Division 44
Environment and Infrastructure

Improvement of Sanitation and Solid Waste Management in Urban Poor Settlements

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Improvement of Sanitation and Solid Waste Management in Urban Poor Settlements

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Sectoral Project
“Improvement of Sanitation and Solid Waste Management in Urban Poor Settlements”

Division 44 - Environment and Infrastructure
OU 4412 - Water, Wastewater and Solid Waste Management
and Division 42 - Political Reforms
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0 INTRODUCTION

This document provides a reader's digest to a publications series on sanitation and solid waste management in urban poor settlements, which was first published in German by the GTZ between 2001 and 2004 in the context of a sectoral project financed by the German Federal Ministry for Economic Cooperation (BMZ). To make this publication available to a wider professional audience, particularly to cooperation partners in the South, it was translated into English in 2005.

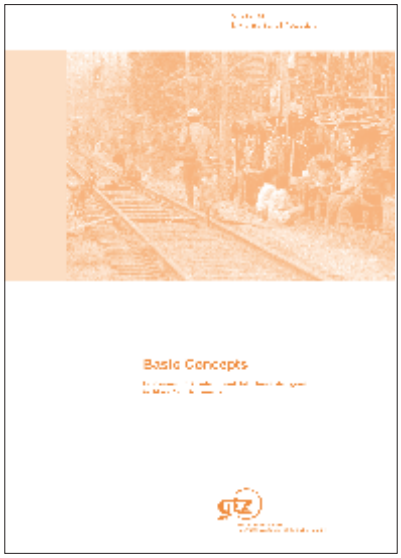
The publication series consists of four volumes, each dealing with specific issues and aspects of waste management projects. Authors with different professional backgrounds (technical, social and economic) have written the various volumes, and thus they provide different perspectives on the subject.

All the volumes have a common introductory chapter which is included, unabridged, in this introduction.

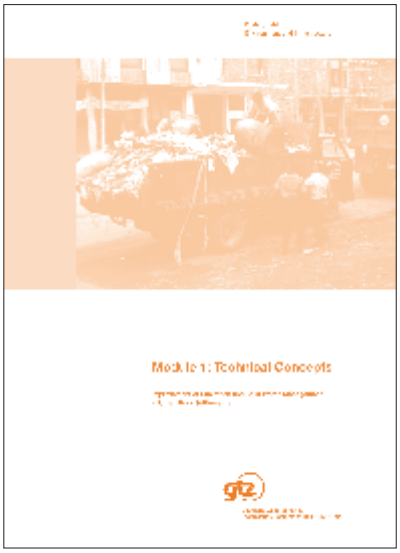
The following chapters present short overviews and abridged excerpts from the different volumes.

Readers who are interested in more detailed information can download the complete English versions of the different volumes of the publication series from the following website:

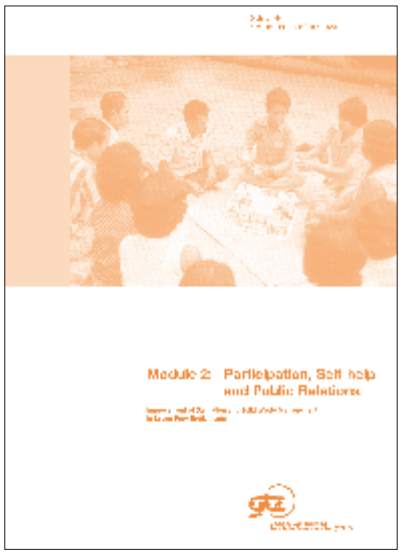
http://www.gtz.de/en/themen/umwelt-infrastruktur/abfall/4991.htm



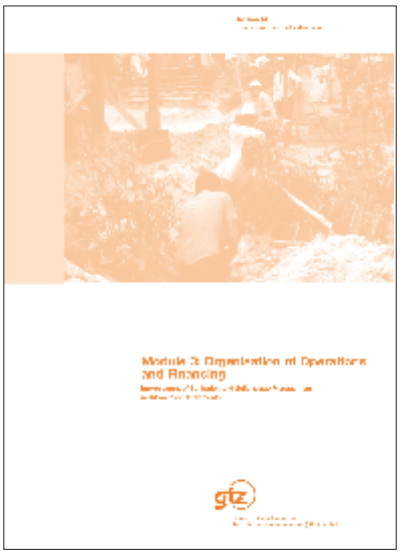
The introductory volume describes basic approaches to the conception, planning and implementation of waste management projects in urban poor settlements. Selected detailed case studies are used as references.



The first module documents proven technical solutions and develops criteria for assessing their suitability for use in different types of urban poor settlements, and for dealing with different conditions and problems.

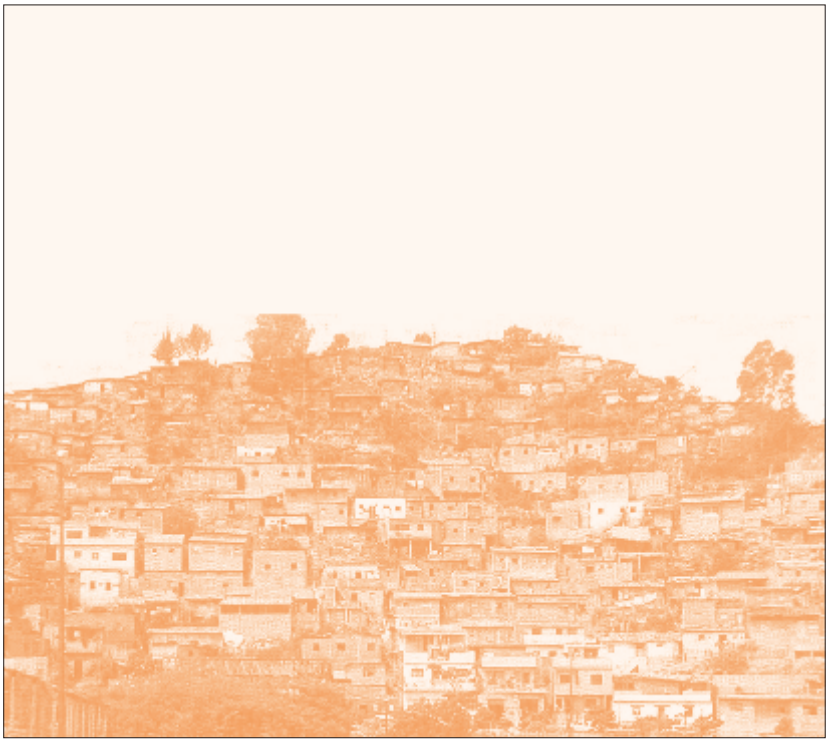


The second module is concerned with procedures, instruments, and methods for encouraging participation and self-help among inhabitants of urban poor settlements in the context of waste management projects and initatives.



The third module describes and assesses possible approaches to appropriate organisational set-ups, operations and maintenance, and the financing of waste management systems at settlement level.

Background and Context



Fast growing informal settlement

Challenges of Urbanisation

Today, worldwide urbanisation is thought of as an unstoppable characteristic of global societal change. According to predictions, by the year 2025 at least two thirds of the world's population will live in cities. Most of this urban growth is taking place in the developing world where two billion people already live in cities - about twice as many as in industrialised nations.

The dynamics of the urbanisation process, and especially its economic, social and spatial consequences, are amongst the greatest challenges of our time. While cities offer an enormous and indispensable potential for the economic growth of developing countries in an increasingly globalised economy, the negative effects of urbanisation are also alarmingly apparent, and these include increasingly inadequate housing and working conditions for the poor and the ecological impact of virtually uncontrollable urban sprawl.

Failure of Conventional Urban Planning and Management Instruments

The emergence and expansion of poorly serviced illegal and informal settlements in peripheral areas within and outside urban agglomerations, have shown that conventional means of city planning and management are not able to cope with conditions of accelerated social change, high demographic growth rates and increasing urban poverty.

City planning, as a mechanism for controlling spatial development, is not feasible in poor districts. In these areas, land is traded informally and built on without permission, and existing buildings are often extended or altered over long periods of time, with no official authorisation. To "formalise" these settlements completely would entail costs that neither municipalities nor inhabitants could handle. Restrictive policies (when applied) have done little or nothing to change the precarious living conditions of the poor. At worst, they have inhibited rather than supported legal, economic and infrastructural improvement. The need for policies of decentralisation and the strengthening of local self-government have therefore been voiced with ever increasing intensity ever since the 1996 United Nations Conference on Human Settlements in Istanbul (Habitat II).

The Need for Flexibility and Pro-Active Solutions

City planning, as well as the management of housing and urban services, demand pro-active, financially feasible strategies adapted to real conditions in order to take advantage of existing potentials; they need to be replicable, to show immediate effects and be sustainable. Although it is obviously not possible to equip informal settlements with extensive infrastructures overnight, they can be upgraded gradually. This requires procedures that take into account the potential for further future improvements.

New Partnerships between the Public and the Private Sector

The supposed dominance of public sector agencies in the supply of social and technical services, no longer holds true. Apart from partnerships with the private sector, often the only sensible alternative for achieving sustainable improvements depends on the cooperation of various different stakeholders, including the local population and non-governmental organisations (NGOs).

For this reason, the significance of the diverse local stakeholders as well as the variety of possible organisational and financial structures should be seriously taken into account during the conception of urban management projects.

Problem: Precarious Living and Housing Conditions in Urban Poor Settlements

Poor settlements, in their various forms, are especially vulnerable to the negative impacts of urbanisation. In many cases, exclusion from legal protection, urban services and infrastructure leads to extremely unhealthy living conditions resulting in high child mortality rates, widespread epidemic illness and chronic disease.

The Lack of Waste Management Systems in Poor Settlements

The neglect of poor settlements by city administrations is often justified by the fact that they are "informal". The term is used to describe not only their combination of uncertain legalities, ownership rights and illegal construction activities, but also their economic structures, which yield hardly any tax or revenues. City administrations cite these factors to explain their lack of input in social and technical infrastructure.

Whatever the case, the consequence is that in many African, Asian and Latin American cities, barely a third of the population is connected to municipal waste management systems, while the rest of the population relies on private contracts or self-help.

Importance of Housing Rights as against Waste Management

Infrastructure, waste management and sewerage systems are usually of secondary importance to the inhabitants during the initial phases of informal settlement. Securing a plot with a right to stay there, and establishing networks for income generation are the primary concerns. Inward migration and continuous construction quickly lead to rising population densities. This establishes and consolidates the social structure and built environment of a settlement, but also inevitably results in increased refuse and sewage management problems. In settlements with population densities of more than 2000 inhabitants per hectare, uncollected garbage, stagnant water and lack of sanitary facilities can create serious health hazards, especially for women and children.

Settlement without security of tenure

Background and Context

Danger of Social and Economic Disintegration

Neglect can lead to social and economic disintegration, which can result in the area becoming further marginalised as the better-off inhabitants try to leave.

In addition, there is the problem of deficient technical infrastructure and services, such as drainage or sewage disposal systems, which cannot be effectively tackled by public or self-help initiatives alone. Solutions often require intervention at many different operational levels and involvement across various existing areas of activity.

Potential: The Resourcefulness of the Urban Poor and their Commitment to Self-help

Despite the relatively unattractive living conditions they provide, poor settlements, particularly in cities, continue to grow in size and density. The social and economic value attached to an urban location apparently outweighs the numerous disadvantages. Moreover, people born and raised in an urban poor settlement frequently have no other option. Today's generation of urban poor has lost its ties to the countryside and survives, physically and economically, within the boundaries of the city or district.

Various Forms of Organisation

The majority of settlements, even including temporary settlements, possess some sort of waste management. These range from individually arranged rubbish removals, to area-wide servicing through private contractors, to complex neighbourhood organisations. However, these organisational possibilities only operate within the narrow confines of each isolated local situation, and this can produce problems. For example, a drainage facility that is not connected to the main sewage system may easily intensify potential flooding in adjacent districts. Many issues related to infrastructure and waste management can therefore only be resolved in a suitable and sustainable way, when they are coordinated in an overall system.

Decentralised Methods of Waste Management

During the past twenty years, a variety of methods for decentralised waste management have emerged from pure necessity – and, in part, without expensive subsidies. They have generally been characterised by their ability to

Refuse as a source of income

adjust to specific social, economic and cultural situations. Some were initiated within the context of international development co-operations; many innovative approaches were devised jointly by inhabitants and NGOs; and others were implemented through city administrations.

Alliance and Cooperation of Different Stakeholders

What these approaches have in common is that they not only pursue technical solutions, but they also incorporate organisational and financial aspects, and involve a variety of local interest groups.

Housing conditions without adequate waste management

Future Challenges: The Improvement of Waste Management in Urban Poor Settlements

The improvement of technical and social infrastructure is of key importance in consolidating low-income settlements. Many such areas that originated in the 1950's and 1960's now have populations similar to those of a medium-sized city, and yet their infrastructures remains rudimentary. With steadily growing populations and increasing building densities, health hazards have increased disproportionately and living standards have plummeted.

The Importance of Improving Technical and Social Infrastructure for the Consolidation of Low-income Settlements

Nowadays, many of the urban poor have access to potable water, although they usually pay more for it than middle-class citizens. Nonetheless, hygienic conditions in low-income settlements have become critically important to the quality of life of their inhabitants. In the long run, any advantages of location will not outweigh the lack of basic services in these areas.

The standard of supply and disposal systems tends to rank only third on the priority lists of inhabitants, behind income generation and security of tenure. Even so, the extent of underserviced areas and the high proportion of the urban population affected have made the absence of functional systems the number one obstacle to overall development.

Integration of Poor Settlements into the Urban Fabric

Finding solutions for waste management deficits in low-income settlements has become a main element in strategies aimed at improving the general functionality of cities and developing their economic potential. The sustainable management of waste has acquired a significance that reaches far beyond its technical or sanitary dimensions. It encompasses fiscal aspects as well as the reorganisation of the relationship between a city's administration and its people. What is required are, on the one hand, new forms of managing increasingly heterogeneous urban structures in an economically sound, yet fair and balanced way, and on the other, the effective coordination of the very diverse stakeholders involved in the development process.

Objectives and Target Groups

This publication series intends to combine the scattered theoretical and practical knowledge acquired in the field of decentralised waste management, and make it available for practical use in development co-operation projects. The listings of waste management projects and the numerous individual project profiles available on the internet are not able to communicate the innovative core, nor the basic parameters of novel approaches in ways that enable comparisons and encourage their application in other contexts. Moreover, the practical experience gained in individual GTZ projects has not, as yet, been systematically brought together.

A treatment that deals only with the technical aspects of waste management in low-income settlements, will not tackle the issues effectively. In order to achieve the sustainable improvement of people's lives, financial and organisational factors must be considered as equally important. Furthermore, without the extensive participation of affected inhabitants in the planning, implementation, and maintenance of systems, sustainability cannot be achieved. Seemingly marginal themes, such as the organisation of campaigns or the pricing of local services, are therefore also dealt with in this publication in so far as they relate to the main topic.

OBJECTIVES OF THIS PUBLICATION

- **To appraise and document experience gathered in sectoral and cross-sectoral development cooperation projects**
- **To provide an overview of current international discussions on improving waste management in urban poor settlements**
- **To offer orientation and support for the initiation, planning and implementation of measures and activities for the improvement of waste management at the urban district or residential quarter levels**
- **To present exemplary solutions and their institutional, organisational, and financial contexts**

TARGET GROUPS

- **People working on projects dealing with housing supply, urban development, and refuse and wastewater management**
- **Interested laypersons and professionals from NGOs, local community initiatives and other grass roots organisations**
- **Professionals and decision-makers in municipal and other responsible institutions involved with waste management in poor areas.**

Division 44
Environment and Infrastructure

1

Basic Concepts

Improvement of Sanitation and Solid Waste Management in Urban Poor Settlements

Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH

Contents Outline

This introductory volume to the publication series focuses more on the content matter and operational requirements of innovative approaches, and less on easily replicable formulas. The examples given are intended to encourage the search for new solutions in specific situations. While this first volume provides an overview, the three following modules offer more specific recommendations, related to their particular topics, for the development of local project approaches.

1. Waste Management Problems in Urban Poor Settlements
The first chapter introduces some of the characteristics and the wide variety of problems found in different types of urban poor settlements. Settlements are described typologically according to locational characteristics and legal status. Each type of settlement is portrayed as it usually is at the outset of a potential intervention, and its typical waste management problems are identified.

2. Case Studies
An in-depth and context-related analysis of problems and possible solutions is described in the second chapter using a number of case studies as reference. The case studies were chosen for their innovative problem-solving approaches. Their concerns extend far beyond one-dimensional technical improvement, and include organisational as well as financial aspects. Examples are given that deal with the following issues:

- Complex projects involving all the important waste management tasks (wastewater management, refuse disposal, rain water drainage);
- Measures for wastewater management (sewerage);
- Measures for refuse disposal (concerted actions);
- Measures for refuse collection and recycling.

To facilitate comparison, each case study is presented in a standardised way: an outline of their background and context is followed by descriptions of implementation approaches, technical solutions applied, operational organisation, financing and the lessons learnt.

3. Comparative Assessment
The main characteristics and the results of each case study are summarised in tables so that their different contexts, and their diverse technical, organisational, and financial approaches can be compared. The structure of the tables relates to the content of each of the modules of this publication series.

4. Conclusions
General conclusions are drawn from the case studies and other reference projects listed in the annex to this volume. Particular emphasis is placed on the importance of political-administrative, socio-cultural and technical conditions.

5. Recommendations
Recommendations are made for the conceptualisation and design of waste management projects in urban poor settlements. These recommendations are directed at technical cooperation projects that have a limited time frame, as apart from long-term improvement processes, in which they often play a part, and to which they should contribute. Pointers are given for the planning and preparation of projects, the implementation of measures, observing their effects and dissimilating their results.

Annex
The annex includes:
- A compilation of international examples of waste management projects;
- A bibliography that reflects the latest international discussions on waste management in urban poor settlements;
- A list of relevant websites;
- An index of abbreviations.

The complete version of this volume, consisting of 111 pages, follows the structure outlined by the table of contents overleaf. It can be downloaded from:
http://www.gtz.de/en/themen/umwelt-infrastruktur/abfall/4991.htm

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1.1

Waste Management Problems in Urban Poor Areas

Definition and Typology of Urban Poor Settlements

Various Types of Urban Poor Settlements

In this publication the term "**urban poor settlement**" is used to include a wide range of settlement structures which may differ considerably in terms of their **location, age, density, legal status, building conditions, access to social and technical infrastructure, and the social and economic status** of their inhabitants. These characteristics can become even more diverse if regional and cultural differences are added, thus making it practically impossible to speak of urban poor settlements as a particular "type" of settlement within a settlement typology.

Nevertheless, in the authors' opinion, the term is valid within the context of this study. As a rule, **poverty** significantly **affects** the **supply of urban services** in these settlements and negatively **influences the possibilities of their improvement**. Middle and upper class citizens are generally favored by existing urban facilities and possess the necessary financial resources to pay for private sanitary and waste disposal systems. Moreover, they often have better contacts to local government and administration officials, enabling them to influence the allocation of urban facilities and services. In contrast, poorer urban residents depend on self-organisation and self-help, simpler technical solutions, and effective cooperation with the city administration or an NGO.

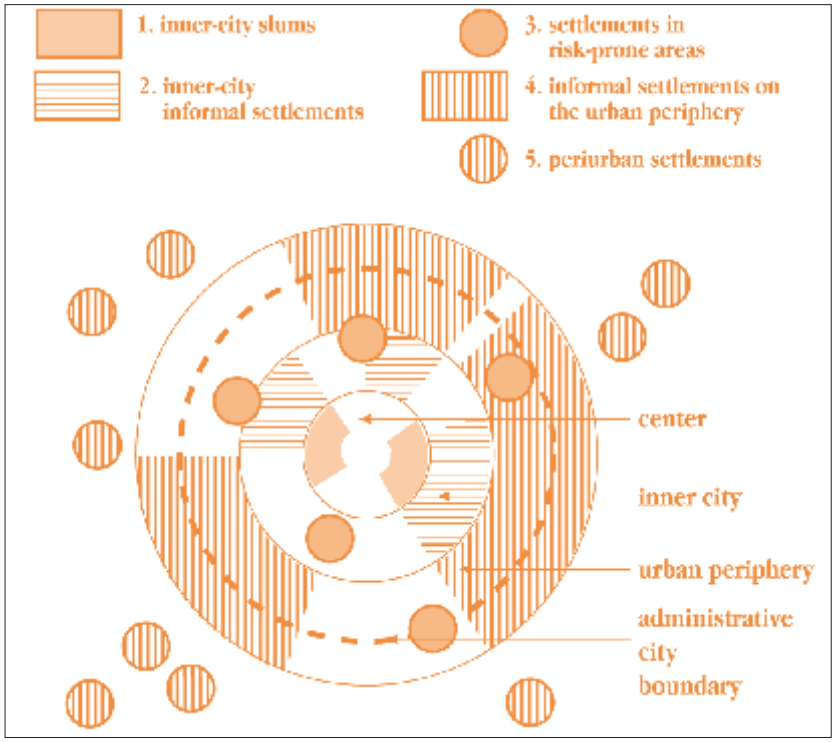
In many cases, their only option is to build and settle "**informally**", with unclear rights of tenure and constant risks of eviction. Interestingly, it has been within this difficult area that some of the most **innovative urban management approaches** have evolved: these are being discussed increasingly in the context of re-defining and redistributing formerly classical government-based tasks.

