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Urban Waste and Sanitation Services for Sustainable Development

Harnessing social and technical diversity
in East Africa

Edited by
Bas van Vliet, Joost van Buuren and
Shaaban Mgana



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Urban Waste and Sanitation Services for Sustainable Development

Urban sanitation and solid waste sectors are under significant pressure in East Africa because of the lack of competent institutional capacity and the growth of the region's urban population. This book presents and applies an original analytical approach to assess the existing socio-technical mixtures of waste and sanitation systems and to ensure wider access, increase flexibility and improve ecological sustainability. It shows that the problem is *not* the current diversity in waste and sanitation infrastructures and services and variety of types and scales of technology, of formal and informal sector involvement, or of management and ownership modes. The book focuses instead on the lack of an integrative approach to managing and upgrading the various waste and sanitation configurations and services so as to ensure wider access, flexibility and sustainability for the low-income populations who happen to be the main stakeholders.

This book provides students, researchers and professionals in environmental technology, sociology, management and urban planning with an integrated analytical perspective on centralised and decentralised waste and sanitation configurations and tools for improvement in the technology, policy and management of sanitation and solid waste sectors.

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1 Introduction

Harnessing social and technical diversity for sustainable development

*Joost van Buuren, Shaaban Mgana
and Bas van Vliet*

1.1 Introduction

Sub-Saharan Africa is the world's region with the most urgent problems with respect to sanitation and solid waste management. This book focuses on East Africa, which, in terms of economic conditions, can be seen as representative for the largest part of the Sub-Saharan region. The East African Community (EAC) comprises Tanzania, Kenya, Uganda, Rwanda and Burundi. These countries are characterised by rapid growth of the population, from a total of 115 million in 2005 to 139 million in 2010, with an expected 237 million by 2030. Across the countries, the percentage of the population living in cities in 2010 ranged from 11% (Burundi) to 26% (Tanzania). Urbanisation is expected to grow further to 20% in Burundi (lowest) and 39% in Tanzania (highest) by 2030. This rapid urbanisation puts an immense pressure on provision of urban infrastructure services, such as water supply, sanitation and solid waste management. The situation is compounded by the bifurcated nature of infrastructure development, with relatively good services in the central and business areas of cities and poor services to those who live in the widely spread informal settlements. Though during the last decade the percentage of people in the EAC countries below the poverty line has slightly decreased, the absolute number is estimated to have increased to 53 million people (38% of the population) in 2010. It is, in particular, the poor dwellers of informal settlements who suffer from the lack of adequate water supply, sanitation and solid waste provision (Society for International Development (SID) 2012: 30).

A 2008 report about the achievement of the Millennium Development Goals (MDG) in water supply and sanitation in Africa pointed out that the number of persons served must double from 350 million in 2006 to 760 million in 2015, which still leaves 400 million persons unserved. This implies for Africa an overall sanitation coverage target for 2015 of 66%. Despite the widely spread awareness of the public health benefits, the expectations of reaching the MDGs – in particular, in the domain of sanitation – are bleak (AMCOW, AfDB, The World Bank, & WSP 2008). More specifically, in the EAC countries, the sanitation provision is still far from satisfactory, with coverage percentages ranging from only 32% (Kenya) to 55% (Rwanda) in 2010. Between 1995 and 2010, the percentage of the population that gained access to sanitation amounted to 14%, which shows that progress is

slow. For Tanzania and Uganda, this figure was not made available (UNICEF & World Health Organization 2012).

Most East African countries signed, in 2008, the eThekweni Declaration (Second African Conference on Sanitation and Hygiene 2008). With this policy document, governments commit themselves to important measures to achieve progress towards reaching the MDG sanitation targets. Among them is the allocation of 0.5% of their GDPs to sanitation. Some progress has been made since then, but the pledged budget turned out to be especially hard to allocate in the countries of the EAC. Accordingly, it seems unlikely that the expected acceleration towards the MDG targets will be achieved in time.

In the domain of solid waste management, international target setting and monitoring of national performance is much less pronounced than in water and sanitation. Here, the situation is full of challenges, as well, as this book will show. Urban waste management in East Africa is characterised by insufficient collection methods, failing equipment and waste dumping, along with low levels of recycling and reuse and the littering of waste within and beyond the city boundaries. There is only one up-to-date sanitary landfill in the entire East African region. All other waste disposal sites are not much more than uncontrolled dumpsites. In addition, the present infrastructure contributes very little to the recovery of valuable materials, such as reusable water, fuels and fertilizers from wastes.

