



## Basic Concepts

Improvement of Sanitation and Solid Waste Management  
in Urban Poor Settlements



Deutsche Gesellschaft für  
Technische Zusammenarbeit (GTZ) GmbH

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## **INTRODUCTION**

# BACKGROUND AND CONTEXT



Fast growing informal settlement

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City planning, as a mechanism for controlling spatial development, is not feasible in poor districts. In these areas, land is traded illegally and built on without permission, and existing buildings are often extended or altered over long periods of time, with no official authorization. To “formalize” 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 decentralization 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).

## Challenges of Urbanization

Today, worldwide urbanization 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 industrialized nations.

The dynamics of the urbanization 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 globalized economy, the negative effects of urbanization 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.

## 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.



# BACKGROUND AND CONTEXT

## 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 organizations (NGOs).

For this reason, the significance of the diverse local stakeholders as well as the variety of possible organizational 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 urbanization. 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

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# BACKGROUND AND CONTEXT

## Danger of Social and Economic Disintegration

Neglect can lead to social and economic disintegration, which can result in the area becoming marginalized 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.

through private contractors, to complex neighborhood organizations. However, these organizational 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.

## Various Forms of Organization

The majority of settlements, even including temporary settlements, possess some sort of waste disposal management. These range from individually arranged rubbish removals, to area-wide servicing

## Decentralized Methods of Waste Management

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

Refuse as a source of income

/3/



# BACKGROUND AND CONTEXT

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 organizational and financial aspects, and involve a variety of local interest groups.

Housing conditions without adequate waste management /4/



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

The improvement of technical and social infrastructure is of key importance in consolidated 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 underserved 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 reorganization 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 intends to combine the scattered theoretical and practical knowledge acquired in the field of decentralized waste management, and make it available for practical use in development cooperation 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 organizational 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 organization 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.

The various waste management tasks, i.e. refuse removal, rainwater drainage and wastewater and sewage disposal, are sometimes discussed together. Although these may require very different technical solutions, successful projects have shown that the organizational structures and financial mechanisms involved are closely related. Hence their thematic combination and the arising general conclusions.

As in the other modules, this introductory volume 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 recommendations for the development of local project approaches.

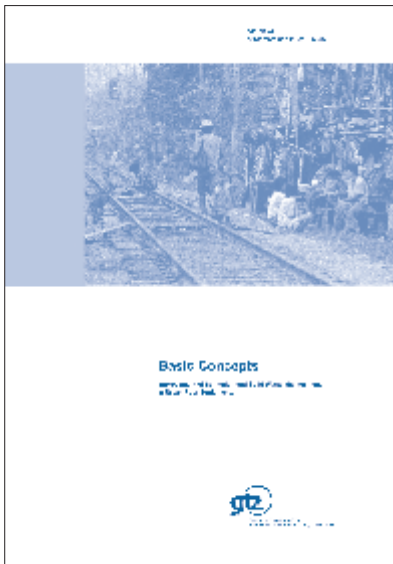
## OBJECTIVES OF THIS PUBLICATION

- **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, organizational, and financial contexts**

## TARGET GROUPS

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

# CONTENTS OUTLINE



## Basic Concepts:

This introductory volume describes the basic information necessary for the conception, planning and implementation of measures to improve waste management in urban poor settlements. Sample case studies and their concrete experiences are used as references.

## Module 1: Technical Concepts

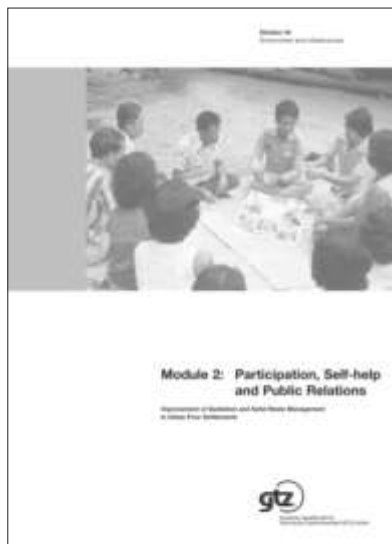
The first module documents proven technical solutions and develops criteria for assessing their suitability for use in different types of housing areas, and for dealing with different conditions and problems.

## Module 2: Participation, Self-help and Public Relations

The second module is concerned with procedures, instruments, and methods for encouraging participation and self-help among inhabitants of urban poor settlements during waste management upgrading.

## Module 3: Organization of Operations and Financing

The third module describes and evaluates possible approaches to the organization, maintenance and financing of waste management systems at the housing area level.



# CONTENTS OUTLINE

## The Basics Concepts Volume in Detail

**This volume deals with the following topics:**

### **Problems of Waste Management 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.

### **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 organizational as well as financial aspects. Examples are given that deal with the following issues:

- Complex measures 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

### **Comparisons**

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

### **Conclusions**

General conclusions are drawn from the case studies and other reference projects (see annex). Particular emphasis is placed on the importance of political-administrative, socio-cultural and technical conditions.

### **Recommendations**

Recommendations are made for the structuring 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 disseminating 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.