Important Characteristics: Location and Legal Status

Of the above mentioned characteristics, the "**location within the city**" and the "**legal status**" of settlements are especially important. They influence a range of other qualities that can include the type of construction and patterns of utilisation of a settlement, the state of maintenance of its buildings, perspectives for future development and also its technical infrastructure. According to location and legal status, **five types of settlements** can be distinguished, each of which possesses a different combination of characteristics, as listed in the table overleaf.

In this publication, as in the table, **different forms of legality** are covered by the term "informal". In many settlements, land occupation by "squatting" is against the law, yet rental or leasing arrangements on the same site may be perfectly legal. In some countries in Asia and Latin America land ownership is legal, but its division into building plots goes against official city zoning plans. If "formality" is defined by the existence of building permits, then most poor settlements are informal. On the other hand, years of official tolerance of settlements on public land or infrastructure improvements by the

Locations and types of urban poor settlements



Waste Management Problems in Urban Poor Areas

Characteristics of Urban Poor Settlements

Type of Settlement	1. Inner-city slums	2. Inner-city informal settlement	3. Settlements in risk-prone areas	4. Settlements on the urban periphery	5. Peri-urban settlements
Location	decaying historical districts	inner-city	scattered throughout the city	in peripheral areas, or on vacant land within the city	bordering rural areas
Building conditions, densities	obsolete infrastructure and decaying housing substance, often very high residential densities	partially consolidated housing substance, relatively high population densities	temporary dwellings, low investments by inhabitants, medium density	housing substance not consolidated, medium density	as in 4., also urbanised villages, low to medium density
Legal status	originally formal, predominantly rental housing	informal, temporarily tolerated by authorities	informal, under threat of demolition	as in 2.	as in 2., partially formal
Tenure status	squatters, owner-occupiers and tenants	as in 1.	squatters	as in 1.	owner-occupiers, squatters
Usage	housing, small enterprises, informal commerce (locational advantage)	housing, informal enterprises (mainly workshops)	predominantly housing, sometimes informal commerce	as in 2.	housing, partially subsistence farming
Typical waste management problems	existing infrastructure obsolete, wastewater and drainage systems not fully functional	lack of drainage , no regular refuse collection or sewerage, partially existing infrastructure (often built in self-help)	lack of drainage, no regular refuse collection or waste water management	as in 2.	no refuse collection and disposal, partial existence of provisional solutions and isolated systems
	Ahmedabad	Karachi, San Salvador	*	Rosario, Fortaleza	Qanater City

** Only potentially sustainable measures are described. Examples of temporary alleviating measures that would be suitable for this settlement type are not included in the case studies.*

administration can justify a de facto legal claim, or at least a subjective understanding of the right to stay. Nevertheless, "**informality**", in its various forms, is **one of the main reasons for the lack of public and private investment in infrastructure**, especially in systems of sanitation and waste disposal.

Typology as Basis for Further Descriptions

The typology described in the table is based on certain assumptions: for example, that the **spatial distribution of housing, manufacturing, and trade** is strongly **related to locational charateristics**, and that the **condition of buildings and infrastructure** is largely **dependent on their legal situation**. Small-scale workshops and commercial enterprises are more likely to be encountered in central areas than in the periphery, and in a squatter settlement prone to eviction, expensive, durable materials would not often be used for construction. Access to the city's technical infrastructure and the quality of streets also depend on location (physical proximity to the rest of the city) and legal status (or some sort of legal acknowledgement beyond mere tolerance).

1.1

Waste Management Problems in Urban Poor Areas

Settlement Types and Their Problems

Inner-city Slums

Inner city poor quarters are usually equipped with **rudimentary technical infrastructure and utilities**, but these systems are **often old and defective**. With limited capacities overloaded by high population densities, they can pose serious health hazards. In many cases, the main problem is not the condition of street mains, but inadequate and neglected house connections and sanitary equipment. Particularly in tenement buildings, maintenance of sanitary installations is often neglected due to sub-marginal rents.

Regular refuse collection services are **more common** here **than in peripheral informal settlements**, partly because the administration provides minimal services in order to prevent epidemics, and partly because inner city areas are within the reach of informal refuse collectors. Although this can provide some alleviation, steadily increasing population densities can have created such pressure that problem solving usually requires more comprehensive rehabilitation or redevelopment measures.

Inner-city Informal Settlements

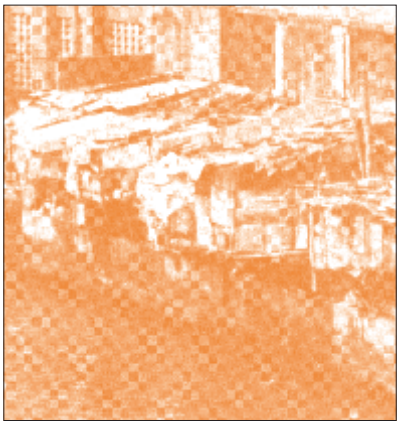
Centrally located informal settlements commonly date back to the first phases of urban expansion. Often **not legalised yet**, they are **hardly incorporated into the urban fabric** and have usually been ignored by local governments for decades. High population densities create hygiene problems similar to those in slum areas in historic city centres, and a lack of even the most basic infrastructure can exacerbate the situation. Although inner-city informal settlements are usually located in relative proximity to existing infrastructure and refuse collection systems, they are generally excluded from their usage. Electricity might be obtained illegally, and some basic refuse collection be organised, but stable integration into existing formal systems is the exception.

The closeness of **employment opportunities** makes inner city informal settlements especially attractive to the poor. Their inhabitants are often socially, economically, and also ethnically heterogeneous, frequently with a relatively high percentage of tenants.

Settlements on Risk-prone Urban Wasteland

Squatter settlements on hazardous urban waste land can be found within the city (on abandoned industrial sites, vacant lots, in ruins, alongside railway tracks or waste water ducts) as well as on the periphery (in canyons, on hillsides subject to erosion, in areas prone to flooding, on dumping grounds), where provisional shelter is erected without the authorisation of the city administration or private owners. Settlements on urban wasteland suffer **legal and social marginalisation**, and their inhabitants often belong to the poorest sections of society. The Latin American term "*Ciudades Perdidas*" (lost cities) describes this situation well. A **permanent integration** of these settlements into the rest of the city is **generally not feasible**.

As to projects for improving sanitation or waste management, the possibilities are often limited to **emergency measures** to alleviate some of the most pressing problems – an incremental improvement and consolidation is usually impossible. In many cases, a complete resettlement of the inhabitants is required.



Waste Management Problems in Urban Poor Areas

Settlements on Urban Peripheries

A high proportion of the population growth in cities around the world occurs **in informal settlements** on the outskirts of urban agglomerations. Many inner-city settlements, such as those previously described, were formerly located on urban peripheries. Continuous urban expansion has made them internal parts of the city. Villages close to the city can be absorbed within a few decades.

This process is accompanied by a **fundamental transformation of the economic, social, and built structure of a settlement**, and can lead to the emergence of serious hygiene problems. The socio-economic situation in these settlements is comparable to that of informal settlements inside the city. Many of their inhabitants work in the **informal sector** or as day labourers. The majority work outside the settlement, as there are not many factories or shops within, other than those for personal needs. In this respect, there is little difference between peripheral and inner-city areas. In both cases, the closeness of job opportunities provides the economic base for settlement.

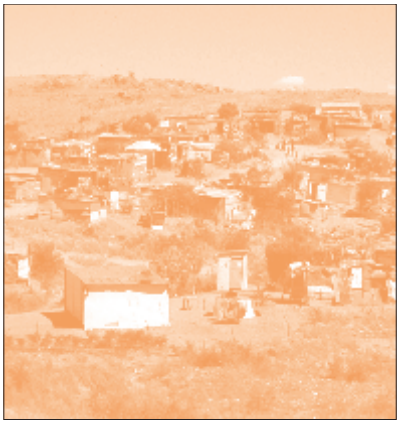
Because peripheral settlements eventually blend into the city through processes of legalisation and consolidation, changes in land use patterns, modes of economic activity and social structure can often be observed. In many cities, between a third and half of the entire urban area consists of previously peripheral informal settlement areas that have been gradually absorbed. They are, therefore, not marginal phenomena, but a **primary cause of metropolitan expansion**.

One major difference between peripheral and inner-city settlements is their legal status. Peripheral settlements are **often** located **outside a city's administrative borders** and therefore not formally acknowledged as parts of the city. This situation has a significant negative effect on the safety and condition of water supply and waste management in many of these areas.

Peri-urban Settlements

Peri-urban settlements are situated **in transitional zones between the city and its rural surroundings**. They frequently consist of former villages that have become partly urbanised in terms of their economy and built structure. As long as inward migration and population densities remain low, rural waste management systems continue to function relatively well. In many cases, these kinds of settlement are surrounded by farmland, and agriculture accounts for much of the inhabitant families' subsistence.

But **with rising population densities** and increasing land use, **greater hygiene risks arise**. Supplies of fresh drinking water are seriously challenged because old wells cannot meet demands, and simple sanitary solutions are no longer adequate. In these cases, participative solutions that function at a basic technical level and are independent from city-wide networks, are especially appropriate.



1.2

Case Studies

Focus on Concrete Examples and Experience

For the purpose of illustration and reference, the first volume presents seven case studies in detail. Case studies generally have the **didactic advantage of relating to authentic experiences;** they therefore have the ability to convey a great amount of complex and specific information, which a typological illustration alone could never include. Nevertheless, this obvious advantage is also accompanied by a **series of disadvantages – lack of comparability and lack of replicability** being among them. Therefore, the presentation of case studies here has been based on a fixed set of criteria, in order to facilitate comparison as much as possible.

Selection Criteria

The examples include **"innovative" and "successful" approaches** within different problem environments. The selection is **not representative** and does not intend to give a cross-section of the waste management practices commonly applied in the world today. The cases were primarily chosen according to the **originality and functionality** of their solutions as applied in their various contexts.

Within the context of this publication, "innovative" projects are defined as approaches and instruments that have been developed for the improvement of a given situation, and that have not yet been broadly applied elsewhere. The examples were compiled giving special consideration to projects that go beyond confronting waste management issues with mono-sectoral interventions. Instead, problem solutions are devised with a view to sustainability, as "systems", and carried out with the cooperation of stakeholder groups. Many of these approaches either directly imply, or aim at a change in the customary behavior of the people involved, especially through the participation of affected residents.

"Successful" projects cause **tangible and sustainable improvements**. All of the projects depicted have yielded some sort of palpable results, for example the construction of wastewater canalisation or regular refuse collection. Although some projects also display typical mistakes, such as the disregard of cultural or social factors, a lack of understanding for traditional values and hierarchies, too much or too little participation etc., at least one component can always be considered successful.

The complete failure of a project usually stems from a complex and individual combination of causes that unfold in a specific scenario. Because learning from other projects' errors is therefore only partially possible, the presentation **focuses on "positive" examples**.

Projects in the Context of German Development Cooperation

Four of the seven case studies refer to projects involving German development cooperation. The prevalence of German examples derives from a better **accessibility to first-hand information** and does not imply that projects involving other development agencies are less interesting. Two of the other case studies concern a grassroots initiative and an initiative instigated by the local city administration.

Criteria for Case Study Selection:

- **Successful contributions to one or more waste management problem can be identified.**
- **Results and impacts are sufficiently documented and easily accessible.**
- **Contact persons can be identified so that more detailed information and an exchange of experience are available.**
- **Project approaches can serve as a reference for initiatives in similar situations.**
- **Different aspects of waste management (wastewater, solid waste management, rainwater drainage) are covered.**
- **Different geographical regions are represented.**

1.2

Case Studies

Different Sized Settlements and Cities

Almost all of the selected cities are inhabited by an **average of one million or more residents** and are characterised by steadily increasing populations. Their urbanised areas usually expand far beyond the administrative borders of the city, and form part of the so-called "metropolitan area". In small and medium-sized cities, informal settlements are normally proportionately smaller in size. Even though the living conditions in the informal settlements of these cities are similarly precarious, problem pressure is usually not quite as high as in bigger cities because land prices are lower and population densities are less.

Concepts and recommendations presented in this volume are also generally valid in the context of small and medium-sized cities. The approaches adopted by "smaller" projects, developed for peri-urban areas, apply **equally in small towns**.

This volume **focuses on informal urban and peri-urban settlements** within cities large enough to have specialised technical departments. However, their cooperation fluctuates very much according to the size and complexity of their existing waste management systems.

The amount of people affected by the projects, the stakeholders and the investment resources involved vary greatly between the different examples. The number of beneficiaries, for example, ranges from several hundred families in certain projects to several hundred thousand in others. This not only reflects the great **diversity of approaches**, but also goes to show that success is not bound by size. However, some of the projects presented are more suitable for replication or scaling-up than others.

Regional Distribution

The case studies were selected so that most large geographic and climatic regions of the world are represented. Three of the case studies are located in Latin America, two in Africa and two in Southern Asia.

Due to the size constraints of this document and limits to the information available, **not all geographical regions** could be **covered** by case studies. Moreover, region-specific features have only been considered when they are relevant for the assessment of waste management problems and solutions.

Location of the case studies presented in detail

1.2
Case Studies

Sources of Information

The examples were selected from a vast amount of sources, including the UNCHS Best Practices Database and the Dubai Competition, which served as starting points. In addition, data was obtained from the GTZ, UNDP and the World Bank's Water and Sanitation Program.

A first rough selection of about 30 case studies was made, twenty of which are documented in the annex to this volume. Of the 30, seven were chosen for in-depth examination. They were analysed with the help of field visits, interviews with the people involved and further information.

The detailed descriptions of the seven case studies in the full version of the "Basic Concepts" volumes uses a standard structure with the following headings:

- background and context;
- implementation;
- technical solutions applied;
- operational organization;
- financing;
- lessons learnt.

Ahmedabad – India

Inhabitants (1999):
City: 4,788,000 Metropolitan Area: 11,212,000

Types of Settlement

Inner-city informal settlements and settlements on the urban periphery; average density between 800 and 1,000 inhabitants per ha.

Project Profile

Upgrading of informal settlements initiated by the city administration and implemented in cooperation with private investors and inhabitants.

- 1994: establishment of the Sharada Trust for a pilot project in the slum settlement of Sanjaynagar, with private funding;
- 1997: beginning of the rehabilitation of Sanjaynagar;
- By mid 2000, 9 settlements with a total population of 2,875 inhabitants had been upgraded; in another 8 settlements, with a total population of 16,050 inhabitants, upgrading was in process.

Stakeholders

- city administration as initiator and implementing agency
- private corporations as sponsors;
- NGOs: organisation and support of inhabitants;
- formal community organisations: co-financing of rehabilitation measures.

Technical Solutions

- simple gravity-based sewer systems with individual household connections;
- drop-off refuse disposal with containers for collection;
- unsealed surfaces for rain water drainage.

Financing

- external support from the World Bank and other donors;
- donations from local industrial enterprises;
- maintenance of neighbourhood facilities through residents' contributions;
- refuse disposal by private contractors against subscriber fees.

Fortaleza – Brazil

Inhabitants (1999):
City: 2,089,000 Metropolitan Area: 2,800,000

Types of Settlement
Predominantly peripheral informal settlements (*favelas*) with densities between 160 and 506 inhabitants per ha; average density of approximately 280 inhabitants per ha.

Project Profile
Improvement of living conditions by promoting self-help and user participation in the upgrading of technical and social infrastructure.
- project start in 1990;
- project end in December 2003;
- directed at nine urban *favelas* in Fortaleza and 5 *favelas* in smaller towns in the inland of the Federal State of Ceará.

Stakeholders
The city administration established "local development councils" in which residents were actively involved. GTZ (German Technical Cooperation) supported the project with technical and financial assistance.

Technical Solutions
- system of sewage canals; connection to community collector tanks (septic tanks) per 100 households in outlying areas;
- domestic refuse separation (retrieval system) and composting of biodegradable waste in one *favela.*

Financing
- financing concept included residents' sharing of investment costs;
- maintenance costs for sewage systems are borne by residents (approx. US$ 1 per household per month).

San Salvador – El Salvador

Inhabitants (1999):
City: 1,398,000 Metropolitan Area: 1,780,000

Type of Settlement
Inner-city informal settlement; average density 530-550 inhabitants per ha; 5,300 inhabitants in total.

Project Profile
Extensive rehabilitation of the inner city informal settlement *Las Palmas* through the collaborative effort of various stakeholders.
- 1984: establishment of the CBO ADESCO and first activities of the NGO FUNDASAL in Las Palmas;
- 1992: land is acquired by ADESCO;
- 1997: beginning of rehabilitation works;
- 2000: completion of upgrading measures.

Stakeholders
- NGO FUNDASAL (project executing organisation);
- CBO ADESCO;
- City of San Salvador;
- sector institutions responsible for water, sewage and electricity;
- financing by KfW (Kreditanstalt für Wiederaufbau - German Development Bank).

Technical Solutions
- construction of a new sewage network (with minimised pipe sizes for cost reduction);
- replacement of existing latrines with individual household connections and indoor toilets;
- construction of retaining walls and rainwater drainage;
- connection to municipal refuse removal service.

Financing
- investment costs mainly externally financed (by KfW);
- small self-help contributions in construction works from target groups; credits for household connections to sewage system;
- maintenance of local sewer canals in self-help by residents' groups and by sectoral institutions against payment of (subsidised) user fees.

1.2
Case Studies

Karachi – Pakistan

Inhabitants (1999):
City: 10,867,000 Metropolitan Area: 11,900,000

Type of Settlement
Informal settlement on the urban fringe; average density: approx. 800 inhabitants per ha; 1.2 million inhabitants.

Project Profile
Organised self-help for the construction and operation of a sewage system under adverse political circumstances.
- 1963: Origin of the Orangi settlement;
- 1980: Foundation of the NGO Orangi Pilot Project - OPP;
- 2000: 90% of households own a toilet that is connected to the sewage system.

Stakeholders
- an NGO as intermediary organisation with a key role in professional consultancy, investigation, and education;
- parts of the city administration;
- residents;
- other NGOs;
- the private sector.

Technical Solutions
- overall planning for the area including the use of canals, natural inclines and existing pipe work carried out by OPP;
- conversion of natural channels and canals into covered sewers implemented by the city administration;
- development of simple, adapted standards for street canals, control shafts, and household connections.

Financing
- residents pay for their connection and the corresponding section of the canalisation;
- they are responsible for maintenance; repairs are financed by small fees;
- no direct cost recovery for municipal investments in main sewers.

Qanater City – Egypt

Inhabitants (1999):
City: 10,800,000 Metropolitan Area: 15,000,000

Type of Settlement
Peri-urban settlement; average density: 500-700 inhabitants per hectare; approximately 7,300 inhabitants.

Project Profile
Establishment of a solid waste management system operated by a community development organisation in collaboration with the city administration
- 1997: beginning of technical cooperation in the context of the UNDP-LIFE programme with support by GTZ;
- 1999: end of support through the GTZ.

Stakeholders
- international and bilateral organisations (GTZ/UNDP);
- the city administration of Qanater City;
- CDA (Community Development Association);
- volunteers from the districts.

Technical Solutions
- door-to-door collection of refuse in plastic bags (pick-up retrieval system) and transport to central collection points;
- transport of refuse from collection points to municipal dump by a pick-up truck remodeled for this purpose.

Financing
- financing of initial investment costs through the GTZ;
- financing of recurrent operational costs and approx. 50% of vehicle amortisation costs through user fees collected by the CDA.

Rosario – Argentina

Inhabitants (1999):
City: 1,005,000

Types of Settlement

Peripheral settlements with medium population densities, various degrees of consolidation and poor vehicle access.

Project Profile

Improvement of hygiene and environmental infrastructure in neglected districts, in combination with measures for income generation and support for local initiatives and micro-enterprises.

- In 1999, with GTZ support, a cooperative was established to carry out domestic refuse collection, cleaning ditches and open sewer ducts, lawn mowing; and complementary environmental education on behalf of the city.
- Settlements with approximately 11,000 inhabitants are being served by the cooperative.

Stakeholders

- a cooperative of 12 residents of the affected settlements;
- the municipality (which supported the founding of the cooperative and awarded it a contract);
- GTZ (advisory assistance especially on organisational and financial issues).

Technical Solutions

- refuse collection with handcarts and subsequent unloading to larger removable containers at central collection points; transport to municipal dump by private contractors with motorised vehicles;
- cleaning and maintenance of container sites;
- cleaning of sewage ditches;
- complementary environmental education of users.

Financing

- financing of initial investment costs for basic equipment by a GTZ loan repayable over 3 years and a subsidy by the provincial government;
- cost recovery through property tax raised by the municipality.

Contonou – Benin

Inhabitants (1999):
City: 500,000 Metropolitan Area: approx. 1,000,000

Type of Settlement

Formal peripheral settlement with low building density, located in an area prone to flooding.

Project Profile

Waste disposal and recycling measures in a cooperation between a local NGO, private refuse collectors and the municipality

- 1993: a system of domestic waste collection is initiated;
- 1995: the NGO *Developpement Communautaire et Assaisissement du Millieu* (DCAM) takes over waste disposal and separation for recycling;
- 1999-2000: recycling activities (plastic, biodegradable waste, compressed paper briquets) are established and operated.

Stakeholders

- a local NGO in cooperation with the city administration and with support from the Protestant Development Service (*Evangelische Zentralstelle für Entwicklungshilfe* - EZE)

Technical Solutions

- door-to-door domestic refuse collection with handcarts by individual private collectors; further transportation to dumpsite by the NGO;
- refuse separation and sorting at household level;
- central refuse sorting and marketing of recycled material.

