paper for the Urban Management Programme (UMP), Ittingen, Switzerland, 10-12 April.

Lohani, B.N. (1984) 'Recycling potentials of solid waste in Asia through organised scavenging', Conservation and Recycling, 7:2-4, 181-190.

Medina, M. (2007) The World's Scavengers: Salvaging for sustainable consumption and production, Lanham, MD: Alta Mira Press.

Osborne, D., Gaebler, T. (1993) Reinventing Government: How the Entrepreneurial Spirit is Transforming Government, New York: Plume Books.

Pakistan, Government of (2020) Pakistan Bureau of Statistics, 18.03.2020. Retrieved from Population Welfare Statistics Section: https://www.pbs.gov.pk/content/population-census

Pew (2019), 'Breaking the Plastic Wave – A Comprehensive Assessment of Pathways Towards Stopping Ocean Plastic Pollution'. Pew Charitable Trust et. al https://www.pewtrusts.org/-/media/assets/2020/10/breakingtheplasticwave_mainreport.pdf

Poerbo, H. (1991) 'Urban solid waste management in Bandung: Towards an integrated resource recovery system', Environment and Urbanization, 3:1, 60-69.

Randhwa, K. (2020) The Express Tribune 23.03.2020. Retrieved from Faisalabad Waste Management Company fails to build landfill site: https://tribune.com.pk/story/2181909/faisalabad-waste-management-company-fails-to-build-landfill-site

Rasool, A., D.M. Abrar, D.S. Habib, M.A. Hassan (2017) The Economy of Faisalabad. Faisalabad: Faisalabad Chamber of Commerce and Industry.

Rid, S.A. and N. Murtaza (2019) 'The Local Government System In Sindh: A Critical Analysis of The Sindh Local

Government Act 2013', The Government-Annual Research Journal of Political Science, 7:7.

Rouse, J.R. (2006) 'Seeking common ground for people: Livelihoods, governance and waste' Habitat International, 30, 741-753.

Rouse, J.R. and M. Ali (2002) Vehicles for People or People for Vehicles: Issues in Waste Collection, Water Engineering and Development Centre, Loughborough University, available online at www.lboro.ac.uk/wedc/publications/vfp.htm

Rouse, J.R. and M. Ali (2001) Waste pickers in Dhaka: Using the sustainable livelihoods approach – key findings and field notes, Loughborough University: Water Engineering Development Centre (WEDC)

Sabir, W., S.N. Waheed, A. Afzal, S.M. Umer, and S. Rehman (2016) 'A study of solid waste management in Karachi city', Journal of Education & Social Sciences, 4(2), 151-163.

Samson, M. (2015) 'Accumulation by dispossession and the informal economy: Struggles over knowledge, being and waste at a Soweto garbage dump', Environment and Planning D: Society and Space, 33:5, 813-830.

Samson, M. (2009) Reclaiming Livelihoods: The role of reclaimers in municipal waste management systems, Pietermaritzburg: groundWork.

Scanlon, J. (2005) On Garbage, London: Reaktion Books Ltd.

Schertenleib, R. and W. Meyer (1992) 'Municipal Solid Waste Management in Developing Countries: Problems and Issues; Needs for Future Research', International Reference Center for Waste Disposal News (IRCWD), 26, 2-9.

SECOM (2012) Textile Industry in Pakistan, Islamabad: Embassy of Brazil.

SWaCH (2022) 'SWaCH India Website 2021'. https://swachcoop.com/

Terrefe (2020) 'Urban layers of political rupture: the 'new' politics of Addis Ababa's megaprojects', Journal of Eastern African Studies, 14:3, 375-395.

Ud Din Ahmed, S. (2016) Informal land controls, a case of Karachi-Pakistan (Doctoral dissertation, Cardiff University).

UN-Habitat (2021) Waste Wise Cities Tool, Step by Step Guide to Assess a City's Municipal Solid Waste Management Performance through SDG indicator 11.6.1 Monitoring, Nairobi: United Nations Human Settlements Programme.

UN-Habitat (2010a) Solid Waste Management in the World's Cities: Water and Sanitation in the World's Cities, Nairobi: United Nations Human Settlements Programme.

UN-Habitat (2010b) 'Collection of Municipal Solid Waste in Developing Countries'. UN-Habitat. United Nations Human Settlements Programme

United Nations (2021) Sustainable Development Goals

New York: United Nations Department of Economic and Social Affairs Statistics Division, https://unstats.un.org/sdgs/metadata/?Text=&Goal=11&Target=11.6 last accessed 16th August 2021

UNEP (2019) 'Guidelines for the Monitoring and Assessment of Plastic Litter in the Ocean'. GESAMP 99 – A report by the joint group of experts on the scientific aspects of marine environmental protection. United Nations Environment Programme. https://wesr.unep.org/media/docs/marine_plastics/une_science_dvision_gesamp_reports.pdf

Urban Unit Punjab. (2018). Integrated Development and Assest Management Plan (IDAMP)

Volume 1. Faisalabad: City District Government Faisalabad.

Van de Kludert, A., A. Scheinberg, M. Muller, N. Dulac and L. Hoffman (2001) Integrated Sustainable Waste Management – a Set of Five Tools for Decision-makers, Netherlands: WASTE, Advisers on urban environment and development www.waste.nl

Venkateswaran, S. (1994) The wealth of waste, waste pickers, solid wastes and urban development, New Delhi: Friedrich-Ebert-Stiftung.

Wilson, D.C., C. Velis and C. Cheeseman (2006) 'Role of informal sector recycling in waste management in developing countries' Habitat International, 30, 797-808.

Wilson, D.C., C. Velis and L. Rodic (2012) 'Integrated sustainable solid waste management' Waste and Resource Management 166:WR2, 52-68.

Woodhouse, P. and M. Muller (2017) Water Governance – An Historical Perspective on Current Debates, World Development, 92, 225-241.

World Bank (2017) 'Business Models for Integrated Waste Management', Inclusive Innovations, Washington DC: World Bank, April.

World Bank (1996) Strategies for Increasing Private Sector Participation in Solid Waste Services in Pakistan, A Sector Study, Washington DC: World Bank Discussion Paper, August.

World Bank (1991) Urban Policy and Economic Development, an Agenda for the 1990s. Washington DC: World Bank.

World Economic Forum (2018) 'This African city is turning a mountain of trash into energy', retrieved from https://www.weforum.org/agenda/2018/05/addis-ababa-reppie-trash-into-energy/