The challenges of a drastic increase of access, of improved performance in terms of public health and environment and of increased recovery of resources from waste and sanitation streams can only be met if environmental governance at multiple levels is fundamentally improved. That improvement is the main topic of this book.

Throughout the past half century, local and international actors have made large efforts to improve sanitation and solid waste management in Africa. These efforts have been based on a variety of assumptions and beliefs about how a good and rapid development had to be approached. In the early years of post-independence, the young governments were expected to put an end to grave inequities with respect to access to infrastructure. As progress soon turned out disappointing, various new views on infrastructure development emerged. The use of expensive large-scale technologies borrowed from, and often promoted by, the North was seen as an impediment rather than an opportunity to meet the needs of all, and especially the poor segments of society. Instead, appropriate small- and intermediate-scale technologies adapted to the local possibilities and legitimised by community participation had to be applied. As the national means for infrastructure development turned out to be very limited, governments had to deliver at least the *basic needs* of the poor. *Privatisation* was recommended as a means to rapidly provide scarce investment capital and know-how. New directions for *good governance* were imposed, pleading for more transparency, accountability and capacity building. In addition, new methodologies for infrastructure analysis and planning emerged, such as the concept of Integrated Sustainable Waste Management, to further a more systematic approach to development in sanitation and solid waste management.

The failure of meeting the Millennium Development Goals for sanitation and solid waste management shows that in many Sub-Saharan African countries, the

recommended approaches have as yet not produced the expected breakthroughs. The challenge of this volume is to contribute to a more profound understanding of the causes of this failure and to more effective and more sustainable approaches towards waste and sanitation infrastructure operation and development. The key notion here is institutional diversity and multiple spatial and technical scales. The approaches mentioned above address governments, the formal private sector or communities, but seem to have less of a vision of the complexity of stakeholder roles and relationships in the implementation and operation of various infrastructures in practice. How are these roles performed? What are the trends in the relationships between these multiple actors? Can this diversity of players together realise what government and/or private sector alone cannot? And can they do it in a sustainable way? The underlying assumption of this book is that they can. It is based on the potential of network governance for infrastructure development and operation that is adapted to local circumstances under the complex political and economic conditions in Sub-Saharan Africa.

1.2 PROVIDE

The present volume is the result of a multi-disciplinary research project, Partnership for Research on Viable Environmental Infrastructure Development in East Africa (PROVIDE). PROVIDE was initiated in Kenya, Tanzania, Uganda and The Netherlands in 2004 to contribute to the understanding and improvement of environmental infrastructures, notably in sanitation and solid waste management, and to further develop the Modernised Mixtures approach (MMa) based on empirical studies. While the MMa was developed for and during studies on environmental infrastructure innovation in Europe (Van Vliet 2006; Hegger 2007), the PROVIDE project was initiated to find out if and how it could become applicable in the context of developing countries (Spaargaren 2006). The geographical scope for all studies was East Africa and, in particular, the urban centres bordering, or with an urban run-off into, Lake Victoria. The project took off with a research framework that combined an integrated flows approach to environmental infrastructure, with a four-level view on involved actors, as well as the contribution of multiple scientific disciplines.

The integrated flows approach views environmental infrastructure as socio-technical institutions functioning through an interplay among flows, technologies, actors and institutions. The flows associated with environmental infrastructure development are, in the first place, the material flows of solid wastes and wastewater, but also the flows of money and information that come along with the material ones.

The flows of wastes and wastewater are conceptualised as being constituted by various components, such as food wastes and plastics. The material flows all follow a chain of processes, such as collection, sorting, transporting, treatment and reuse. Each process in such a chain, such as the treatment of sewage in a septic tank, is associated with a technology (the septic tank), one or more actors (households, builders, emptiers, governmental policy makers), spatial requirements, rationalities and rules (e.g., about the required size). In order to operate a chain of processes, actors enter into relationships with each other and make agreements. In the field of solid waste

management, such agreements (in some form) exist between households, primary collectors, itinerant buyers of recyclables, waste transporters and operators of the disposal sites. Similar relationships exist in the domain of sanitation. The shaping and operation of the abovementioned processes are formal and informal economic activities that engender flows of money and information through society.

The handling of waste and wastewater flows implies practices at multiple levels of society. This is true for the material flows, for the associated flows of money and information, and also for governance and institutions: legislation, policy making and chain management. The levels at which PROVIDE aimed its research were: 1) households and communities, 2) cities, 3) the national state and 4) the international community.