Financing

- operational costs of refuse collection financed by subscriber fees;
- refuse separation and sorting covered by a municipal subsidy;
- testing the economic feasibility of recycling activities.

1.3
Conclusions

General Conclusions

Variety of formal and informal solutions and a broad spectrum of stakeholders

The case studies illustrate the enormous variety of current solutions. This is especially true in the areas of organisation and dealings between different actors and levels of authority. Stock solutions do not necessarily fit to formal generic municipal systems, nor to informal local situations. The case studies show that instead, a broad variety of approaches are called for, each of which respond to local political, administrative, and cultural conditions. Systems will therefore differ in the number of stakeholders involved and their respective roles, the extent of resident participation and the technical and financial methods used.

Social acceptance and participation as pre-conditions for waste management measures

Social acceptance of, or residents' identification with a system, seem to be among the most important requirements worldwide for their introduction, and for ensuring their financial and organisational sustainability. Inhabitants of urban poor settlements are only willing to contribute to a system financially or otherwise if they can identify with it, and if it offers substantial improvements. With regard to sustainability, a greater value must therefore be placed on residents' participation as a means to attain local ownership.

Viable and effective approaches are even possible in difficult situations

The examples show that viable and effective approaches have also been developed in areas with relatively unconducive project conditions.

Sustainable solutions through secure financing of operational costs and integration with city level systems

In addition to financial security, organisational links to the city's different vertical and horizontal systems have proven to be centrally important for sustainability. Making effective connections requires extensive training and campaigning by all participating groups. This not only involves technical knowledge, but, above all, familiarity with the distribution of responsibilities within the various levels of communal and municipal managements and their interconnections.

Importance of process orientation and sustainability as opposed to short-term success

Waste management and sanitation projects are usually accompanied by long and multi-faceted implementation processes because of the number of stakeholders and the variety of aspects involved (technical, financial, and organisational). Possible short-term success should not however, take precedence over securing the sustainability of improvements.

Higher chances of success in socially and economically homogeneous areas

Analysis suggests that a project's chances of success are higher in socially and economically homogeneous areas than in complex, heterogeneous situations. Size, however, is not a crucial factor, assuming that projects in large areas or entire districts are carried out in manageable, socially coherent segments.

Economic incentives for waste management measures

Refuse and waste water management projects are especially successful if they manage to provide financial incentives (e.g. through sales of recyclables; reduction of disposal fees by reducing the amount of refuse; utilisation of faeces / wastewater for irrigation; utilisation of rainwater, etc.). In these cases, it is especially important that the expected proceeds should go as directly as possible to the people or institutions that do the most work.

Preference for locally adapted technologies

Any technology should, if possible, be locally produced, maintained, and operated. Manual rather than mechanical techniques are preferable.

1.3

CONCLUSIONS

Political and Institutional Aspects

Willingness of responsible authorities to cooperate is more important than decentralisation or autonomy

The political and administrative context has a significant influence on the success of waste management measures. The preparedness of responsible authorities to cooperate with local stakeholders is a decisive factor, compared to which, the degree of decentralisation or the autonomy of self-management groups is secondary. Projects, which have been carried out in the context of extremely centralised administrative systems, show that upgrading projects are possible in nearly every kind of bureaucratic environment. However, under unfavorable conditions, the existence of formal structures does not guarantee success. Success depends rather on the subtle integration of the measures into local rules and traditions, and the intelligent exploitation of their possibilities.

Scope for local initiatives

Giving local initiatives a margin of operational freedom, and formally recognising local stakeholders (CBOs, NGOs) as project partners seems to play a significant role in all successful and sustainable projects. Several of the cases show how handing over responsibilities to local organisations can affect communal power structures. Political systems have very different attitudes towards "local", or "bottom-up" projects: these range from a positive commitment to participation to mere toleration. However, projects have also been successfully implemented where autonomous local action was openly disapproved of.

Service orientation and understanding inhabitants as "clients"

Many city administrations – and not only those of more authoritarian regimes – focus exclusively on problems of law-and-order. Risk-prevention and cost-reduction are among their foremost concerns. Functional waste management systems, however, need to be oriented toward efficient and well-balanced patterns of service directed to all citizens equally, as "clients". Unfortunately, local city administrations are seldom able to cope with their role as efficient service providers. As various case studies show, they have therefore agreed to cooperate with the affected residents, intermediary organisations and the private sector. This, however, requires at least a minimum of mutual acceptance between the residents and the authorities, which should be carefully sounded out before a project begins, or established while new systems are introduced. Moreover, many sectoral authorities disapprove of self-help, despite their own lack of resources and their subsequent inability to perform the tasks themselves.

Various forms of cooperation between local initiatives and city administrations - The role of local administrations

Interactions between the local (project area) level and the administration level differ and hardly ever follow a common pattern. Although central institutions can effectively coordinate cooperation, their distance from the problems can slow down or inhibit local organisation. However, the city administrations' collaboration is definitely required in order to overcome bureaucratic and legal obstacles, or to connect up to different subsystems, such as drainage networks. They are equally important for the replication and dissemination of successful project approaches.

Cooperation between public institutions and NGO's not always free of conflict

Cooperation between official authorities and CBOs or NGOs can entail conflict. But where authorities show interest and determination, success during the course of a project usually prevails. In the end, it seems that the motivation of the parties determines whether objectives are successfully achieved.

Possibility of sustainable improvements through cooperation with responsible public institutions

Essentially, processes of societal restructuring are not possible without the involvement of local and supra-local decision-making and administrative bodies. The case studies reveal that sustainable improvements of a district or neighbourhood are not feasible unless the local administration takes part. New forms of democratic legitimisation have mobilised politicians' interest in "their" electoral constituencies, which can have an operational effect on waste management projects in urban poor settlements.

1.3
Conclusions

Social and Cultural Aspects

Cultural traditions as opportunities

Cultural traditions need not only be project inhibiting rules, or taboos on handling refuse and feces, as in India, for example; they can also have enormous potentials for self-help and communal preparedness. The case study from Geziret El Sheir highlights the large, unused organisational potential inherent in the Community Development Associations (a kind of state-controlled CBO) that are the equivalent of traditional Islamic city organisations, which allow for considerable autonomy in the regulation of local concerns.

Significance of social and cultural ties

Social or cultural affiliations often result in especially strong community bonding. In metropolises such as Mexico City, residents frequently organise themselves according to their rural origins and maintain contact with the hinterland. In many countries, groups, especially ethnic groups, organise for collective causes because of repression.

Importance of ethnic and cultural characteristics in urban management

The ethnic or cultural background of a community group can become an important factor in urban management. In Cairo, for example, Copts, unlike their Islamic neighbors, can own pigs, and can therefore make use of organic waste as pig feed.

Importance of neighbourhood organisations for mobilizing residents

Neighbourhood organisations are usually not able to acquire the skills needed to set up new waste management systems. Their main contribution is in mobilizing residents and ensuring their participation over long periods of time.

Specialised and socio-culturally attuned NGO experiences

In many countries Non-Governmental Organisations (NGOs) have diversified, professionalised, and developed beyond the narrow scope of religious, philanthropic, or charitable aid organisations. Many of the organisations involved in environmental issues are also involved in refuse management. The case studies show that most successful projects involve NGOs, some even in pivotal positions. NGOs play an essential role in organizing target groups, implementing upgrading measures in project areas, and acting as mediators between residents and state or communal administrations. Some NGOs even assume functions similar to those of a bi- or multilateral organisation. NGOs often initiate or replicate successful project concepts and have accumulated considerable detailed knowledge of their fields.

Refuse collection and separation site operated by a community organisation

1.3

Conclusions

Technical Aspects

Location of settlements as against geographical conditions

As the case studies reveal, geographical conditions are of minor importance for project success. Nevertheless, the geographic characteristics of settlements, as described by the settlement typology, do have an influence on their rehabilitation possibilities. But upgrading can depend on other factors: socially or ethnically heterogeneous settlements or settlements under threat of eviction, for example, offer fewer opportunities for the successful implementation of improvement measures.

Danger of displacement through upgrading

The location of a settlement can have considerable indirect influence on its development perspectives. According to where it is within the town, infrastructure improvements can result in a status shift, which can lead to the displacement of poorer residents by middle-class newcomers. Research in the Phillipines indicates, however, that this is not necessarily always the case. Districts where the residents are well organised, have a strong sense of local identification and social regulation, are less likely to suffer from gentrification despite substantial increases in property values following legalisation.

Population densities and degrees of consolidation as important conditions for technical solutions

The population and building densities, and the degree of consolidation within a settlement, have a significant influence on system design. Complicated plot divisions, for example, hamper technical interventions, such as canalisation, in highly consolidated, densely built environments, because of the intense organisational and participatory effort involved.

Short-term emergency measures in vulnerable and hazardous locations

In extremely vulnerable or risk-prone areas (e.g. railroad embankments, slopes alongside sewage canals, river banks, refuse dumps) minimal measures of urban hygiene can substantially diminish health risks for inhabitants – even if they are not sustainable in the long run.

Importance of geographic, climatic, and topographic conditions for technical design

Geographical factors, such as soil conditions, precipitation, temperature and topography, influence system design. Drainage systems, for example, are easier to realise on sites with natural inclines than in low-lying areas prone to flooding. The use of on-site wastewater systems, such as latrines, soakaways and cesspits, are largely determined by the ground's capacity for absorption and filtration. Climatic conditions effect and limit the possibility of storing domestic refuse temporarily in households or at central collection points.

Taking into account local resources for the choice of technology and as the basis of technical solutions

The choice of technologies for waste water or refuse management should be based on locally available resources. This cannot, of course, always be accomplished as outstandingly as in the Coptic district of Manshiet Nasser, Cairo, where a large part of the entire city's accumulated refuse is sorted and recycled, and where different types of recyclables are processed with machines developed and produced locally. Serious problems of hygiene have arisen in the settlement as a result of the system, but even so, other developing countries could profit from such local experiences. For example, importing machines from Egypt, India, Thailand, Brazil, etc., which are suited to the requirements of urban poor settlements, would be far more appropriate than using their counterparts from the developed world.

Division 44
Environment and Infrastructure

2

Module 1: Technical Concepts

Improvement of Sanitation and Solid Waste Management in Urban Poor Settlements

Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH

Contents Outline

The technical solutions described in this volume, Module 1, of the publication series are intended as a guide, and only provide basic background information on the main issues to be considered in identifying appropriate waste management solutions. The length of this document is limited, and hence technical aspects have been described as concisely as possible, and should not be taken as a comprehensive basis for detailed technical planning and implementation. For these purposes, it will therefore be indispensable to draw on specialised expertise and advisory assistance.

In more detail, this volume deals with the following topics, and, where possible, these are illustrated by short summarised case studies and examples of technical waste management solutions.

1. Technical Aspects of Waste Management

The introductory chapter of this module outlines the main framework conditions and the most important aspects that need to be considered in the design and implementation of technical solutions to waste management problems. It also gives an overview of the basic information needed for selecting suitable technologies and approaches, and indicates appropriate selection criteria.

2. Solid Waste

The first part of the second chapter describes the main problems, potentials and challenges of solid waste management in urban poor settlements and provides information on tools and instruments for assessing solid waste generation. The most relevant technical solutions and procedures for solid waste collection and transport, sorting and recycling, and final disposal are then presented and assessed in more detail.

3. Wastewater

As an introduction to wastewater management tasks and functions, the first section of this chapter outlines the main problems and challenges to be confronted in urban poor settlements, and describes basic concepts for assessing the amounts of wastewater to be disposed of and treated. More detailed descriptions and evaluations of technical options follow in two main parts: on-site (i.e. settlement level) solutions for collecting and treating wastewater, and solutions for wastewater disposal and treatment both on-site and off-site.

4. Rainwater

As in chapters 2 and 3, an initial overview of the problems and challenges for rainwater management and erosion control in urban poor settlements is given. Against this background, the most relevant technical approaches and solutions for drainage systems, erosion control measures and rainwater harvesting are presented and assessed.

Annex

The annex comprises:

- checklists, tables and design parameters for solid waste and wastewater management;
- a list of literature that can provide more detailed information on the technical solutions and approaches presented;
- photograph and illustration credits.

The complete version of Module 1, consisting of 139 pages, follows the structure outlined by the table of overall contents overleaf. It can be downloaded from:
http://www.gtz.de/en/themen/umwelt-infrastruktur/abfall/4991.htm

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2.1

Technical Aspects of Waste Management

Introduction

Depending on the specific context and the resources available, various technical solutions, procedures and forms of organisation can be used to process and dispose of solid waste (refuse), wastewater and rainwater in urban poor settlements. In general, the technologies involved are only one aspect in assessing whether a particular waste management solution is appropriate.

In most cases, social, cultural, financial or institutional aspects will be more relevant than specific technical measures, the choice of which are usually unproblematic. As a rule, the long-term viability and sustainability of waste management projects and initiatives depends more on factors such as social acceptance, the capabilities of target groups and users to operate and maintain equipment and installations, the necessary institutional and organisational arrangements, and economic efficiency, in particular the possibilities of cost recovery. Thus, the selection of appropriate technologies normally requires a careful assessment of the prevailing socio-cultural, institutional, organisational and financial conditions, and the possible scope of action will need to be based on these findings.

However, there may be situations in which the particularities of various technical solutions of waste management tasks do become important. In such cases, it will not be sufficient to assess their advantages or disadvantages primarily on the basis of the general conditions. A comparison of specific technical aspects, such as efficiency, quality, ease of maintenance, durability and environmental impact will then have to be used to select the most favourable option.

A broad spectrum of appropriate and well-tested technical solutions and procedures for waste management in urban poor settlements has developed over time, and an assessment of the applicability of any of them requires specific technical know-how and practical experience.

This chapter therefore, first outlines the basic information that will be needed to select and plan appropriate technical waste management solutions, and how to collect and compile this information. It then presents the most important technical assessment criteria that will need to be considered in selecting a particular technical solution in a specific context.

As far as is possible and useful, the presentation also describes important non-technical aspects, or provides references to their detailed description in other modules of this publication.

The technical or technological aspect is only one of the factors in assessing whether a waste management solution is appropriate. Social, cultural, financial or institutional issues are often more important than any specific technical solution.

The viability and sustainability of a technical waste management solution mainly depends on:

- **its social and cultural acceptance;**
- **the capabilities of target groups and users to operate and maintain technologies and equipment;**
- **the institutional and organisational set-ups required;**
- **its economic efficiency and level of cost recovery.**

TECHNICAL ASPECTS OF WASTE MANAGEMENT

Type of Information Needed to Select Appropriate Technologies and Procedures

Since different urban quarters and settlements may have considerably different characteristics and problems, it will usually be necessary to analyse the prevailing development conditions and problems carefully in order to identify and develop waste management measures that reflect each settlement's particular situation.

Densely built-up innercity areas need technical solutions different from those for peri-urban settlements

Technical Aspects

The following technical aspects and information will be important inputs in analysing development conditions:

- data on residential densities, housing conditions and public open space;
- information on topography and geology (terrain profiles, slopes, soil conditions);
- existing waste management solutions, and the quality and conditions of their respective technical solutions:
  - method of collection and disposal of household and commercial refuse,
  - condition of latrines, septic tanks, sewage pipes and treatment plants (as relevant),
  - condition of possible open sewerage canals,
  - type of rainwater and other surface water drainage,
  - risk of land slides and flooding,
- existing initiatives to improve waste management;
- data on refuse and wastewater produced, on rainwater yield and on the corresponding needs for disposal;
- possibilities of connecting to existing municipal waste management systems or networks;
- possibilities of recycling and marketing solid waste components (compost, scrap metals, glass, paper, etc.).

Social, Institutional and Financial Aspects

The following social, institutional and financial information is indispensable for the selection of appropriate solutions:

- problem perception and requirements of target groups and users; where relevant, considering socio-cultural or gender-specific factors;
- interests, willingness and possibilities of target groups and users to participate in waste management activities (e.g. through self-help and mutual help, financial contributions, payment of user charges);
- existing community based organisations (CBOs) and non-governmental organisations (NGOs), which can be used as starting points for waste management initiatives;
- interests, capacities and capabilities of public sector (municipal or governmental) institutions responsible for waste management services;
- existing fee and tariff systems for waste managements services; possibilities of recovering service costs;
- possibilities of support from governments or administrations, such as local governments, governmental sector institutions, etc..

2.1

Technical Aspects of Waste Management

Criteria for Selecting Appropriate Technologies and Processes

Costs

Waste management in urban poor settlements will usually require low-cost or relatively cheap solutions in order be affordable to target groups and public sector service providers. Hence, one of the most important selection criteria will be the costs involved in a particular technical solution.

In addition to net investment costs, the long-term costs of operations and maintenance will be of particular importance:

Investment Costs

The investment costs of a particular technical solution depend on a number of factors:

- The level of technological complexity: Considering the conditions in developing countries, which are usually characterised by low labour costs and high capital expenditure, sophisticated, automated and labour saving equipment and processes will generally be less appropriate than simple, labour intensive technologies.
- Physical factors, such as topography, geology, residential density or accessibility (e.g. latrines need to be regularly emptied and sludge transported when the absorption capacity of the soil or space is limited).
- Possibilities for financing and capital costs: financing of investment costs by government subsidies or external donor grants is usually "cheaper" than loan financing.

A good indicator for comparing the costs of different technical solutions is the investment cost per household or user.

Operating Costs

In previous practice, the importance of the operational costs of technical solutions as a selection criterion has often been neglected. These are mainly determined by:

- salaries and wages of operational and administrative staff;
- energy consumption and costs;
- other necessary consumables (lubricants, spare parts, cleaning agents, etc.);
- the expected life span of equipment or system components, and the resulting depreciation;
- the needs for regular maintenance and repair works.

Efficiency and Quality

In addition to cost aspects, the efficiency and quality of technical solutions are other important criteria for assessments.

The need for low-cost solutions and affordability often calls for compromises and/or cuts in quality. In general, waste management measures in urban poor settlements will provide less quality or convenience than those in better-off, formal urban quarters. Nevertheless, even simple low-cost solutions can lead to significant improvements. Important selection criteria for technical solutions are:

- the amount of hygienic and environmental improvement that can be achieved with the financial resources available;
- the possibilities of gradually improving and further developing initially simple low-cost solutions.

Simple but efficient: Refuse containers

Technical Aspects of Waste Management

Interfaces with Networks and Systems beyond Settlement Level

Closely related to quality and efficiency, the necessities or possibilities for interfacing with networks and systems outside the settlement or quarter are further important criteria in assessing waste management solutions. In this, a distinction should be made between:

- "Technical" interfaces that are the result of the technical solution selected, such as the connection of local sewers to municipal or public sewerage networks or the collection of refuse by municipal refuse departments or enterprises.

  Such technical interfaces usually require close collaboration with the responsible public or private services providers from the outset of planning and preparation.

  Moreover, they usually mean that at least part of services at settlement level will later have to be taken over by the public (municipal) or private sector operators who are responsible for waste management operations at city-wide level.

- "Systemic" (institutional) interfaces, resulting from the necessity to coordinate projects or particular measures with public or municipal institutions responsible for waste management services.

  For technical on-site solutions that do not need to connect to overall systems (e.g. the construction of latrines), coordination or cooperation with responsible sector institutions may, in any case, be necessary or useful, e.g. to obtain official approval of a waste management measure. The need for such coordination and cooperation should thus be carefully assessed, even when it seems not to be required by the technical option selected.

Ease of Operation and Use

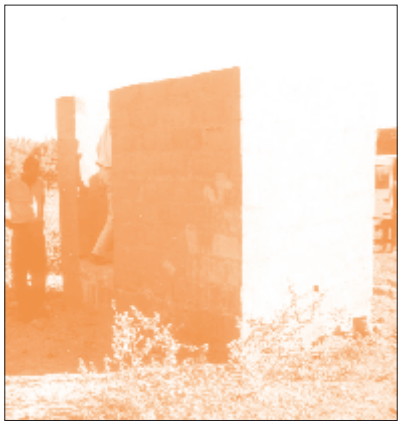
The ease of operation and use of a technical solution or process is mainly determined by two factors:

- its level of complexity and the skills needed to make it function;
- the capabilities and skill levels of users and target groups.

In the selection of technical equipment, solutions or processes, the relationship between both factors should be adequately considered. For more complex solutions, or in cases where user skills and capabilities are inadequate, complementary training and advisory assistance will be needed. This should be considered in planning and preparation.

Connection to municipal system: Sewerage

Simple localised solution: Latrine



Simple technology: Manual push-carts for refuse collection in Benin

2.1

Technical Aspects of Waste Management

Maintenance Requirements and Durability

Maintenance requirements and durability of materials, equipment and system components are further important assessment criteria.

Maintenance requirements and durability largely depend on the complexity of a technology:

- Simple technical solutions often require less maintenance or have longer maintenance intervals. Moreover, their maintenance usually needs relatively less skill and technical know-how, and can thus be secured more easily; this, if necessary, can be supported by complementary training.
- More complex technical solutions generally present a higher challenge for maintenance and repair work. On the other hand, they are often more efficient and can provide a better service quality.

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Requirements for Operations and Organisation

Different technical solutions generally call for different operational and organisational set-ups. Operational forms and organisational structures also relate closely to some of the aspects described above, including:

- ease of operation and use;
- maintenance requirements and durability;
- technical and systemic interfaces with networks and institutions beyond settlement level;
- costs of operations, maintenance and asset depreciation.

In most cases, the operational and organisational challenges increase with a technical solution's level of complexity. However, even simple technical solutions require a minimum of stable organisational or institutional structures in order to be sustainable.

Accessibility of Technical Solutions and Technologies

As a consequence of economic globalisation, most up-to-date technologies for urban waste management are available almost everywhere (albeit at very different costs). Theoretically, they could therefore also be used in urban poor settlements. However, due their technical complexity, maintenance requirements or costs, many technologies and related equipment are only partially appropriate or even completely inappropriate in this context.

On the other hand, importing technologies can make sense if it helps achieve technically and institutionally sustainable improvements at reasonable costs. Machines, equipment and technologies from countries with similar development levels that correspond to specific local conditions (e.g. with regard to labour and capital costs or soil conditions) can be applied. The needs and costs for spare parts, repairs and staff training will, however, have to be considered.

Complex technical solution with a higher need for maintenance: Waste compactor truck in Aqaba, Jordan

High organisational challenge: Operations of sludge pumping trucks

Reasonable import of technology: Machine for paper pressing in Egypt

Technical Aspects of Waste Management

Possibilities for Self-help

The possibilities for target group and user self-help (e.g. in form of labour or other contributions in kind) are largely determined by the ease of operations and use of a technical solution.

But even more complex technical solutions, such as the construction of sewerage networks or retaining walls against soil erosion or landslides, can at least partially be done through self-help (e.g. digging trenches or other earthworks).

Basing an assessment of self-help possibilities on technical aspects alone however, will usually be insufficient. Poor target groups often have to fight for their livelihood on a daily basis, and this has to be taken into consideration. Thus the possibilities and scope for self-help can be limited.

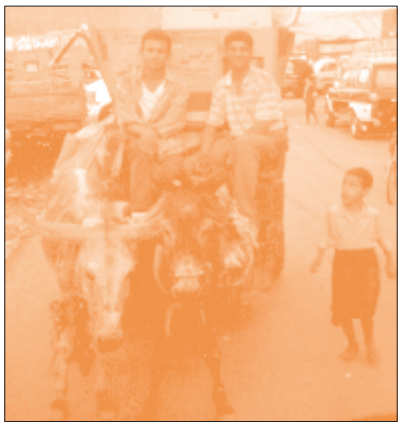
Self-help in the construction of a sewer network

Social and Cultural Acceptance

Specific social, cultural, religious or ethnic factors can have a considerable influence on a technical solution's level of acceptance and willingness to be involved in self-help and participation. In many cultures, the handling and collection of refuse is seen as a low status activity, which is often designated to disadvantaged social groups, e.g. to Coptic Christians in Islamic Egypt or to members of special castes in Hindu countries. The handling of human excrement is often subject to similar taboos.

Specific socio-cultural conditions should thus be identified in the planning and preparation of waste management initiatives, and be adequately considered in the selection of technical options. On the other hand, existing prejudices against specific technical solutions can be overcome by information, awareness raising campaigns and public relations efforts.

Limited social acceptance: Refuse collection and recycling - the Zabaleen of Cairo



Environmental Impacts and Environmental Balances

In the past, the environmental impacts and the environmental balances of technical solutions have often been neglected in the assessment of waste management solutions.

Although the overall objective of most waste management projects is to improve hygienic and environmental conditions for residents, problems are often transferred elsewhere, that is, they are "externalised". This is particularly true where solutions at settlement level are not fully integrated into functioning city-wide waste management systems, e.g. sewerage systems without final sewage treatment facilities, or refuse collection without suitable landfills or dumping sites.

The selection of appropriate technical solutions should thus also consider the following:

- In cases of interfacing with or connection to city-wide systems (off-site solutions): the existence of sustainable solutions for waste disposal outside the settlement, or the possibilities of creating or introducing environmentally sound final disposal options over time.
- In cases of local solutions at settlement level (on-site solutions): their impact with regard to soil contamination, vegetation, pollution of ground and surface water, and other emissions.

2.2
Solid Waste

Basic Concepts of Solid Waste Management in Industrialised Countries

Refuse is generally perceived as material that the owner no longer needs and wishes to dispose of. The traditional form of refuse disposal is to just throw it away and/or have it transported by a refuse collection service to a landfill or dumping site.

Today, this form of disposal (end-of-pipe technology) has not yet completely vanished, but has generally become less acceptable. Simple refuse disposal has developed into solid waste management, a complex system involving various measures and activities which increasingly focuses on the reduction and recycling of refuse material. Environmentally sound, resource-conserving waste management aims to recycle the largest possible number of waste components and reintroduce them into the economic cycle in order to reduce the consumption of valuable material resources and energy.

From refuse disposal to solid waste management as part of a recycling economy

Solid waste management, as applied in most industrialised countries today, prioritises the reduction and recycling of refuse over its final disposal. Environmental laws or other regulations aim at only allowing final disposal after all possible means to reduce or recycle waste material have been made use of.

Hierarchy of Solid Waste Management

1. **First priority: avoidance and reduction of waste**
   - **avoidance of waste in production processes**
   - **use of products with low waste constituents or that generate low amounts of waste**
   - **reduction of hazardous waste materials by sorting and separation**
2. **Second stage: waste reuse and recycling**
   - **reuse of goods or products**
   - **recycling of material**
   - **composting of organic waste**
   - **energy recycling**
3. **Only then, final stage: end disposal**
   - **sanitary landfill sites**
   - **waste incineration**

Solid Waste Management in Developing Countries

This new understanding of solid waste management has only slowly taken hold in developing countries.

In most of these countries, governments, political bodies and institutions responsible for solid waste management still perceive waste as refuse to be disposed of, rather than as a resource that supplies, among other things, reusable materials. Traditional methods of refuse disposal still largely prevail, and, in most cases, they function badly. Even in mega-cities, such as Cairo, Caracas or Manila, well-managed sanitary landfill sites are still an exception, and refuse collection and disposal are often erratic and of bad quality. In parallel to formal refuse collection and disposal services, a huge informal sector for refuse collection and recycling has developed in many cities which provides income and jobs for some of the poor population.

More recent initiatives to privatise or license waste management in the form of concessions, which have emerged in many larger cities or metropolitan areas over the past 10-15 years, have had little impact so far on the low quality of waste management services. Part privatised waste management services, which largely remain publicly organised and regulated, still tend to be only available to the formal parts of cities and to rich or middle-income residential areas.

Solid Waste Management in Urban Poor Settlements

Problems

In urban poor settlements, well-organised solid waste management is rare. In most settlements, residents have no alternative other than to dispose of household and commercial refuse in streets and alleys, in public open spaces, in valleys or creeks, or in sewage or rainwater drainage canals. Informal dumping sites at the fringes of settlements are common, resulting in serious environmental hazards (from smouldering fires, the pollution of surface water, breeding vermin, etc.).

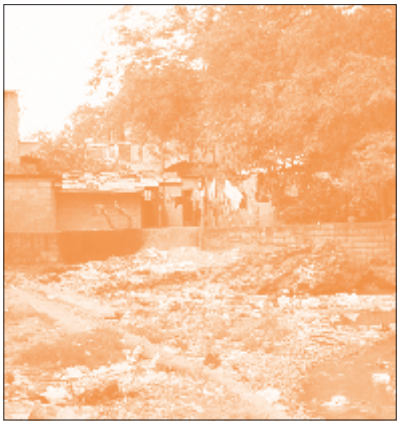
Where public waste management services are at all available in urban poor settlements, they are usually limited to the collection of refuse from central collection points, often at the fringes of settlements which can easily be accessed from the urban street network. Typical solutions consist of the installation of containers or walled transfer stations where residents can discharge their refuse. In the best case, containers or other collection points are regularly emptied by municipal refuse collection services; more frequently however, such services can be rather unreliable, and serious health hazards, as with informal dumping sites, can arise from these intermediate collection points.

As for private refuse collectors, who often collect and recycle refuse in wealthier formal residential areas, they have little interest in extending their services to poorer areas, where recyclable waste materials are difficult to find.

Limiting factors for efficient solid waste management in urban poor settlements:

- **missing formal recognition of settlements by responsible public sector institutions (in most cases, municipalities)**
- **limited capacities of public waste management services; caused in particular by insufficient refuse collection cost recovery through user charges**
- **limited willingness and capacity of residents to pay user charges for refuse collection**
- **difficult accessibility in many settlements (narrow streets in bad condition)**
- **few incentives for private informal refuse collection due to limited recycling possibilities of waste material**

Dumping of waste in river beds or creeks



Dumping of waste in streets

Irregularly emptied refuse containers

2.2
Solid Waste

Potentials

Due to the economic situation of residents, the amount of waste generated in urban poor settlements is usually significantly lower than in formal, wealthier parts of cities: all materials with any possible economic value are usually separated and recycled. Organic matter, for example, is used to feed domestic animals, or the animals "separate" it themselves from the accumulated refuse.

In extremely poor settlements: high level of recycling and low amounts of waste generated

In less consolidated poor settlements, recycling of waste generated inside the settlement itself is usually an exception. Instead, residents of poor settlements often collect recyclable materials from wealthier urban areas. Sorting and preparation for recycling is then done inside poor settlements, where often highly specialised informal recycling economies have developed. In a few cases, whole urban quarters have specialised in the collection and recycling of waste, for example, the Zabaleen settlements in Cairo, or the waste collector neighbourhoods in Metro Manila (Smoky Mountain and Payattas).

With the consolidation of settlements, waste composition changes and opens up new possibilities for internal recycling

With the increasing consolidation of an informal settlement, which is usually accompanied by the growing wealth of its residents, the composition of waste changes: changes in consumption patterns usually produce a higher proportion of recyclable waste components as well. Even in formerly poor residential quarters, e.g. in the older, more consolidated *favelas* in Brazil, basic internal recycling methods have developed.

Informal Markets for Recycled Waste

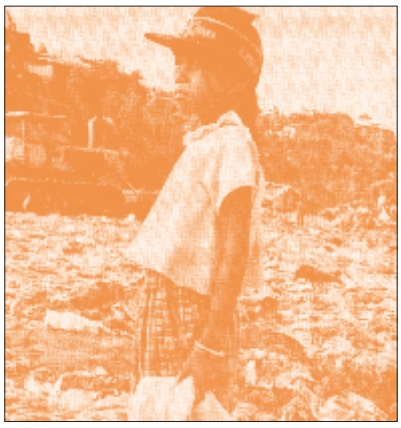
Typical informally recycled materials are metals (in particular non-ferrous metals and large scrap items), reusable glass bottles and plastic containers, and, to a lesser extent, paper and cardboard.

Organic waste, plastic bags, thin sheet iron and steel scrap, and paper and textile off-cuts are generally more difficult to recycle.

As a rule, the development of private initiatives for recycling waste depends less on the material available and its suitability for recycling, than on the practical possibilities of selling recycled materials to intermediate agents, or of reusing or further processing them within the settlement itself.

Recycling of organic waste components

Living and working on a refuse dump site



Informal recycling enterprise in Manshiet Nasser, Cairo

Conceptual Approaches

The specific characteristics of urban poor settlements largely define the possible scope for initiatives and projects to improve solid waste management. For very poor and vulnerable target groups, whose main interest is to secure a livelihood, increasing their awareness of the necessities of protecting their health and the environment will generally not be enough. It will usually be more important to provide economic incentives as well.

Taking into consideration such factors as poor target groups' limited capacity to pay, the general inefficiency of public sector waste management and the difficulties of achieving complete cost recovery for solid waste management services, only few basic approaches will be realistically feasible. As far as possible, they should be combined or applied in a complementary way:

- to further reduce amounts of waste by promoting better sorting and recycling;
- to demonstrate the economic feasibility of waste recycling, supported by training and advisory assistance;
- to mobilise the potentials for resident self-help and initiatives by other civil society stakeholders (e.g. NGOs) to solve the most urgent and obvious solid waste management problems;
- to promote and support informal sector micro-enterprises who are interested in the business opportunities offered by refuse collection and recycling activities;
- to enable public sector institutions responsible for solid waste management to cope with their tasks better, particularly with regard to supervising and controlling solid waste management initiatives at settlement level;
- to introduce consumption-oriented user charges as incentives to reduce refuse. Such user charges should be introduced in a careful and gradual manner in order not to put too much financial pressure on residents of poor neighbourhoods.

There is a wealth of examples and positive experience of solid waste management initiatives in urban poor settlements worldwide, and a variety of feasible and realistic technical approaches and solutions for the collection, sorting, recycling and final disposal of waste have been developed.

The most relevant technical solutions are presented on the next page in summary overviews on approaches and processes that can be applied in urban poor settlements.

Self-help: Clearing refuse from a canal

Private refuse collectors in Kenya

Sorting of plastic waste in Kenya

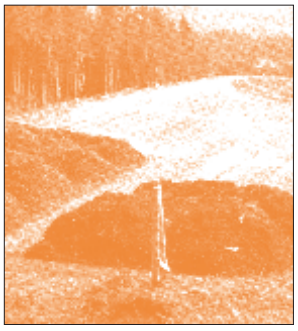
2.2

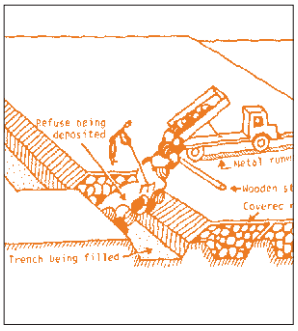
Solid Waste

Overview of Technical Solutions

Technical Solution	Drop-off Systems	Pick-up Systems	Non-motorised Systems
Characteristics	individuals bring refuse to central collection points; emptying and disposal by service providers	door-to-door collection; refuse transported directly to dump or reloaded onto truck for disposal	refuse transported from households with simple vehicles (hand or animal drawn carts, bicycle rickshaws, etc.)
Advantages	inexpensive; possible even in very poor areas; vehicle wide streets not required; suitable for self-help; potential for refuse separation	creates employment; fees related to quantity and/or households; control over where refuse is; intermediate storage in households facilitates separation and composting	suitable for self-help; easy handling; versatile; first step towards self-help based refuse management
Disadvantages	requires user interaction; fees not related to quantity (no financial incentive to reduce amount of refuse); no control of refuse at collection points	some infrastructure is needed; space for, and acceptance of intermediate storage in houses; willingness to pay fees is required	limited transporting capacity; limited range
To be considered	refuse collection points should be restricted to specified areas; capability of those responsible for further transportation should be checked	regular removal needs to be ensured so that user acceptance is not jeopardized	loads and routes should be adapted to capabilities of persons and/or animals involved

Motorised Systems	Sorting and Recyling	Composting	Small-scale Landfills
waste transportation with motorised vehicles with bigger load and distance capacities	extraction of recyclable material and separation of hazardous waste from household or commercial refuse; preferably at source	aerobic fermentation of organic refuse components by bacteria and compost worms	disposal and depositing of residual waste in earth trenches subsequently covered with earth after separating out valuable fractions
efficient transportation of large amounts of refuse over long distances	part financing of refuse management by separating out and marketing recyclables	reduction of residual refuse; less transport and dump volume; production of valuable fertiliser; low investment costs	Simple and inexpensive waste disposal that can be done by self-help initiatives when disposal at a central landfill site is not possible
high investment and operational costs; limited application in poor settlements because of maintenance and personnel requirements, and the need for vehicle accessible roads	requires users to know about recycling; marketability of recyclables is necessary	requires separate collection of biodegradable refuse; acceptance and market-ability required; basic knowledge of composting process needed	No protection against seepage of pollutants into soil and groundwater; no provision for disposal of industrial and hazardous waste
regular maintenance needs to be assured; overloading of vehicles needs to be avoided	requires careful checking of marketing possibilities; recyclable materials should be separated as well as possible in order to maxi-mise their sales potential	climatic conditions need to be considered; the temperature and humidity of composting material should be carefully controlled	Control over refuse before it is deposited





2.3
WASTEWATER

Problems

Most urban poor settlements have developed in an unplanned way without following formal urban layout standards. High densities and often extremely narrow internal streets make it difficult to establish a sewerage system. Municipal infrastructure, e.g. for wastewater treatment, is usually completely lacking.

Without functioning municipal sanitation systems, problems of wastewater discharges from kitchens, bathrooms and toilets have to be solved individually. Where there is sufficient space, it may be possible to construct a simple filtration pit for greywater and a latrine.

However, in densely built metropolitan areas, e.g. at the fringes of Indian megacities, there often is no space. The few public open spaces that may exist (e.g. railway tracks) are thus used for defecation, and greywater from kitchens and bathrooms is simply discharged onto streets.

In industrialised countries with ample water supplies, the usual sanitation method is water-borne sewerage (so-called flush-and-discharge-systems). Large amounts of fresh water flush relatively small volumes of wastewater and faeces through piped systems to central treatment plants.

This conventional form of sewerage used in industrialised countries, and which is also often applied in wealthier urban neighbourhoods in developing countries, is, however, hardly appropriate for urban poor settlements.

Globally, about 80 countries, with about 40% of the world's total population, are affected by regular periods of water shortages. 95% of all wastewater generated in Third World countries is discharged completely untreated into surface waters. Many cities do not have any wastewater treatment system, and even in cities that do have sewage systems, only a few households are actually connected to it.

Where there is a lack of treatment capacities, the mixture of different types of wastewater can seriously aggravate hygiene problems, as small amounts of hazardous wastewater (e.g. faeces) can pollute large volumes of less problematic wastewater (i.e. rainwater, surface water and grey water from kitchens and bathrooms).

Factors impeding efficient sanitation in urban poor settlements:

- **The usually unplanned pattern of settlement development renders it difficult to construct efficient sewage systems.**
- **High densities and limited space hamper ex-post improvements of sanitation infrastructure.**
- **Municipalities that do not support the connection of poor areas to existing sewage systems.**
- **Sanitation is often left to the individual initiative of residents.**
- **Functioning self-help sanitation systems require joint communal efforts with some degree of participation and a sense of ownership.**

Discharging of wastewater and refuse in canals in Thailand

Discharging wastewater in a flooded seashore area

Potentials

Suitable sanitation options for urban poor settlements are simple water-saving on-site and off-site systems. Such systems are characterised by:

- low investment requirements;
- low water consumption with low (regular) pipe flushing requirements;
- adequate environmental health and hygiene standards;
- possibilities for self-help construction and operation;
- feasibility of connection to citywide municipal sewage systems.

Community-operated wastewater systems call for high levels of participation and resident self-help, but this cannot always be mobilised.

Availability of water as a decisive factor for waste-water systems

The availability of water, or rather its scarcity, is a decisive factor in selecting a sanitation technology.

Water supply is often not sufficient, therefore solutions at household level or decentralised dry or semi-dry (on-site) systems will be needed. Instead of systems providing continuous flushing of wastewater and faeces through interconnected pipe work, as in conventional sewerage, discontinuous sanitation options at settlement level will usually be preferable.

Approaches

The basic principle for the design and selection of sanitation options for urban poor settlements should therefore be:

Limiting and avoiding the mixing of wastewater and faeces (don't mix!)

As far as possible, mixing the following wastewater components should be avoided:

- urine and faeces;
- faeces and water;
- greywater and sewage
- wastewater and rainwater;
- household and industrial wastewater.

Separating urine and faeces can reduce or even eliminate problems, such as bad smells or the breeding of flies, and storage, treatment and transport can be facilitated. Separating faeces from toilet flush-water also greatly reduces the treatment needed for relatively small volumes of urine and faeces.

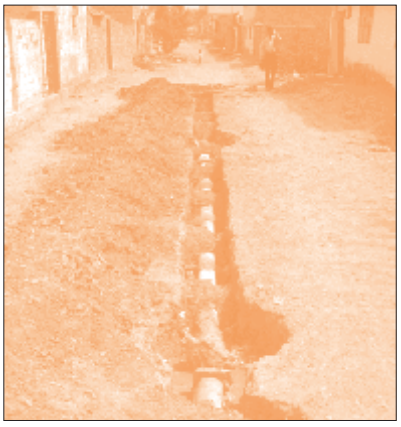
Storage systems and local treatment technologies needed for such separation will have to comply with the following requirements:

- secure storage that protects both the environment and the inhabitants;
- the facilitation of aerobic or anaerobic decomposition processes;
- the conditioning of wastewater, e.g. the separation of solid and liquid components, of grease etc.;
- easy access for transport and discharge.

Where the construction of piped systems (off-site systems) is possible, "unconventional" systems, known as settled sewage, simplified sewage or condominial sewage, might offer the most appropriate solutions. They can either be connected to decentralised small treatment plants or to the city-wide sewage network.

Sanitation systems in urban poor areas will usually require a high level of participation and self-help.

Shallowly laid sewage pipes with small diameters in Karachi, Pakistan



2.3
WASTEWATER

Since more developed sanitation systems are communal installations that cannot be constructed or operated individually, they will usually require a communal approach. For this purpose, functioning community organisations will be necessary to take on the construction and operation of wastewater systems.

In most cases, it will be difficult to generate direct operating revenue for such approaches. Financial contributions from individual households will thus have to be organised and monitored.