The PROVIDE research ran from 2006 to 2011 and was a collaboration between Wageningen University in The Netherlands and three universities in East Africa: ARDHI University in Dar es Salaam, Tanzania; Kenyatta University in Nairobi, Kenya; and Makerere University in Kampala, Uganda. The project brought together scientists in the fields of environmental policy, environmental technology, development economics and environmental system analysis. Throughout the project, the involved researchers made efforts to learn from their partners in other disciplines so that the interdisciplinary results of the project as a whole would exceed the results of the individual studies.

As the initiators of the PROVIDE project considered that the development and operational performance of urban infrastructure would primarily depend on improvement of governance, the emphasis in the project had to be put on the roles and relationships of the actors that shape and operate the infrastructure chains; the researchers could then take the results as raw material for recommending new policies and practices. Accordingly, the practices of various actors at multiple levels in urban sanitation and solid waste management were the key study objects. These actors were households, formal and informal private service providers, NGOs and CBOs, local government and international development agencies. As the PROVIDE project was meant to be relevant to East Africa as a whole, the study areas had to be spread over the various countries of East Africa. For practical reasons, the field work for the project and this book has been carried out in the cities of Mwanza (Tanzania), Kisumu (Kenya) and Kampala and Jinja (Uganda), bordering Lake Victoria. In addition, case studies were done in the capital cities Dar es Salaam (Tanzania) and Nairobi (Kenya).

Five African researchers obtained their PhD degrees in the framework of PROVIDE. Their work lies at the basis of Chapters 4 through 8 of this volume. The book as a whole is a product of the collaboration between these African academics and several other scholars associated with PROVIDE and environmental research in developing countries.

1.3 Outline of the book

The book begins with two chapters that present the core theoretical concepts and the technological chains associated with waste and sanitation provision in the urban centres of East Africa.

In Chapter 2, Van Vliet, Van Buuren, Oosterveer and Spaargaren introduce the Modernised Mixtures approach to the provision of environmental services, the core theoretical concept of this volume. They do so by first reviewing strategies that have been developed over time to combat the deficiencies of urban infrastructures. The chapter discusses the role of the state in providing waste and sanitation services in East Africa, drawing on models of the developmental and network state and the theory and practice of decentralisation of service provision. These models of governance are then linked with approaches of technology development and implementation designed to enhance the provision of waste and sanitation services in developing contexts: appropriate technology and integrated sustainable waste management and, on a more applied level, participatory planning tools. The chapter infers that the discussed approaches are predominantly technology- and infrastructure-centred, while the wider debate on governance in East Africa rarely focuses on governance of waste and sanitation systems. The final part of the chapter situates MMA as a reflexive modernisation approach that is related to Ecological Modernisation Theory. Under an MMA there is no blueprint for the provision of environmental services, neither in technical nor in governance terms. The objective is to create a 'fit' between different infrastructure options and the prevailing socio-economic, ecological, technological and political conditions. When applied to the assessment of infrastructure, the approach abandons dogmatic lines of thinking about technology and management as either centralised or decentralised. In the design of policies, MMA begins with an analysis of stakeholder roles, their relationships and prevailing rationalities and builds on institutional and technological diversity to find new – and strengthen existing – network governance arrangements in waste management and sanitation. The chapter ends with questions about whether and how the modernised mixtures that will be analysed in this volume can be conceived as necessary stepping stones of a wider transition towards sustainability.

Chapter 3, a contribution of Van Buuren, Mgana, Salukele, Okot-Okumu, Zurbrügg and Zeeman, looks at sanitation and solid waste management in East Africa from a technological and systems perspective. The first part reviews the present systems of sanitation and solid waste management in Tanzania, Kenya and Uganda; the second part sketches possible resource-oriented approaches to the management of urban flows. The existing infrastructure usually lacks a systems perspective and the environmental performance is low: Latrines and septic tanks, for instance, lack a proper system of sludge management; if they are emptied, the sludge is dumped and heavily pollutes the environment. The chapter discusses material chains in waste (water) management as elements in a Modernised Mixtures approach. The elaborated chains are faecal sludge management in unplanned settlements, wastewater reuse and the reuse of biowastes from municipal solid waste. In addition, new developments in sanitation and solid waste management techniques relevant to Sub-Saharan Africa are briefly described. The chapter ends with recommendations for African research and the use of participatory methods in technology selection.

After the abovementioned conceptual chapters on, respectively, governance and technology, the book continues with five chapters that present the field research of the PROVIDE project.