Many sanitation services at settlement level can be privatised

Many services necessary to construct and operate communal sanitation systems at settlement level can be contracted to small private enterprises, either for individual works or services, or as more comprehensive packages. These may consist of the following:

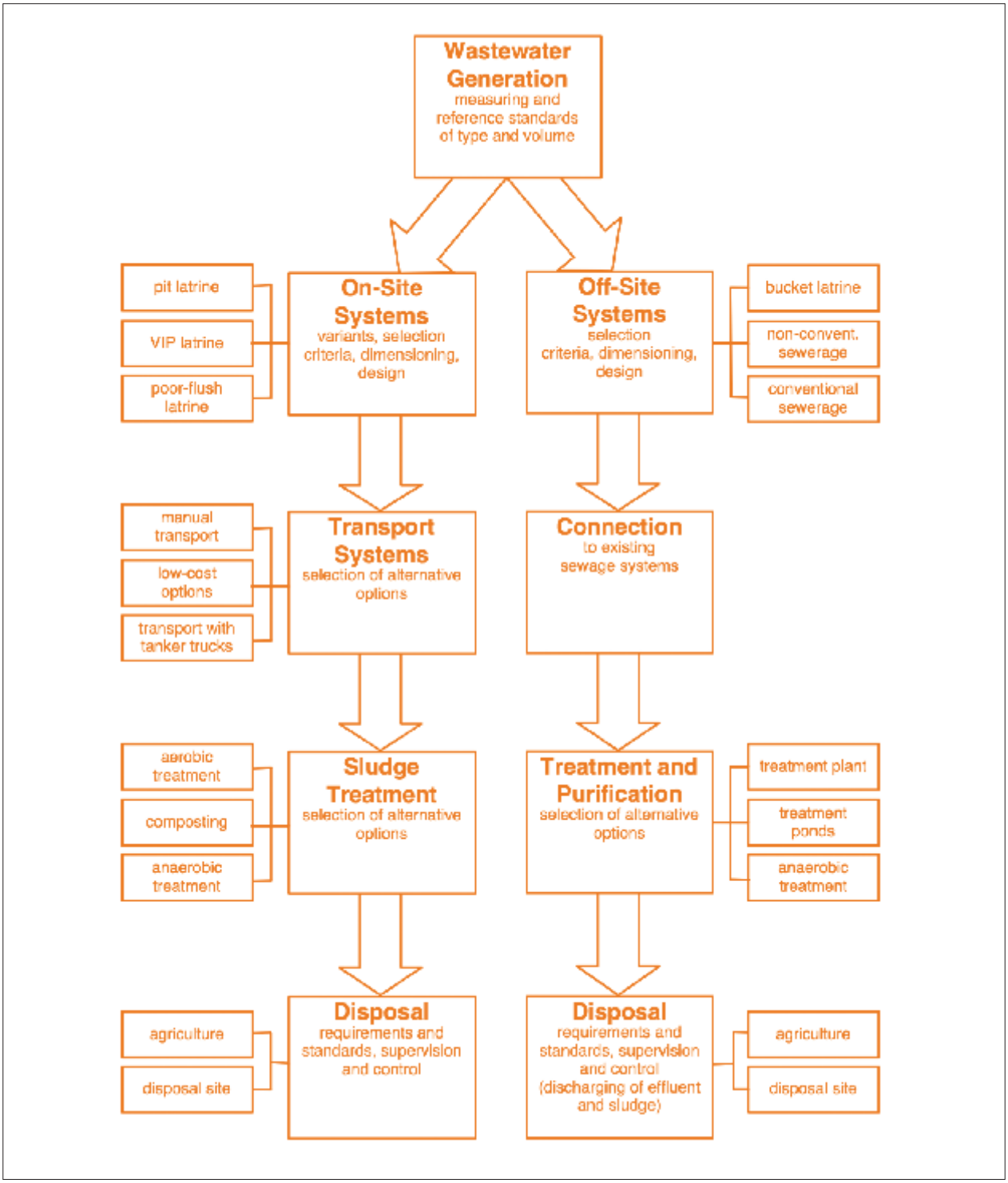
- construction and maintenance of piped sewage systems;
- emptying of septic tanks and latrines;
- operation of small decentralised wastewater treatment plants;
- composting of sludge derived from organic waste generated by refuse separation;
- operation of biogas installations.

Such services will have to be paid for directly by individual users either according to their utilisation of the particular service, or, in the case of communal installations, by paying a fixed share of the service's costs. Composting and biogas installations can possibly cover part of their costs through the marketing of the compost, biogas or energy produced. The opportunities for jobs and income that this might offer may improve residents' acceptance of such solutions.

Self-help in laying sewage pipes in Aswan, Egypt

Emptying of septic tanks by private small-scale enterprises

The diagram below is an overview of sanitation options and processes. This publication mainly focuses on sanitation options at settlement level with a view to the specific problems and conditions in urban poor settlements: city-wide systems and options are only dealt with so far as they are relevant to interfaces with local solutions.

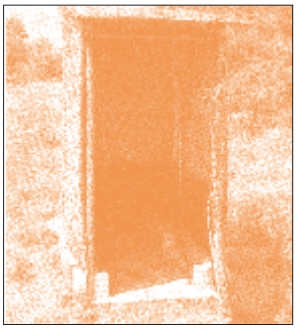


2.3

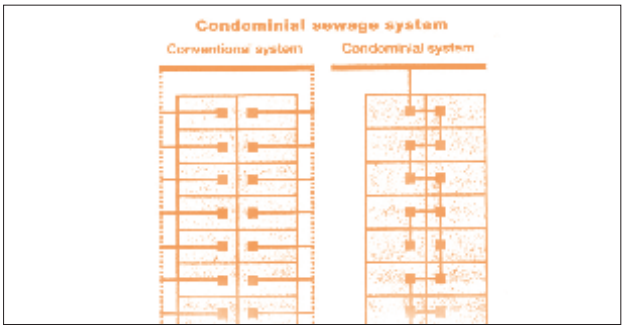
WASTEWATER

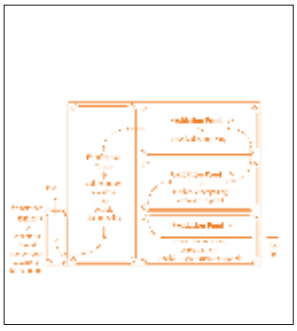
Overview of Technical Solutions

Technical Solution	On-site Solutions		
	Latrines	Dry Toilets / Urine Separation	Septic Tanks
Characteristics	faeces disposal without water; collection of faeces in outhouse and / or covered pits	division of urine and stools; drying and use as fertiliser	environmentally safe sewage disposal without connection to canalisation; suitable for joint use by several households
Advantages	simple and cost-effective system; construction with local materials possible; low technical requirements	simple and inexpensive; use of local materials possible; no seepage (therefore no danger of soil contamination); production of fertiliser; low technical requirements	widely used technology; requires little maintenance; part conversion of faeces into less problematic products; mostly odorless; later connection to canalisation possible
Disadvantages	not suitable in areas built on bedrock, with high ground water levels, danger of flooding or high housing densities; danger of soil contamination	careful use necessary; requires knowledge of composting; not widely spread to date; problems with acceptance	relatively high initial investment costs; requires regular paid emptying; minimum flow of water from toilet, bath or kitchen is necessary
To be considered	cultural factors need to be taken into account; use patterns, cleaning and maintenance determine success and the avoidance of illness	attention to hygienic aspects of use of separated faeces needed to avoid transmission of illness	attention to be paid to chemical contamination especially from chlorine based disinfectants, which can hamper bacterial conversion of solid wastewater components



Off-site Solutions			Treatment
Transportation of Effluent Using Vehicles	**Unconventional Sewages Systems**	**Conventional Sewage Systems**	**Decentralised Treatment Plants**
emptying of on-site installations (latrines, septic tanks etc.), transportation and disposal of effluent	according to the solution: shallow laid ducts, ducts across properties, small gradients and pipe diameters, intermediate separation of solid material	large-volume sewerage ducts with individual household connections laid in streets	treatment of wastewater before discharge into surface waters; phased treatment process with separation of solid components, anaerobic fermentation and aerobic decomposition
emptying ensures the regular utilisation of on-site toilets; can generate employment; can be done through self-help	low costs because pipe work is simple	"traditional", hygienically unproblematic solution for high density areas; technically simple maintenance; high degree of acceptance	Protection of surface waters
vehicle accessibility determines whether emptying is possible; possibility of carrying effluent to accessible collection point by hand, in buckets, barrels etc. is limited	requires high user / inhabitant willingness to participate and organise	high investment costs; requires regular minimum quantity of wastewater flow; high costs for maintenance and repair	High investment and operating costs; high level of organisation required; large space requirement
attention to hygienic, technical, and ecological aspects needed; cultural or religious factors in some countries need to be considered	high maintenance required; users and those carrying out maintenance need to be qualified	requires maintenance and repair; usually requires connection to the overall sewage system	Regular control and monitoring of effluent quality facilitates efficient operations and protects against unforeseen discharges of under-purified effluents in surface waters





2.4

RAINWATER

Problems and Challenges

Problems

Rainwater can pose problems when there is too much or too little of it. This is particularly true in urban poor settlements, which are often in climatically or topographically hazardous locations, e.g. on steep slopes threatened by landslides, on loamy soil, in marshland with high groundwater levels, or in arid or desert areas with inadequate water supply.

Too much rainwater

Rainwater can be a particular problem when it occurs seasonally in heavy downpours. If this is aggravated by adverse topographical conditions, such as steep slopes, low soil absorption capacities or high groundwater levels, it may have the following hazardous impacts:

- erosion of roads, public open spaces or cultivable land;
- undermining of roads, bank reinforcements, bridges or houses;
- landslides or mudslides;
- local or extensive area flooding;
- overflowing latrines, septic tanks and treatment ponds;
- increase of water-breeding insects;
- increase of infections caused by polluted water.

Too little rainwater

However, rainwater need not be a hazard: in dry and arid climates, it can be a highly valuable asset. In particular, in peri-urban areas, which often suffer from inadequate water supplies, rainwater can be used to partially cover household water demand. When rainwater is collected before it can be contaminated by contact with the ground, it can be reasonably clean. With some pre-treatment, it can be used for different purposes:

- as potable water (when boiled for sterilisation);
- for washing, cleaning, dishwashing and laundry;
- for irrigation in horticulture and agriculture.

Hazardous slopes and soil erosion

Due to the hazardous locations of many urban poor settlements, problems are caused not only by too much or too little rainwater. Geological conditions can also often pose serious risks of landslides and erosion:

- steep or overhanging cliffs;
- rifts or cracks in the ground, particularly in earthquake-prone regions;
- loose rock or stone.

Danger of flooding

Landslide caused by a site adjacent to steep slopes

Vulnerable housing beneath overhanging cliffs

Potentials

The main considerations for avoiding hazards from too much rainwater are:

- controlled drainage of excess water;
- stabilisation of soil, buildings and slopes against undermining water.

Where rainwater is scarce, possible measures to conserve it can include:

- using rainwater from roofs and courtyard surfaces;
- provision of rainwater collection and storage containers.

Precautions can be taken to deal with the potential problems of both excesses and scarcities of rainwater at individual household level, or by community initiatives at neighbourhood level, involving participation and self-help.

Possible Approaches

In the case of excessive rainwater, controlled drainage reduces soil erosion and avoids the occurrence of stagnating water. Rainwater can be drained in open or covered culverts. In addition, streets and roads can be designed in a way that drains off water (e.g. in form of so-called trough roads). Measures, such as terracing, erosion protection trenches or ditches, slope stabilisation and planting trees and shrubs can also reduce erosion risks. Well-targeted residents' self-help initiatives can be promoted to implement rainwater risk reduction measures.

Rainwater harvesting involves the selection and introduction of suitable approaches to collecting, storing and cleaning rainwater, if possible in combination with greywater recycling. Traditionally, rainwater is harvested from roofs of buildings, but it can also be collected from impermeable ground surfaces (paved public spaces, rocky soil, *arroyos* or *wadis*, etc.). Collected rainwater can be stored above ground and underground. Depending on its intended use, suitable filters may be needed.

Many rainwater harvesting techniques are well suited for self-help application. When accompanied by awareness campaigns and training in water saving methods, rainwater harvesting can make a significant contribution to satisfying the water needs of residents of urban poor settlements.

Main elements of rainwater management:

- **controlled drainage of rainwater from buildings and other installations;**
- **construction and maintenance of drainage canals;**
- **road and street design enables temporary excess rainwater to drain off;**
- **connection of drains and culverts at settlement level to citywide or regional drainage systems**

Main elements of rainwater harvesting:

- **using available roofs and other suitable surfaces (e.g. paved courtyards) for rainwater collection ;**
- **construction of rainwater conduits or pipes (possibly with intermediate interceptor tanks for sedimentation of solids) to water storage tanks or containers;**
- **construction or installation of appropriate rainwater storage containers above or beneath the ground**

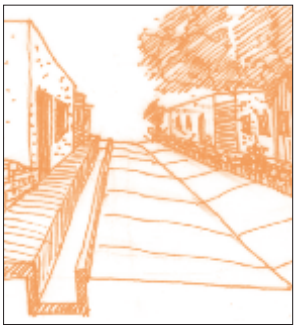
Threat from loose rocks

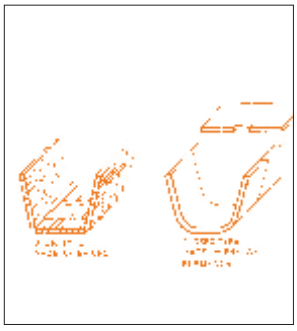
2.4

RAINWATER

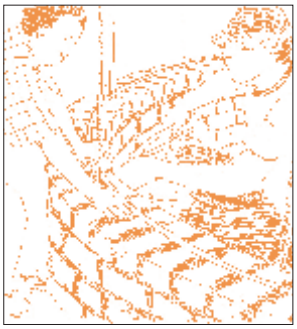
Overview of Technical Solutions

Technical Solution	Rainwater Drainage		Rainwater Collection
	in Roads	Closed and Open Gutters or Canals	in Households
Characteristics	gutters or channels along roads and pathways (normal case in urban settlements)	discharge of rain water through (supplementary) sealed gutters	collection and storage of rainwater from roofs
Advantages	use of levels and surfacing for run-off drainage	systematic prevention of flooding and damage through erosion, especially where there are heavy seasonal rainfalls	water supply for domestic use (for washing, watering plants and irrigation, and, when boiled, for drinking water)
Disadvantages	intake capacity of gutters or channels can be limited; flood sluices and possibly rainwater retention tanks may be necessary	danger of blockage by refuse and sand; regular maintenance is needed	high costs for rainwater receptacles where there are big fluctuations of rainfall
To be considered	requires regular maintenance and cleaning	intake capacities should be determined by costs and maximum expected rainwater (in some cases flooding may have to be accepted on occasions)	requires regular cleaning of roofs and tanks to ensure clean water





Rainwater Collection	Erosion Protection		
Storage above and below Ground	Drainage for Buildings	Terracing	Retaining Walls
collection and storage in relatively large facilities	diverting rainwater from foundations and walls	of ground	concrete or brick earth retaining walls
supply available for household and commercial use	prevention of erosion and undermining of buildings; self-help measures possible	slows water flows and prevents landslides; self-help with simple means possible	securing steep slopes against landslides; possibilities for higher building density
	can entail complex and costly construction	requires a certain amount of organisation and community cohesion; requires regular maintenance	high costs; complex construction; requires skilled construction work
careful planning and implementation, especially for tanks above ground because of high water pressures		planting trees and bushes improves the way terracing works	cost-effectiveness of slope-reinforcement measures should be checked




Division 44
Environment and Infrastructure

3

Module 2: Participation, Self-help and Public Relations

Improvement of Sanitation and Solid Waste Management
in Urban Poor Settlements

Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH

Contents Outline

Module 2 focuses on procedures, tools and instruments for promoting and mobilising participation and self-help in the context of waste management projects in urban poor settlements. Without being exhaustive, it aims to provide an overview of possible and proven approaches. In more detail, it comprises the following chapters and sections:

1. Overview: Definition and Concepts

The first chapter summarises the historical development and perception of participation, self-help and public relations in the context of international development cooperation. As participation and self-help are cross-cutting issues, which are relevant for most other sectoral approaches, the presentation also addresses issues that lie outside the scope of solid waste management and sanitation projects. The most important forms and characteristics of participation, self-help and public relations, as well as their typical objectives and uses in this context, are summarised in a table.

2. Important Factors and Framework Conditions

Chapter 2 points out major spatial/physical and social factors, as well as the relevant political, institutional and legal framework conditions defining both the possible scope and the limitations for participatory processes. The chapter concludes with a listing of the basic principles of successfully promoting and supporting participatory processes.

3. Participation and Self-help in the Project Cycle

Chapter 3 describes the possible forms and uses of participation, self-help and public relations during the different phases of waste management projects: from the early stages of project identification, to project planning and securing financing, project implementation and long-term operational management, and, finally, monitoring and evaluation. The specific context and background, and the tasks and functions of each of the different project phases are presented and assessed, as are the instruments and tools for promoting participation and self-help, and for complementary public relations activities. Each phase is illustrated by a brief description of an example of project practice. In addition, the main potentials and limitations for participation and self-help in the different project stages are pointed out.

4. Cooperation Partners and Implementing Agencies

Chapter 4 deals with the possible cooperation partners and implementing agencies in waste management projects in urban poor settlements. These can be local NGOs and community-based organisations, national NGOs, municipalities and local governments, other governmental institutions or sector agencies, and private sector operators. Each of their potentials and limitations, and the tasks and challenges to be expected in a cooperating with possible partners are pointed out.

Annex

The annex consists of:

- Examples of instruments and tools for participatory approaches in the different stages of project planning and implementation (without being a comprehensive listing). The instruments described can be used for analysing framework conditions, for facilitating decision making processes, for participatory planning and management, and for participatory monitoring and evaluation.
- Literature and websites,
- Photograph and illustration credits.

The complete version of Module 2, consisting of 100 pages, follows the structure outlined by the table of overall contents overleaf. It can be downloaded from:
http://www.gtz.de/en/themen/umwelt-infrastruktur/abfall/4991.htm

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3.1

Overview: Definitions and Concepts

Interrelationship between Participation, Self-Help and Public Relations

For almost three decades, **participation** and **self-help** have been core elements of international development assistance. In urban development and technical infrastructure, as in other sectors, perceptions of these concepts and their practical application have changed considerably over time. However, although there is a wealth of literature and practical guidelines on the subjects, no clearly defined standards have yet been developed on how participation and self-help should be put into practice in specific contexts.

In any case, this would hardly make sense, as participation and self-help are primarily motivation-oriented processes. Their possible forms and characteristics cannot easily be transferred between different situations. The possibilities and limitations of their application depend on a large number of factors, and therefore, to promote participation and self-help successfully, strategies and procedures that consider the special conditions in a specific context are required.

In development projects, self-help is not usually thought of in isolation, but is understood rather as a particular form of participation. The mobilisation of self-help capacities is frequently an element of participative approaches. Consequently, self-help is described in this publication as an integral part of participation.

Public relations is an important tool for mobilising participation and self-help. Moreover, it can help create or widen the scope of participation and self-help initiatives. Potential types and techniques of public relations are thus dealt with here as functional instruments that support participatory and self-help processes.

Residents of an urban poor settlement in Egypt

Target Groups

Sanitation and solid waste projects are targeted at the inhabitants of urban poor settlements who would gain directly or indirectly from improved waste management and sanitation. It is they who are the ultimate beneficial users of any measures that are undertaken.

In most cases, these target groups are heterogeneous, with diverse characteristics, problems and interests. Depending on the type of settlement, there may be considerable differences between households, families and individuals in terms of income, housing conditions and education. Differences may also occur with regard to willingness to pay for improved sanitation and solid waste management.

The spectrum of target groups may range from: inhabitants of relatively established settlements to homeless people living in extremely precarious shelters; or from economically active informal street vendors, small entrepreneurs or craftsmen, to families living in abject poverty without any income, entirely dependant on public welfare, begging, or the support of relatives or neighbours. Considerable differences in interests, needs and problems also generally exist between men and women, different age groups, landlords and tenants, small-scale entrepreneurs and day labourers.

See also: German Federal Ministry for Economic Cooperation and Development - BMZ: Participatory Development Cooperation - Participation Concept, Bonn, September 1999

3.1

Overview: Definition and Concepts

Objectives and Possibilities

Objectives of Participation and Self-help

The objectives of participation and self-help may vary considerably depending on the content of the project and the concept of participation being applied. Possible objectives range from simply securing a smooth project implementation, to processes promoting the control of development efforts by target group themselves:

- In the first case, participation and self-help are primarily a means for successful project implementation.
- In the second case, it is rather the project that is a means to achieve broader objectives, such as decentralisation, strengthening the influence and negotiation power of the target group, and supporting democratic structures. Participation and building up self-help capacities are themselves key objectives in this instance.

However, projects generally combine both approaches and put various emphases on these different aspects of participation, i.e. whether it is a means or an objective in itself.

Possibilities and Potentials of Participation

- Improved **efficiency** of project implementation and use of project resources through target group involvement and adoption of responsibility;
- Improved **effectiveness** of projects through improved adaptation of measures to the needs of the target group;
- **Sustainability** of project measures through stakeholder identification (ownership) with the project as well as the strengthening of beneficiary capacity;
- Widespread **impact** and replicability of the project or individual project components through binding with the social, political and institutional context;
- Improved access of target groups to resources and the strengthening of their influence on political decisions (**empowerment**) through grassroots organisation support and capacity-building;
- Strengthening of the **institutional capacities** of the local administration through improvement of management capacities, transparency and accountability;
- Improvement of problem-solving capacities, decentralisation and **democratic structures** through strengthening of dialogue, negotiation and cooperation skills of all stakeholders.

Possibilities and Potentials of Self-help

- **Reduction of** construction and investment **costs** through securing beneficiary contributions;
- **Cost efficient operation** of facilities when other potential operators (e.g. communal actors, private enterprises) are not interested;
- Strengthening of **ownership and** willingness to adopt **responsibility** for operation and maintenance;
- Strengthening of the target group's **sense of community** and collective self-awareness;
- Promotion of **independent initiative**, innovative ideas, problem-solving and management capacities;
- Strengthening of cooperation and negotiation skills, and capacities for **mobilising local and external resources.**

The following tables present an overview of different forms and objectives of participation, self-help and public relations (PR) in the context of waste management.

3.1

Overview: Forms and Characteristics

PARTICIPATION

Form	Characteristics	Typical Objectives
Manipulation	Participation is used as a means to achieve a certain purpose or even as a means to exert influence: • the primary concern is to obtain the target groups' agreement to measures that were planned externally • there is no real participation in decision-making on measures and resources	• hedging against political risks • strengthening of clientele relationships • fulfillment of donor conditions (e.g. cost recovery)
Information	No real participation takes place, the target groups are only informed about planned measures: • information is filtered by implementing or financing agencies; processes are only minimally transparent to the target groups • the flow of information is in one direction, leaving no opportunity for communication, feedback or suggestions for change	• to overcome potential resistance of target groups against planned measures (e.g. street widening that may entail house demolitions) • smooth implementation of project measures
Consultation	Target groups are given the opportunity to articulate their interests and needs during the planning and decision-making process: • forums are set up in which target groups can comment on the proposed measures • their comments can facilitate adaptations of the measures, and the planning and decision-making procedures, to specific local conditions • promotes the establishment of interest groups and/or target group representative bodies • provides transparency and accountability	• establishment of functioning waste management facilities • improving orientation towards the needs of target groups • target groups identify with project measures (ownership) • improving outreach to disadvantaged or poor target groups • sustainability
Consensus building	Target groups participate in decision-making processes and can negotiate own proposals: • attempts by different actors to identify common solutions and procedures which are acceptable to all through dialogue • the influence of individuals or interest groups within the target group on decision-making reflects their respective social capital (social position, economic resources, education, negotiation skills etc.) • the interests of the poor, women and other , often marginalised groups are at risk if not taken into consideration	• identification of the target group with project measures • securing contributions and self-help activities • more efficient use of resources • increased effectiveness of project measures • early solving of problems • sustainability

Overview: Forms and Characteristics

PARTICIPATION

Form	Characteristics	Typical Objectives
Partnership	Target groups participate as equal partners in decision-making and implementation processes. The forms, responsibilities and functions of the different participation partners vary, but their respective interests are recognised on equal terms: • existing organised target group representatives or target group organisations (CBOs or NGOs), or those in a the process of becoming representatives, are seen as partners in waste management initiatives • target groups are involved at an early stage of the project (identification and preparation of possible measures) • women and other disadvantaged groups are often particularly motivated to use participatory partnerships to articulate their interests and increase their status	• orientation towards target group priorities • target group adopts responsibility • distribution of risks • empowerment of target groups and community organisations • participation and empowerment of women and disadvantaged groups • strengthening of decentralised structures and democratic processes • sustainability
Self responsibility and self-determination	Ideally, different actors interact in learning processes that maximise benefits for all: • members of the target group become actors and decide themselves on priorities for development • target group organisations control planning and decision-making processes to a large extent • external partners respond to the demands of target group initiatives or encourage target group organisations to take the initiative by themselves • target groups and beneficiaries take on responsibilities in planning, implementation and operation • there is a risk that government or municipal actors withdraw from their responsibilities to provide basic services	• the needs and priorities of target groups are considered to the highest extent possible • reduction of investment and management costs through mobilisation of local capacities and resources • sustainability • empowerment of target groups in terms of access to, and participation in decisions on resource allocations • decentralisation, transparency, democratisation

3.1

Overview: Forms and Characteristics

SELF-HELP

Form	Works/Services	Typical Objectives
Collectively organised work to implement construction measures	• construction of ditches for sewer pipes • construction of septic tanks or latrines as collective facilities • construction of garbage collection or garbage sorting facilities • construction of small dumps or composting facilities • protective measures to prevent erosion	• limitation of construction and investment costs • target group ownership of project measures • strengthening of a collective sense of community
Individual self-help with construction measures	• provision of individual house connections for sewerage • construction of individual septic tanks, latrines or toilets • construction of individual rain storage facilities • financial contributions of individual house-holds to investment costs in the form of donations or fees	• reduced construction and investment costs • beneficiary ownership of project measures • strengthening of individual's sense of responsibility
Financial contributions	• sharing or payment of part of the investment or construction costs by providing personal capital or re-paying loans • in-kind contributions (e.g. construction material) • payment of fees for waste management services	• beneficiary ownership of project measures • improved cost recovery for waste management measures • decreased burden on public budgets • decrease of necessary subsidies

Overview: Forms and Characteristics

SELF-HELP

Form	Works/Services	Typical Objectives
Collectively organised operation of waste management facilities and systems	• operation of garbage collection facilities at community level • maintenance of sewerage facilities and drainage systems etc. • monitoring of the quality of waste management services by community organisations, which can exert pressure on responsible actors, if necessary, in order to maintain quality • ensuring the payment of due fees through community organisations and with the help of awareness campaigns	• ensuring appropriate operation and maintenance • ensuring quality services • cost effective operation of facilities when other operators (e.g. municipal or private enterprises) are not interested
Implementation of accompanying measures to reduce operation costs and increase the benefits of waste management services	• awareness campaigns on the proper use of waste management facilities and systems (e.g. to prevent blockage of sewage pipes) • awareness campaigns to reduce the amounts of garbage • organisation of garbage sorting at its source (i.e. in households) • implementation of campaigns to increase health and hygiene awareness • organisation of activities to increase environmental awareness, e.g. in schools, community centres and public places	• securing sustainable use • increased benefits related to the improvement of health conditions and the reduction of negative environmental effects • increased sense of responsibility for overall social development
Independently initiated self help measures by inhabitants' groups (These can be supported and continued by the project or other external actors.)	• organisation of the transport of household garbage to garbage collection points (drop-off system) • provision of land for the construction of garbage collection facilities, transfer stations and pumping stations • establishment of a community fund to co-finance a sewerage system • independent organisation of household connections to existing sewerage systems • organisation of waste management systems as cooperations between neighbourhood initiatives, local administration /sector agencies and (local) private enterprises	• financing of waste management services when sufficient public finance is unavailable • promotion of private public partnerships • strengthening of self initiative and problem solving capacities • job creation

3.1

Overview: Forms and Characteristics

PUBLIC RELATIONS

Possible Use	Activities and Media	Typical Objectives
Project internal information of target groups about planning and implementation of project measures (at community level)	Primarily, the provision of plain straightforward information: • brochures and leaflets about the project and planned measures • putting up information boards • signs and posters to announce project measures	• establishing acceptance • smooth implementation of project activities
Regular information of cooperating inhabitant group partners and the exchange of information between all stakeholders	Flow of information in all directions: • regular information meetings with target group representatives • setting up contact and information offices • nomination of contact persons and coordination officers • use of informal channels of information	• promoting cooperation • taking up ideas and proposals • solving problems and resolving conflicts
Addressing specific social groups (women, youth) or particular topics (e.g. health, hygiene, recycling) through targeted PR activities	Frequently, specific appropriate media tools are used, e.g.: • audio-visual tools (wall paintings, posters, films) in awareness campaigns in schools, literacy classes, community centres and public places • theatre plays, puppet plays, songs, stories etc.	• raising awareness and changing behaviours • capacity-building in certain areas of concern • mobilisation of target group participation in the implementation of project measures

Possible Use	Activities and Media	Typical Objectives
Targeting information to external actors (e.g. sector agencies, NGOs, other contributors and donors) about the project and as starting points for further development measures	Primarily, the provision of information on objectives, activities, key concerns and the broader potentials of the project: • information events • project presentations (using PowerPoint, overhead projectors etc.) • project visits, site visits • targeted distribution of reports and brochures • nomination of contact persons and coordination officers • use of informal channels of information	• mobilising the support of government and municipal agencies • mobilising additional resources of external actors • promoting synergy effects through integrated approaches in development efforts
Information of the general public (beyond the community level) about projects and measures	A primary concern here is the promotion of a positive image of a project: • compilation of press information packs • interviews with journalists • exhibitions and presentations at conferences, events etc. • inviting members of the press representatives to project and site visits, presentations, opening ceremonies etc. • presentations at universities, to professional organisations and trade associations etc.	• sensitising the general public to the problems and potentials in poor urban neighbourhoods • mobilizing political support • improving the framework conditions of participation and self-help

3.2

Important Factors and Framework Conditions

Participation and Self-help as a Process

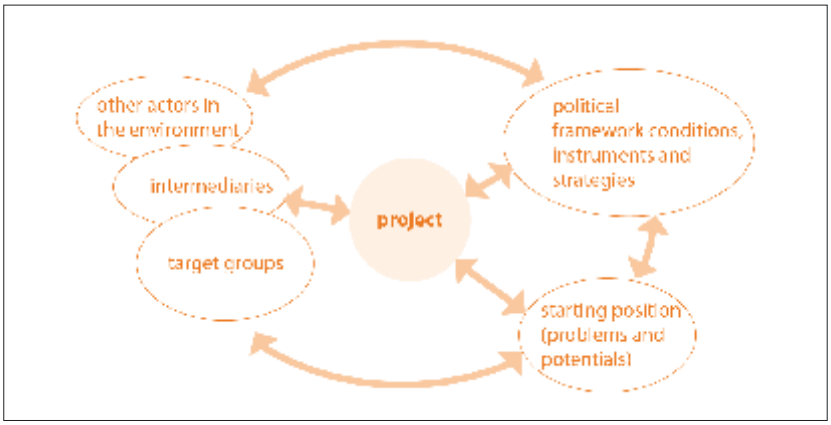
Participation does **not** develop **automatically and** is also **not cost neutral**. It takes time and money and needs committed effort. Even if the benefits often exceed the investment in the medium and long term, there is no guarantee that the expected results will be in fact achieved.

Projects that have been initiated externally, in most cases by donor agencies, must first create the necessary preconditions for the successful participation of target groups and other relevant actors. This entails **building trust, capacity-building and the promotion of innovative thinking**. In addition, the different actors need to be prepared to cooperate: in many cases, most of these actors have never worked together before or even entered into a dialogue with each other. The cooperation of the inhabitants cannot be counted on either. Beneficiaries and target groups are usually not homogeneous but consist of a multitude of heterogeneous social and interest groups, which can lead to conflicts of aims and modes of exclusion.

Participation is a **learning process** for all concerned, and it develops step by step. It requires careful planning that leaves ample room for experiment. The mobilisation of self-help potentials and the targeted use of PR activities are integral components in the development of participatory processes. When identifying appropriate strategies and activities to initiate and/or support these processes, it is important to first define the **factors** that can promote or obstruct participation and self-help in a particular context.

Only on these bases is it possible to formulate **realistic objectives**, identify **key actors** and their respective roles, and identify and plan a series of measures and activities to manage and intensify the development of participation processes.

Project environment, target groups, and political conditions, strategies and instruments influence each other as shown below (systemic approach)



Important Factors and Framework Conditions

The possibilities and leeway for participation and self-help in waste management depend on a series of factors and framework conditions:

- specific **characteristics of the neighbourhood** (size, density, social structure and complexity, incidence of poverty, lack of services, degree of marginalisation or integration in the city)
- expectations, interests, degree of organisation and the social and cultural norms of the **target groups**, i.e. neighbourhood residents whose living conditions are to be improved by the waste management measures
- number, nature and interests of relevant **actors and cooperation partners** and their level of experience with participatory processes
- prevailing **political, institutional, legal and economic framework conditions** at national and local levels. Depending on the context, these may have a positive effect or present risks or obstructions

Important Factors and Framework Conditions

Actors and Cooperating Partners

The actors who are relevant in planning and implementing waste management measures differ according to the content and goal of a project. Potential actors can be divided into the following categories:

Target Groups/ Beneficiaries

Groups, organisations and representatives at local population level (primary stakeholders), such as:

- community-based organisations and local NGOs;
- neighbourhood initiatives;
- informal women's and youth groups;
- informal social networks;
- traditional social or ethnic group leaders;
- local private sector enterprises or groups;
- local professionals (lawyers, physicians, engineers, teachers etc.);
- religious institutions (churches, mosques etc.).

Intermediary Actors

Institutions or organisations that have a significant share of responsibility in decision-making, planning and implementation (secondary stakeholders), such as:

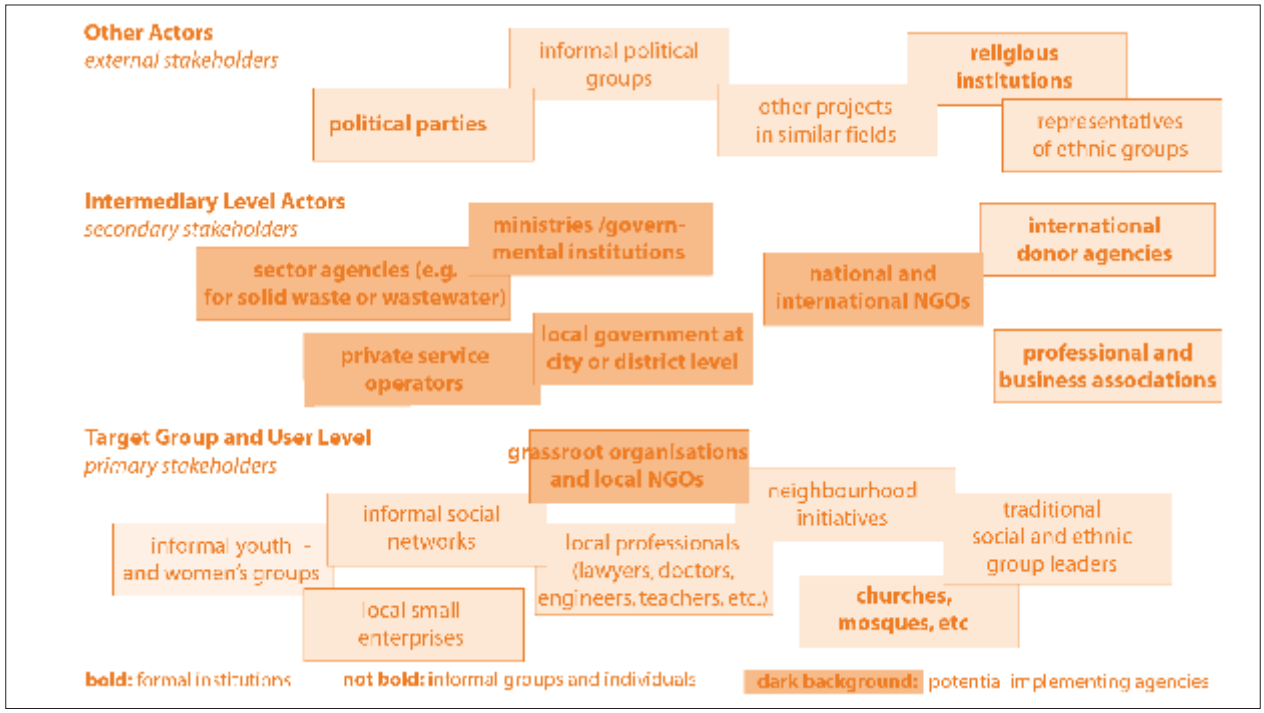
- local administration at city or district level;
- ministries/ governmental administrative institutions;
- sector agencies (e.g. for solid waste or wastewater management);
- national or international NGOs;
- professional syndicates, business associations and other civil society organisations that may contribute to the project;
- donor agencies.

Other Actors

Actors who are not formally involved but are affected by or have an influence on project activities (external stakeholders), such as:

- religious institutions;
- representatives of ethnic groups;
- political parties (e.g. during the run-up to elections);
- informal political groups;
- other projects in similar fields.

Different Categories of Potential Actors



3.3

Participation and Self-help in the Project Cycle

Introduction

There are different challenges and options for participatory and self-help approaches in the different phases of waste management projects or initiatives at community level. They are summarised in the following.

The full version of Module 2 presents these stages in more detail in a standardised way:

- First, the **context** and the most important **tasks and challenges** are described.
- Against this background, the most important **advantages, risks and constraints** concerning target group involvement are assessed.
- An overview of important **instruments and procedures** for promoting participation and self-help follows, which is supplemented with more information in the annex. In addition, possible ways to use PR in each phase are also described.
- Where possible, a short **description of an example project** illustrates this overview.

Identification and Preparation

This phase takes place prior to actual planning, and its main objective is the **clarification of the nature and scope of possible** waste management **projects** or initiatives. Residents' groups, NGOs or municipal and other governmental agencies may already have preliminary ideas or proposals, but using them depends on their purposes and the initial situation.

In most cases, it will be necessary to carefully analyse the conditions for participatory processes as well as the interests of target groups and other stakeholders in order to be able to clarify the above mentioned issues.

Reaching **agreements on the objectives** of envisaged measures and possible stakeholder contributions is the most important challenge in this phase.

These agreements are usually the basis for further planning and for the mobilisation of financial and other resources necessary for further planning.

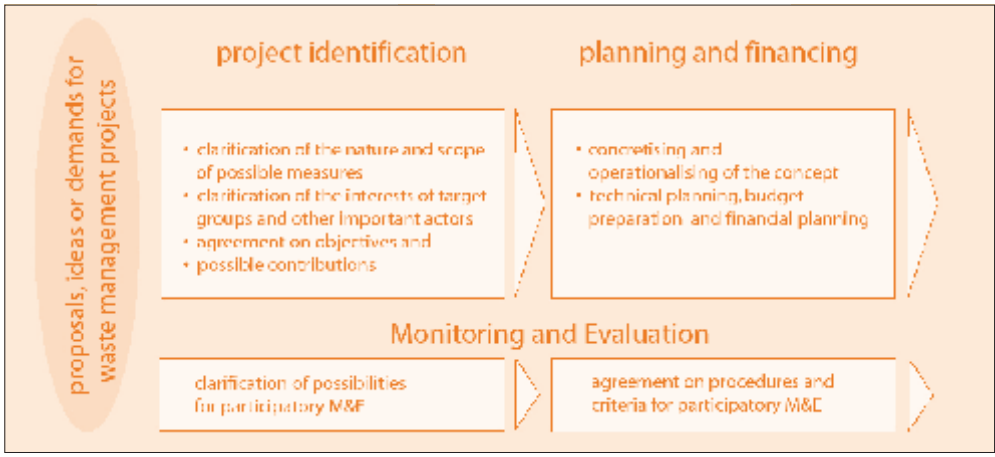
Planning and Financing

The most important objective of this phase is to **concretise and operationalise the** waste management **concept** identified during the previous phase.

Usually, further **technical planning** is necessary for the individual measures that are envisaged. In this context, detailed **budget and finance plans** are also prepared, including the fine-tuning of required stakeholder contributions.

Funding for the long-term operation of waste management solutions also usually has to be clarified.

The **funds required for implementation** can be requested from eligible institutions (depending on the initial situation: governmental agencies, NGOs or external donors).



Participation and Self-help in the Project Cycle

Implementation

During this phase, the planned waste management measures are implemented and their operation is initiated. This usually calls for the following:

- The **construction of facilities or waste management networks** and/or
- the **procurement** of facilities and equipment,
- and **complementary advisory and capacity-building measures** for future operations.

Depending on the nature and complexity of project measures, **different steps with different time horizons** are feasible for implementation. These determine the possibilities and scope for participation and self-help:

- Canalised sewerage in densely populated areas requires, for example, extensive construction measures that take a long time.
- For solid waste management, it is usually sufficient to procure equipment such as vehicles or containers. It may, however, require significant training and advice efforts.

Operation and Management

This phase closes the project cycle: waste management measures and facilities are in long-term operation and use. The phase is part of the project cycle only in a narrow sense since sustainable and regular operation is not usually the task of "projects", which are normally limited in terms of time and resources.

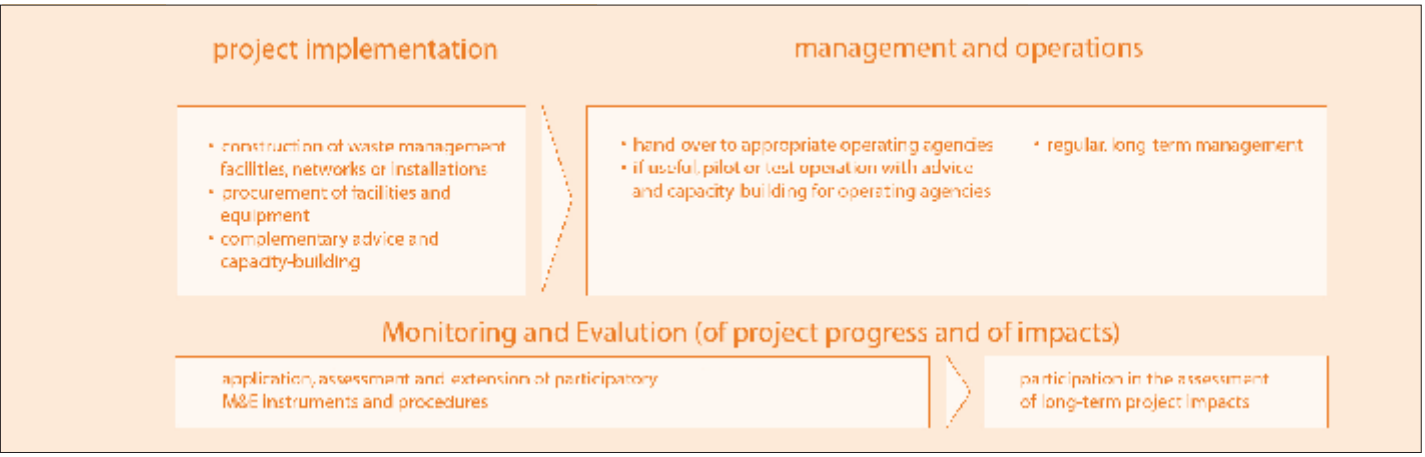
Typical tasks in this phase that will nonetheless need to be fulfilled within the project cycle encompass the following:

- **handing over** facilities or equipment **to appropriate operating agencies** (depending on the nature of the waste management measures and the agencies, e.g. municipal or other public waste management agencies, NGOs or residents' self-help groups);
- providing the operating agencies with **advice, guidance and capacity-building for long-term operations** during an introductory or pilot phase.

Monitoring and Evaluation

Monitoring and evaluating (M&E) participatory processes are **cross-cutting issues** that have to be dealt with in different ways during the various phases of the project cycle:

- During the project identification phase, it is important to **clarify possibilities for involving target group**s in M&E activities.
- In the context of the concrete planning and identification of finance phase, it is important to reach an **agreement on appropriate criteria and procedures** for assessing the involvement and role of target groups in future implementation, related adjustments of plans as well as in long-term operations.
- During the implementation phase, the **application, evaluation and extension** of these procedures and criteria are focused on.
- The application of M&E procedures and instruments, and the **assessment of long-term project impacts** is of primary importance for successful sustainable operations.



3.4
Participation Principles

Principles for the Successful Promotion of Participatory Processes

Against the background of the factors and framework conditions elaborated above and taking the risks and constraints described into consideration, the following important principles for the support of participatory processes can be derived:

- It is important to investigate the political, institutional, legal, social and cultural context prior to preparing participatory concepts that are to be implemented in those contexts. In doing so, the factors that can influence participatory processes positively or negatively have to be identified. This includes scrutinising all stakeholders and their potential roles.
- The objectives of participation and self-help in a concrete project can only be determined on the basis of an analysis of the roles of the actors and the framework conditions. Participation and self-help may be defined in many different ways. It is, therefore, important to ascertain the desired form of participation and the added value it gives to the project and to anticipate potential unintended results.
- It is important to distinguish between the following: participation in development is not the same as participative development. In order to achieve the latter, participation must not be thought of in terms of episodes of input, but as the basis and one of the governing principles of all project activities.
- Participatory processes need conscious efforts and careful planning. However, participation is not a linear process. It requires ample opportunities for experiment. The type and scope of participation and target group involvement need not be fixed at the earliest stages. It can be better if participatory approaches and activities are developed in the process of identifying, planning and implementing the waste management measures.
- During the process of planning and implementation, target groups and other actors accumulate experiences that increase their efficiency and widen the space for participation; this can add new qualities to the interaction and cooperation between the different actors.
- When guiding learning processes, it is important to reinforce concrete on-the-job learning experiences with targeted training measures that encompass theoretical and general aspects to supplement capacities acquired through practice. Whenever possible, locally available expertise should be utilised for training so that mechanisms of mutual exchange and knowledge transfer can be established or supported.
- Participation requires new forms of cooperation that incorporate all relevant actors. During this process, opportunities may arise to increase the capacities and strengthen the position of poor and as yet marginalised population groups, and sometimes even to achieve far-reaching improvements of framework conditions in their favour. These chances should be pursued whenever possible.
- It is often difficult to sustain newly created structures, which are not easily integrated into existing structures, may not yet be properly representative and might not be accepted by governmental agencies and state institutions that are in any case sceptical about participatory approaches. Projects should, therefore, work as far as possible through existing institutions.
- Participation does not occur automatically. Individuals and institutions that do not have any experience with participation cannot easily incorporate participatory approaches into their work routines. Employees of, for example, state institutions may need to be supported with training and capacity-building.
- Monitoring and impact assessment should be integral components of steering participatory process steering. They are both important to adapt project activities to target group needs and to realise and take advantage of new potential participation and self-help activities. Moreover, monitoring and impact assessment can also be used as an instrument to increase target group capacities for analysis and action. They should, therefore, be carried out in a participatory way, as far as possible.

Division 44
Environment and Infrastructure

4

Module 3: Organisation of Operations and Financing

Improvement of Sanitation and Solid Waste Management in Urban Poor Settlements

Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH

Contents Outline

Module 3 deals with organisational and financial management tasks relevant to the long-term operations of waste management systems at settlement level. These tasks normally continue beyond the duration of "projects", which have limited time horizons and resources. In some cases, they may be part of a transition phase, lasting until a complete hand-over of managerial and operational responsibilities has taken place. A timely consideration of the functions of these tasks, if possible in the early planning phases of a project with a view to building up appropriate operational structures, is an indispensable pre-requisite for the success of any waste management project.

The module also emphasises the need to carefully identify both the investment and the operational costs of waste management solutions, since these provide the basis for determining and improving their potential level of cost recovery.

1. Operational and Financial Aspects of Waste Management

The first chapter relates the focus of this module to those of the other volumes of the series, and provides an overview of the experience to date of operational set-ups and the financing of waste management solutions for urban poor settlements. It presents the main challenges facing the institutional and financial organisation of waste management solutions and their sustainability against the background of the objectives formulated in the international debate on sanitation and solid waste management in developing countries. As an introduction to the following chapters, it outlines the most important institutional, legal and economic conditions to be considered in the development of organisational set-ups and financing concepts.

2. Organisation and Operational Set-ups

The second chapter describes different alternatives for the operational and organisational set-ups of waste management projects or initiatives at settlement level. Its first section assesses typical solutions for the different waste management services (i.e. refuse, wastewater and rainwater) and their interfaces with city-wide systems.

The second section concerns possible operators and stakeholders who could take on the operational functions of waste management at settlement level. It is augmented by short descriptions of different case studies.

3. Financing and Cost Recovery

The final chapter focuses on the possibilities of improving the cost recovery and economic viability of waste management services at settlement level, and the requirements for doing so. Firstly, the basic principles and approaches on how to identify the investment and operation costs of waste management options are described, and the main factors determining the capacity and willingness of users to pay are outlined.

Next, the main aspects to be considered in the design of fee systems are presented. The types and determination bases of fees that can be appropriately applied in urban poor settlements are described. In addition to waste management service cost recovery through user fees, other possible sources of financing investment and operation costs are pointed to.

The final section of this chapter outlines basic financial management tasks related to the operation of waste management systems at settlement level: they include budgetary planning and management, billing and fee collection, accounting, managerial competences, and controlling and monitoring.

The complete version of Module 3, consisting of 97 pages, follows the structure outlined by the table of overall contents overleaf. It can be downloaded from:
http://www.gtz.de/en/themen/umwelt-infrastruktur/abfall/4991.htm

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4.1

Operational and Financial Aspects

Tasks and Challenges

Sector-Specific Objectives and Millenium Development Goals

The continued growth of urban poor settlements in most cities of the South and the growing needs to rehabilitate or renew those water supply and sanitation systems constructed during the first development decades, require massive investments. Present national and/or international development budgets are hardly sufficient to cope with these challenges.

The **New Delhi Statement** of the United Nations Development Program (UNDP) of 1990 called for a fivefold incremental increase of development finance for the water and sanitation sector over ten years in order to satisfy basic needs for clean potable water and adequate sanitation. This objective could not be reached as expected by the turn of the century and was therefore updated by the **Millennium Development Goals** agreed on by the United Nations in 2000. The headline of Goal No. 7, "Ensure Environmental Sustainability", sets the target **to** "**halve** by 2015 **the proportion of people without sustainable access to** safe drinking water and **basic sanitation**".

To achieve this target, the **objectives for the operation and financing of basic infrastructure for water supply and sanitation** as formulated by the New Delhi Statement of 1990, still apply:

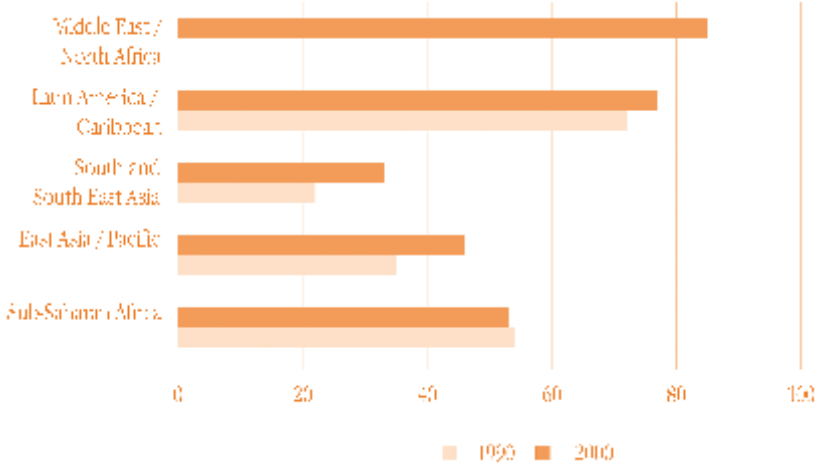
- **more participation and cooperation of users in the operation and management of basic infrastructure services**, as well as the more efficient promotion of such measures by broad national support programmes;
- more **solid** and professional **financial management** with, in particular, **improved management of existing facilities, networks and assets**;
- the use of appropriate and context-sensitive technologies.

Similarly, the strategies to reach the **key objectives** for the financing of water supply and sanitation also remain valid:

- **more sensible and efficient use of the financial resources** already **available** for the sector, with particular focus on increasing the awareness of responsible sector institutions in service costing and cost recovery;
- the **mobilisation of** additional **financial resources from** existing and **new sources**, consisting not only of those of national and international financing institutions, but also of financial contributions from the **consumers and users** of water supply and sanitation services.

To implement these strategies, the still common practice of **subsidising** water supply and sanitation **services** from national or municipal budgets

Proportion of population with access to improved sanitation



Over the period 1990-2000, access to improved sanitation increased globally from 51 to 61 per cent, resulting in 1 billion additional people with access to sanitation. Despite these gains, in 2000 about 2.4 billion people, 80 per cent of them in Asia, still lack access.

Halving the proportion of the world's population without improved sanitation by 2015 will require reaching an additional 1.7 billion people, a challenge calling for greater financing and more effective sanitation programmes.

Institutional and Financial Sustainability

needs to be restructured. This is also a matter of social equality, since well-off population groups living in consolidated neighbourhoods often benefit much more from such subsidies than poor households in marginalised settlements.

Since water supply and sanitation are economic goods with defined prices like other services, a high proportion of **operational and maintenance costs should be recovered** through the collection of appropriate fees and tariffs as a precondition to ensure their financial sustainability and to achieve more equality in basic service provision.

Against this background, and with regard to the two thematic issues of this module, waste management projects aiming to improve living and housing conditions in urban poor settlements face a number of fundamental challenges.

Operational Organisation

To ensure long-term sustainable operations and to identify appropriate operators and providers of waste management services, the following main aspects need to be considered:

- the possibility or need to **integrate measures** at settlement level **into** comprehensive networks or **systems at city level**, and the definition of the required interfaces;
- the **involvement and participation of all important** formal and informal **stakeholders** and actors;
- the creation of sufficient scope for user groups and community-based organisations **to take responsibility for operational tasks and procedures**;
- the clarification of the roles, **responsibilities and contributions** of the different actors and stakeholders involved **with regard to operations, servicing and maintenance**;
- the **professional and economic capacity of all involved actors**, and their need for advice and training for them in order to take over operational and management functions.

Finance and Cost Recovery

To safeguard sustainable operational financing and users' willingness to pay, it is essential to take the following into account:

- appropriate **technical standards and solutions**, which poor target groups can **afford**;
- possible **cost reductions by rehabilitating** or extending existing **systems** or installations;
- possible **user contributions** in the construction of installations and in their long-term operation;
- **introducing and collecting user fees** that poor target groups can afford;
- **communicating the reasons for raising cost related fees** through information and awareness campaigns;
- introducing both **incentives and sanctions** for the payment and collection of user fees;
- **appropriate procedures** and regulations **for fee collection**;
- adequate **information** on **and accountability** for the quality of waste management services, **including the possibility for users to appeal or complain** to service providers and/or supervisory bodies.

Lack of waste water management

4.2

Organisation and Operational Set-Ups

Forms of Organisation

Solutions and approaches to the organisation of waste management in urban poor settlements and how to connect them to city-wide systems and networks are determined by a number of **situation-specific** factors:

- the **degree of consolidation** of the settlement and its legal status;
- the **settlement's location** in relation to the city as a whole;
- the **responsible municipal or national institution's willingness** to provide services to urban poor settlements;
- the **capacity of** public sector (municipal or national) **service providers**;
- the **number of inhabitants**, the **population density** and the **built configuration** (blocks or scattered buildings, building heights, number of storeys, construction materials etc.);
- **geological, topographic** and **climatic conditions**.

Internal factors also influence the choice of organisational approach:

- the **interests**, priorities and preferences **of residents** concerning service quality, standards and costs;
- the capacity and **willingness** of users **to pay for waste management services**;
- the **degree of** residents' **self-organisation**, and their **willingness** to contribute to solutions and **to initiate or take part in self-help initiatives**;
- the kind and **level of** (informal) **economic activities** within the settlement;
- the **potential for mobilising private sector initiatives** for improving waste management.

Depending on the context and the specific local conditions, the **options for organisation and operational approaches** can in general be based on the following:

- **solutions at settlement level** ("island solutions") with no connection to city-wide systems or networks: disposal of waste water or refuse takes place within the settlement itself, or close to it;
- **mixed solutions, with partial connections to city-wide systems** or networks: in developing countries, this is generally the most common and typical solutions;
- **complete integration in city-wide networks or systems**: services cover all parts of a city, or, in big cities or metropolitan regions, even larger areas: this is the typical solution in most industrial countries.

In order to provide **orientation** and guidance **for the selection of appropriate forms of organisation**, the main characteristics of these basic alternatives are described in the following pages.

Public relation activities to promote payment of refuse collection fees in Maputo, Mozambique

Organisation and Operational Set-Ups

Emptying of latrines, Mali

Solutions at Settlement Level

Independent, or quasi autonomous waste management solutions at settlement level, which have no connection to city-wide systems, are the exception in urban poor settlements. Where they do exist, they are usually **temporary or "emergency" measures** because there are no other options. They are, however, typical in the early phases of informal settlement processes, for instance in new extensions at the fringes of existing settlements, or in thinly settled peri-urban zones in transition from rural to urban areas.

With the progressive densification and consolidation of a settlement, connections to overall systems usually become essential, in particular for wastewater and refuse disposal. Consequently, municipalities or other responsible public institutions realise the need to invest in at least some basic waste management services in order to avoid major health hazards.

Self-sufficient "island solutions" for wastewater and refuse disposal usually develop:

- on the **initiative of individual households** in countries or regions with traditional or commonly accepted ways of dealing with these or similar matters (e.g. protection against erosion or rainwater drainage);
- or with the **support of local NGOs or CBOs**, who encourage and promote residents' self-help initiatives.

The participation or support of national or municipal institutions in such self-sufficient local solutions is unusual.

4.2

Organisation and Operational Set-Ups

Partial Connection to City-wide Systems

Hybrid systems, consisting of decentralised components at settlement level partially connected to city-wide systems or networks, are the **most common way of** dealing with **waste management** in urban poor settlements.

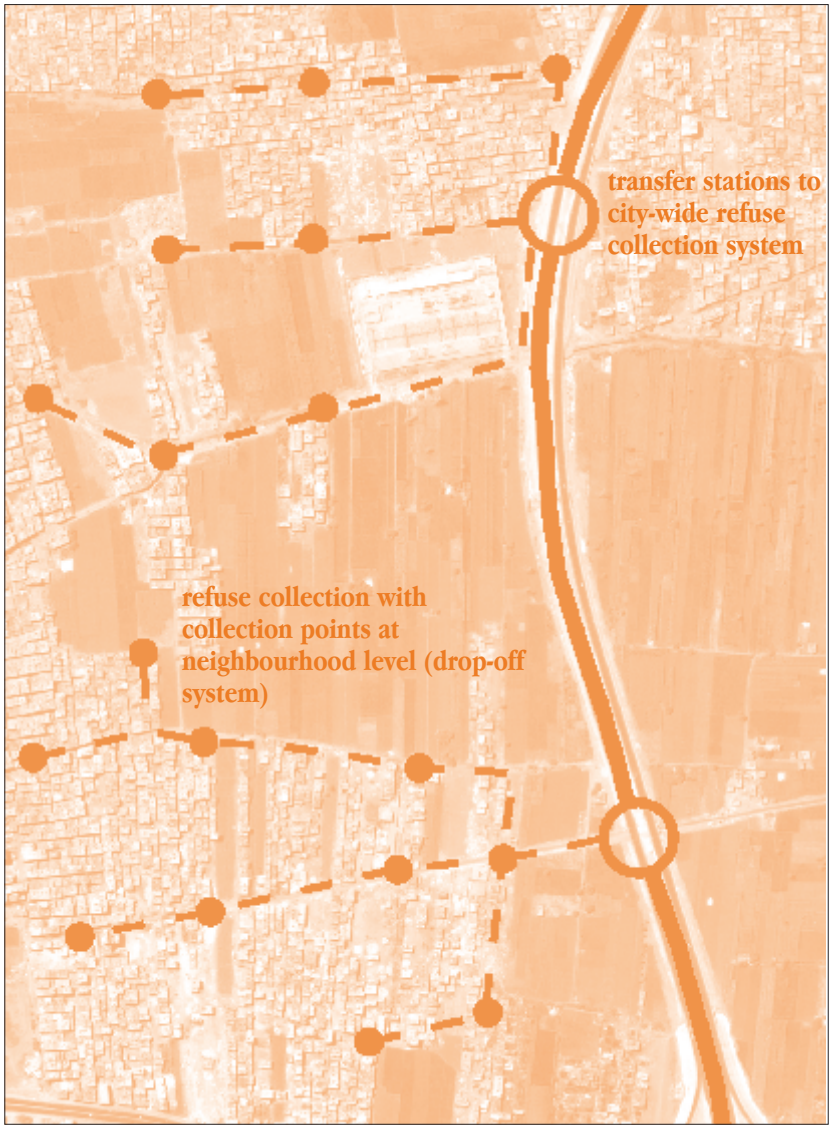
In most cases, **decentralised informal solutions, often involving local small-scale enterprises, are linked to overall systems or networks, which are usually operated or supervised* by municipal or other public sector institutions**.

Such local informal solutions emerge because municipal or other public institutions:

- are rarely able to extend their services to densely populated urban poor settlements, which are often difficult to access;
- and/or frequently have little interest to do so, because of residents' limited capacity and willingness to pay.

As settlement patterns and structures become more diverse over time, a broad spectrum of informal and sometimes even formal providers of waste management services usually develops, particularly in the area of sorting and recycling refuse, which is generally closely linked to other informal economic activities, such as the paid-for disposal of faeces (e.g. from the emptying of pit latrines or septic tanks).

* e.g. supervision of private sector enterprises contracted to undertake waste management services



Emptying of septic tank in Cairo, Egypt

Refuse collection in Windhoek, Namibia

Construction of a sewage system in Cairo, Egypt

Sewage pumping station in Cairo, Egypt

Complete Integration into City-wide Systems

A complete integration of urban poor settlement waste management into overall city-wide systems is defined by the following main characteristics:

- **Waste management services** are provided **in a single comprehensive approach**, i.e. without any interfaces between the different providers or stakeholders who provide part services. Services are either rendered by providers operating at city-wide level or by providers covering large parts of a city. This is a frequent solution in large cities or metropolitan regions, where refuse management, for example, is contracted to different private operators.
- There is a **direct relationship between the service provider and individual households** or business enterprises using the waste management service.
- Waste management is part of a **complete** and comprehensive **"chain" from collection** at individual user level **to final disposal** (dump, landfill or wastewater treatment plant):

However, the complete integration of urban poor settlements into city-wide systems of waste management is **a rare exception**. Even in older well-consolidated settlements, which have been formally acknowledged in some way and are no longer threatened by demolition or resettlement, there are usually some waste management services that are not provided by city-wide operators.

4.2

Organisation and Operational Set-Ups

User Associations and Community Based Organisations

Forms of Service Provision

In many urban poor settlements, a wide variety of self-help initiatives and residents' associations concerned with improving waste management have arisen over time, usually in connection with other initiatives for improving living and housing conditions. Such initiatives can be undertaken by:

- loose **informal temporary self-help initiatives** by resident groups that emerge to solve urgent problems;
- **groups based on geographic origin, ethnicity, religion,** etc.;
- **residents' associations**, neighbourhood organizations and local NGOs, with formally acknowledged status (e.g. official registered associations or NGOs), which have been established for a particular purpose and have long-term perspectives;
- **formal representative bodies** at settlement level, such as elected local district councils or committees.

Self-help initiatives, can effectively take on many different operational functions. However, a certain level of organisational stability will be an important precondition.

In urban poor settlements that are not yet connected to city-wide systems and are difficult to access, self-help is often the only option for ensuring a minimum level of hygiene and sanitary health, at least for a transitional period.

Where local waste management services are connected to city-wide systems operated by municipal or other public providers, or the private sector, the active involvement of user associations or similar organisations can also be useful :

- Collectively organised self-help can make waste management services more affordable to poor target groups, e.g. local refuse collection and transfer to city-wide systems.
- Operating costs can be saved , when user associations take over maintenance and repair work.
- The collection of fees by user groups themselves can encourage willingness to pay and hence improve the level of cost recovery.

In summary, self-help initiatives and user contributions can substantially improve the level of ownership and the acceptance of operational arrangements.

Refuse collection by resident's initiatives in Bangalore, India

Factors Conducive to Success

To successfully involve residents' initiatives in the operations of waste management services, some basic conditions should be met:

- Users need to be interested and willing to support waste management activities (e.g. through individual or mutual self-help in maintenance and repair work, financial contributions to investment costs, or the payment of fees for running costs).
- Target groups should have access to all the relevant information about decisions on their possible participation in operations.
- Municipal or other public sector institutions should be willing to cooperate with community based organisations.
- Prevailing legal and political framework conditions should be conducive to self-help initiatives.
- Rules for the collection of user charges should be practical and sufficiently transparent.
- Technical solutions should be compatible with user demands and their capacity to finance, manage and maintain them.
- Existing community organisations can be used as a starting point for local waste management initiatives.
- Organisational structures should be sufficiently stable and capable personnel should be available to take on operational tasks.
- Adequate resources for complementary training, capacity building and advisory assistance (from public institutions, NGOs, external donors, etc.) should be made available.

Organisation and Operational Set-Ups

Municipal and Other Public Sector Service Providers

Forms of Service Provision

Waste management in urban areas is a public service in most countries, and it can be based on various operational set-ups:

- **Municipal departments or offices:** These are the most common providers for rainwater drainage, which is usually assigned to public works or civil engineering departments. Similarly, refuse management is often allocated to special departments or offices within municipal administrations.

  This kind of arrangement is typical for smaller cities and towns with simple administrative structures.

- **Municipal or other public enterprises:** Such enterprises can be organised according to corporate or public law, as a state or municipality run company or as an independent public enterprise.

  Municipal enterprise providers are more frequent in larger cities, and often operate wastewater services (usually in combination with water supply) or refuse management systems.

  Other public sector enterprises, including those at the national level, often provide water supply and sanitation services in large metropolitan areas, or regionally or countrywide.

- **Specialised sector agencies or institutions:** These are generally autonomous entities (e.g. *General Organisations for Sewerage and Drainage* in Arab Countries or *Institutos de Agua y Alcantarillado* in Latin America) and are usually similar to public enterprises, both in terms of their functions and their organisational structure.

  In contrast to most entrepreneurial forms, they normally do not own assets, but are more an integral part of public sector or national government administrations.

However, the services of most public sector providers are normally available to formal, better-off urban areas only, while urban poor settlements, and in particular informal areas, are usually neglected and only partially covered, if at all.

Construction of sewer mains in Siem Reap, Cambodia

Factors Conducive to Success

The following factors will be important for improving the coverage and performance of public sector service providers with a view to more sustainable operational set-ups:

- the level of clarity and transparency in laws or other regulations governing their activities;
- a degree of autonomy to decide on financial, organisational and management issues (e.g. determination of user fees, internal procedures, staffing, etc.);
- a sound financial status (financial balance, capital reserves, liquidity, acceptable debt level etc.);
- sufficiently qualified staff in administrative, technical and financial departments;
- appropriate technical equipment and adequate maintenance systems and procedures;
- appropriate service quality and standards;
- the willingness to extend services to urban poor settlements;
- capacities to communicate and carry-through operational and financial improvements, particularly with regard to cost recovery;
- adequate levels of user acceptance and trust, especially from poor target groups;
- the willingness to cooperate with other partners and actors, including the private sector and residents.

Since most of these conditions will only be met in exceptional cases, complementary training and advisory assistance will most probably be necessary to improve the capacity of municipal or other public sector operators.

4.2

Organisation and Operational Set-Ups

Private Service Providers

Forms of Service Provision

Over the past years, due to the inefficiency and serious deficiencies in the quality and range of public service provision, new initiatives have arisen to mobilise and increase private sector participation in waste management.

While large private companies usually have little interest in extending their services to urban poor settlements, small local enterprises, both formal and informal, offer a wide variety of waste management services at that level. They are usually well-tailored to settlement-specific conditions, problems and user demands, and can consist of:

- Sanitation options for individual households, ranging from simple pit-latrines to flush toilets with aqua privies or septic tanks.

  Different approaches to operations and maintenance are possible for these solutions:
  - construction and emptying of simple latrines in sparsely settled urban fringe areas,
  - manual emptying of latrines by private service providers in more densely settled urban areas,
  - pumping out and transporting sludge from septic tanks.
- The construction and operation of public toilet facilities, which is often undertaken by **private small-scale enterprises**.
- A similarly broad spectrum of **private refuse management services** has become available:
  - the collection and transport of refuse by micro-enterprises or cooperatives, as a house-to-house pick-up service and/or for transporting refuse from central collection points as part of a drop-off system,
  - the sorting and recycling of valuable waste materials.

In many settlements, economically and institutionally sustainable systems have developed, with functioning networks of many small-scale enterprises and service providers, but there are also cases where informal waste management activities have led to the emergence of powerful, mafia-like structures.

Emptying of latrines by a private service provider in Maputo, Mozambique

Factors Conducive to Success

Private sector participation, particularly by small-scale and micro-enterprises, in the operations of waste management services at settlement level, can be facilitated by the following factors:

- formal and legally reliable acknowledgements of private sector initiatives (e.g. service contracts, service concessions, etc.);
- agreements on appropriate fees, and the rights and duties of the involved contract partners (commissioning bodies, contractors, end users or "customers");
- regulations and procedures for customer complaints, and for the introduction of customer information services;
- procedures for the regulation and supervision of private sector service provision, and for the monitoring of service standards;
- complementary training and technical assistance, particularly for small-scale enterprises.

The broad mobilisation of private sector initiatives will also require improvements to the overall regulatory framework with regard to:

- reliable and transparent legal regulations (with foreseeable legal consequences) for private sector involvement;
- procedures and regulations for public tendering and procurement;
- definitions of service quality standards, and of regulations for supervision and control;
- the transparent definition of licensing or concession fees, and of other necessary contractual arrangements.

Organisation and Operational Set-Ups

Hybrid Forms

Forms of Service Provision

In addition to services provided exclusively by either the public or the private sector, a **wide variety of co-operations between all kinds of public and private service providers** has developed over the past 15 to 20 years. By and large, such collaborative initiatives have emerged in situation or project specific contexts, often spontaneously or in connection with externally supported programmes.

A growing numbers of municipalities and public service providers have realised the potential benefits of partnerships with the private sector and resident organisations, and hence have developed initiatives to mobilise and tap this potential. In most cases, such partnerships are based on a partial or complete delegation of service tasks, which, due to their limited capacities, public sector institutions are not able to cope with or extend to urban poor settlements. Many of these tasks are given over to private operators, including:

- user associations or other community based organisations, or
- formal and informal small-scale private enterprises.

The degree and scope of delegated financial and operational responsibilities can be defined in flexible ways and tailored to specific local conditions and requirements.

In addition to "bilateral" agreements between public agencies and private providers or user associations, there are also "multilateral" forms " of cooperation, involving a large number of actors, e.g. municipal and/or governmental institutions, small-scale enterprises and/or various different community based organisations. But the more informal such cooperations are, the less likely that initial commitments and agreements will be complied with.

Compared to cooperation between public institutions and local partners at settlement level, partnerships between large formal private sector companies and local operators in waste management in urban poor areas are rare. They are usually only feasible in the context of citywide waste management solutions, which would then make them interesting enough for large private operators.

Public toilet facilities operated by the women's cooperative COFESFA in Bamako, Mali

Factors Conducive to Success

Successful cooperation between public and private providers in waste management initiatives will largely depend on the following factors:

- a sufficient level of trust between the different partners involved;
- a precise definition of operational responsibilities and contributions;
- unambiguous and transparent contractual arrangements;
- clear-cut arrangements for financial compensation for services to be rendered;
- transparent rules for setting and collecting user charges;
- the creation of functioning bodies for supervision and control, as well as agreements on rules and procedures on how to monitor service quality and reliability;
- adequate information for users and customers on the modes of cooperation between the service providers involved;
- appropriate rules and procedures on how to deal with customer complaints.

Partnerships between public and private providers can also be facilitated by improvements in overall regulatory frameworks, such as:

- consideration of public-private partnership arrangements in corresponding legal regulations (local government laws and other regulations for service provision);
- legal definitions of partnership types and operational set-ups;
- the introduction of appropriate standards that facilitate the involvement of user associations and small-scale enterprises.

4.3

Financing and Cost Recovery

Cost Recovery as Main Challenge

Some important basic conditions have to be considered in developing and implementing sound and sustainable waste management measures in urban poor settlements.

The **main challenge** will be to identify **waste management options that poor target groups can afford** so that high levels of **cost recovery can be achieved**. For this purpose, specific limitations in coping with this challenge in the context of urban poor settlements will have to be analysed and assessed.

Taking into consideration the broad range of conditions and problems in different countries and environments, various conceptual approaches, procedures and criteria for assessing financing concepts and the financial management of waste management in urban poor settlements can be applied. The complete version of Module 3 provides more detailed information on this.

Costs

Different **types of costs** will have to be considered in determining the expenditure needed for different waste management options. In addition to initial **investment costs**, particular emphasis will have to be given to operating costs as the decisive factor for long-term operational sustainability.

For operational and financial management purposes, **liquidity-relevant costs and supplementary costs** will have to be distinguished. Supplementary costs should also take into account the **costs of smaller systems extensions, and of maintenance and replacement investments**.

For a sound **comparison** of different options, both **unit costs** and **user-specific costs** for a particular waste management service will have to be identified.

The results of **cost calculations** and **cost comparison** provide the basis for selecting appropriate waste management options and assessing their potential level of **cost recovery**. The importance of covering at least the operational costs of a waste management service from regularly collected user fees is a crucial precondition for the operational sustainability of the selected option.

Costs of Different Technical Standards

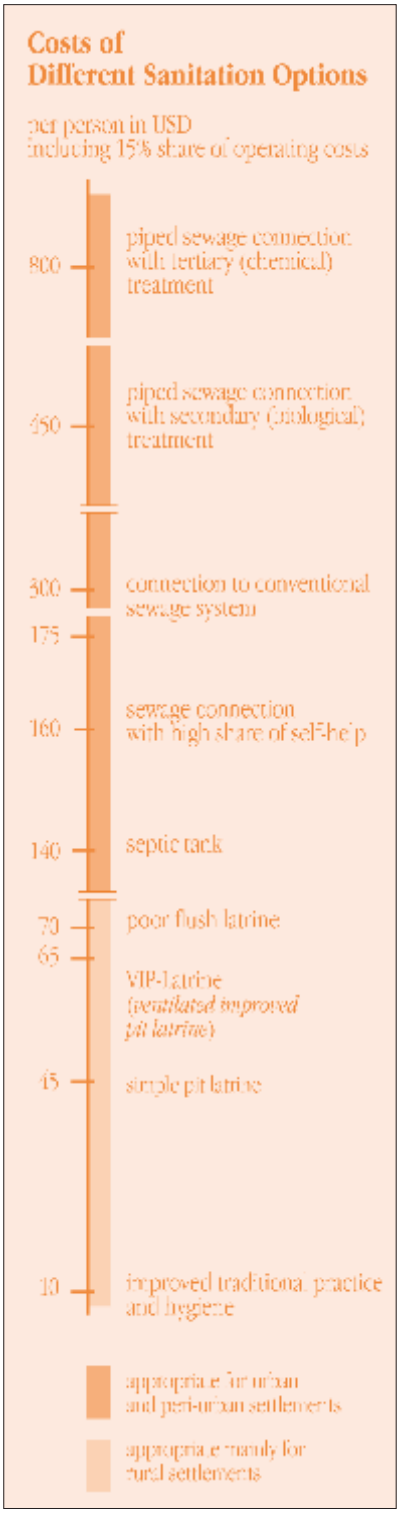
In order to select technically sound and economically feasible solutions and operational concepts for waste management services, it will usually be necessary to compare different **alternatives with their specific investment and operating costs**. In this context, all possible options **to reduce operating costs** should be assessed and analysed. Such options can involve for instance:

- saving **energy costs** by selecting the least energy-intensive technical solutions;
- reducing **costs for material and equipment** by selecting for durability, life span and limited maintenance needs, and by giving preference to local supply;
- **preventive maintenance** to reduce interruptions of operations and prolong the life spans of equipment.

In addition, less obvious aspects, such as ensuring the availability of spare parts, planning for regular repair work or possible system extensions or rehabilitations, should be adequately taken into account.

In all, the mutual interdependencies between the technical standards and the overall costs of waste management measures will need to be carefully assessed and balanced. The high costs of most conventional waste management technologies can easily make them unaffordable to poor target groups. Generally, only a few low-cost solutions will be really financially feasible.

Capacity and Willingness to Pay



Closely related to costs, the users' capacity and willingness to pay are further important factors in determining the economic feasibility and sustainability of waste management services. In order to identify appropriate financing concepts, it will thus be indispensable to carefully assess the **financial capacities of users**, as well as their **expectations and demands** with regard to service standards. For this purpose, the **main factors and parameters** that influence the capacity and willingness of users in urban poor settlements to pay will have to be analysed.

To assess the long-term operational perspectives of waste management services realistically, the actual **willingness to pay** will, in general, be much more **important** than a "theoretical" capacity to pay, which is usually based on assumptions about the economic situation and income of users. Even poor target groups are often ready to provide **substantial contributions**, also in financial terms, if they clearly recognise the potential benefits of waste management services and expect tangible improvements in their living and housing conditions. The participation of target groups in all phases of planning and implementation of waste management measures will thus be important to promote user acceptance and willingness to pay.

Different tools and procedures (e.g. household surveys, rapid appraisal techniques, planning workshops, etc.) can be used **to assess the capacity and willingness to pay** in quantitative and qualitative terms. As all these instruments have specific advantages or disadvantages, it will usually be helpful to combine different approaches and tools in order to obtain a realistic and reliable assessment. In any case, the following aspects should be clarified and analysed:

- household incomes and general economic situation;
- current behaviour patterns of payment for services supplied by municipal or private providers;
- the deficits caused by insufficient sanitation and refuse management;
- the willingness to provide financial or other material contributions;
- payment patterns to be expected in the future.

4.3

Financing and Cost Recovery

Financing through User Charges

The **most common** and appropriate **way of financing waste management services is the collection of user charges**. In order to achieve a maximum level of operating cost recovery, the selection of **suitable service options and standards** that poor target groups can afford will be a major challenge. However, in addition to criteria for financial sustainability, **social factors, environmental impacts** and other issues will have to be considered in the design of fee systems and tariffs.

As information on users of waste management services, and on the amounts of waste to be disposed of is particularly difficult to obtain in urban poor settlements, the possibilities for identifying appropriate principles of assessment in a **simple and uncomplicated way are important** in selecting applicable types of fee.

Moreover, the methods and **time schedules of fee collection** should be defined in a way that corresponds to the interests and possibilities of poor target groups, who often have no regular income or access to banking services.

The following table provides an overview of the main fee types and their determination bases, with an assessment of their possible application in the context of waste management in urban poor settlements.

Basic charges	Flat rates
Collection of a basic fixed charge that is independent from the actual use of a service	Fees are collected per user (unit) in the form of a unified lump-sum independent from use or consumption
Determination bases	
• per connection or subscriber (usually per household or plot)	• per person or household member • per household or apartment • per plot
Advantages	
• relatively easy to collect • permits distinctions between fixed costs and volume or consumption based costs • can be based on linear or progressive tariffs	• relatively easy to collect • is like a tax; has no direct relation to the actual utilisation of a service
Pre-requisites	
• simple user register or cadastre	• comparable user consumption patterns • simple user register or cadastre
Possible application(s) in urban poor settlements	
• share of costs or neighbourhood fee for rainwater drainage and erosion control • share of costs for refuse collection in simple drop-off systems; • share of costs for piped sewerage systems	• simple drop-off systems of refuse collection • emptying of latrines and septic tanks • simple piped sewerage systems • rainwater drainage and erosion control

Scaled flat rates	Volume-based fees	Hybrid fee systems
Fees are collected as lump-sums based on linear or progressive tariff scales	Fee collection based on metering volumes disposed of per period (usually per month) and user unit (usually per household) and appropriate tariffs	Combination of basic charges with user-related (normally scaled) flat rates or volume-based fees
Determination bases		
• persons per household • living area or plot size (m^2) • Length of street frontage	• refuse: weight (kg) or volume (m^3 or litres; bins, bags or similar receptacles) • wastewater: volume (m^3 or litres) of sludge (latrines / septic tanks) or wastewater (usually based on water consumption)	*same as for scaled flat rates or volume-based fees*
Advantages		
• relatively easy to collect • enables a certain degree of consumption or utilisation related differentiation to be made (e.g. when the number of household members is used as determination base)	• enables utilisation related differentiation • provides incentives to reduce wastewater or refuse • possibility of regulating consumption with progressive or scaled tariffs	• enables utilisation related differentiation • provides incentives to reduce wastewater or refuse • possibility of regulating consumption with progressive or scaled tariffs
Pre-requisites		
• more differentiated user register or cadastre with additional information on the determination basis used for rate scales	• detailed user register or cadastre with regular identification or metering of volumes disposed of	• detailed user register or cadastre with information according to the determination base applied or with regular identification or metering of volumes disposed of
Possible application(s) in urban poor settlements		
• drop-off and pick-up systems of refuse collection • emptying of latrines and septic tanks • piped sewerage systems • rainwater drainage and erosion control	• refuse collection from individual households or plots in pick-up systems • emptying of latrines and septic tanks • piped sewerage systems	*same as for scaled flat rates or volume-based fees*

4.3
Financing and Cost Recovery

Other Financing Sources

Considering the **limited possibilities of completely recovering the costs** of both investments and operations **through user charges**, and the high demand for better waste management and improved hygienic conditions in urban poor settlements, additional financing sources will be needed in most cases. They relate in particular to the **financing of investment costs**, which can be covered by user fees only in exceptional cases.

In addition to **financial and user contributions** in kind, e.g. in the form of self-help, additional finance can be provided through **subsidies** from municipal or other public sector institutions or by **external donor funding**.

A special form of investment cost financing is micro-credits, e.g. for house connections to sewer systems or for small-scale enterprises. While loans to finance waste service components for private households are predominantly provided through public programmes or external donor projects, the financing demands of small-scale enterprises are often met by micro-finance institutions and private moneylenders in special "markets".

Further **financing options are private donations, private capital investments, or partnerships** between public and private sector actors. However, to achieve the expected results, the roles and contributions of private partners need to be carefully defined and supervised.

Ahmedabad / India

Establishment of a Municipal Fund with User Contributions and Private Sponsoring

In the mid 1990s in the Indian city of Ahmedabad, the city administration launched an intensive programme for upgrading different informal settlements with 40,000 households spread all over the city through the collaborative efforts of private sector actors, the inhabitants and themselves. Waste management measures consisted of individual sanitation connections, and sewerage and rainwater drainage. The average cost of these upgrades was USD 150 per household, which was shared equally between the city administration, residents and private sponsors. To finance their contribution, users had to first save for the needed amount. Savings were deposited at a bank managed by a local NGO, which also took over community mobilisation and organisation functions. In addition to their contributions to investment costs, users also had to pay USD 2.5 to cover initial maintenance costs.

After carrying out a pilot project with financial support from a private enterprise, the city administration has been implementing and coordinating the programme since 1999. The city's own financial resources were supplemented by contributions from various international donor agencies (UNDP, USAID and DFID). An important element of the programme was the enlistment of private sponsoring from the local business community. However, this support largely depended on the overall economic situation and was not a stable or reliable source of finance.

Street with problematic, semi-open drainage duct after its rehabilitation, in an informal settlement in Ahmedabad, India

Financing and Cost Recovery

Financial Management

Even for simple waste management solutions at settlement level, some basic requirements for financial management will have to be considered.

Efficient budgetary planning, based on a realistic estimate of expected expenses and revenue, is a core function of financial management. Moreover, to avoid liquidity problems, estimates of expenses and revenues as they may develop over time will need to be made.

The **introduction of functioning systems for billing and payment** is another important aspect. They should include both incentives for fee payment and sanctions against non-payers.

Although waste management solutions may be simple, they will still require **systematic and efficient accounting** that documents all relevant revenues and expenses, and thus provides the basis for **monthly, quarterly and annual financial reporting**.

Well-defined **competences** of financial staff and clear-cut **regulations** on how to manage financial resources and how to pay bills are further important conditions for the efficient financial management of waste management services.

Appropriate procedures and tools for **monitoring and auditing** cost-effectiveness and service quality, as well as proper financial management practices, will also have to be introduced, as they are important components of financial management, and can have considerable impact on users' willing-ness to pay.

Basic aspects to be considered in fee collection

- form and content of bills;
- delivery of bills to users: date, form of delivery, acknowledgement of receipt;
- collection procedure: door-to-door collection, central collection points, at the provider's premises;
- collection date: monthly at set dates, or at intervals when users are likely to have enough money to pay;
- responsibilities for collection: employees of the operator, user representatives, representatives of neighbourhood committees;
- procedures and sanctions in case of non-payment: documentation of non-payment, procedures for warnings and overdue notices, including the terms and procedures in cases of refusal to pay, communicating to operators the need and preconditions for sanctions.

Accounting department of a service provider in Kota Tandes, Indonesia

Simple cash journal of a waste service provider in Accra, Ghana

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