# 1

## WASTE MANAGEMENT PROBLEMS IN POOR SETTLEMENTS

*The following section outlines some of the specific characteristics of different types of urban poor settlements, and the problems and conditions that influence waste management in these areas.*

- *The location of such settlements within the urban context and their legal status are used as basic criteria for the development of a **settlement typology**.*
- *Based on this typology, the **characteristics** of different settlements are described in greater detail, and the **likely situation at the outset** of any possible intervention is illustrated.*
- ***Typical conditions and** waste management **problems** encountered in these areas are summarized in a tabulated overview.*

# 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-organization 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.

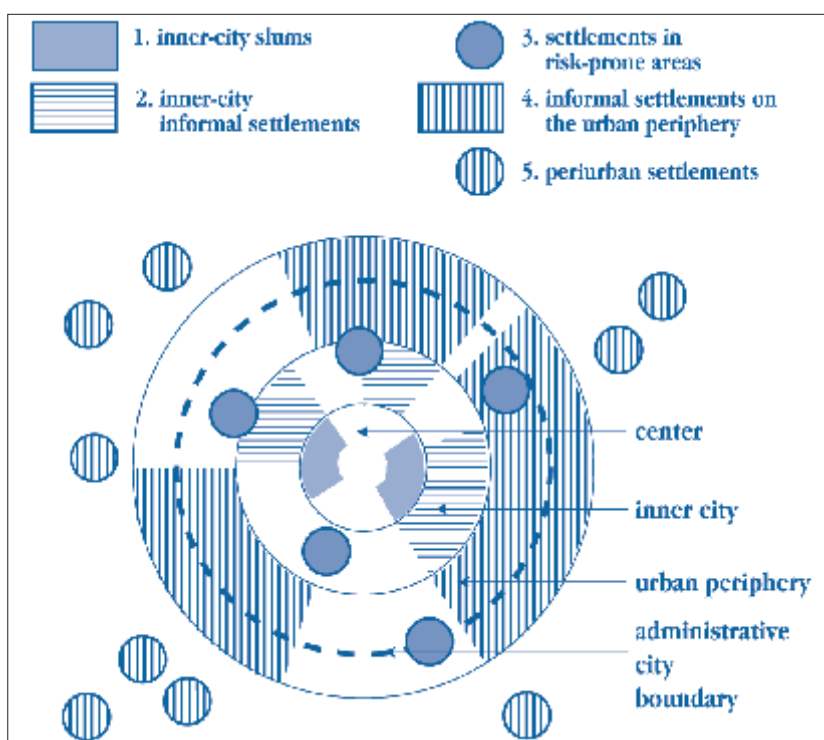
## Important Characteristics: Location and Legal Status

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 utilization 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 below.

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 administration can justify a de facto

Locations and types of urban poor settlements





# DEFINITION AND TYPOLOGY OF URBAN POOR SETTLEMENTS

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, 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 urbanized 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, waste water 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	Geziret El Sheir

\* 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.

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 characteristics**, 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).

# 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. The density of the built environment causes **difficulties for the construction of new sanitation systems** (for example drainage and sewerage) and regular refuse collection often encounters financing



## 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 authorization of the city administration or private owners.

Settlements on urban wasteland suffer **legal and social marginalization**, 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.



# SETTLEMENT TYPES AND THEIR PROBLEMS

## 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 laborers. 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 legalization 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.

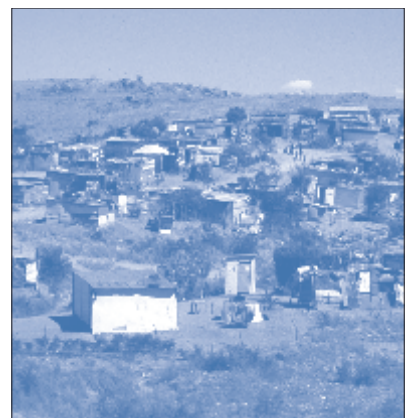
## Peri-urban Settlements

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 urbanized 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.



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# TYPICAL CONDITIONS AND PROBLEMS

In the following, a series of typical general problems are listed that will have to be taken into consideration in the early stages of planning and identification of waste management projects.

## Political, Institutional and Legal Conditions

- inability of local governments to provide waste management and other public services due to a lack of sufficient political autonomy;
- lack of technical resources and personnel of local governments;
- in spite of increasing decentralization towards local governments, waste management remains in the hands of central institutions (e.g. wastewater authorities, or private waste management companies);
- reluctance of authorities, because official cooperation with informal settlements could be interpreted as formal recognition of their existence;
- general bias towards supply management as opposed to disposal management (water supply is prioritized over wastewater disposal);
- city and state authorities have little interest in poor settlements; middle and upper class settlements are generally favored;
- little or no legal margin for participative measures.

## Organizational Problems

- there is little knowledge of non-traditional alternative forms of organization;
- efficient cooperation is complicated by the fragmentation of service providers and stakeholders;
- the responsibilities of different waste management agencies overlap, and there is competition at the local level;
- difficulties in identifying qualified agencies and the lack of suitable "intermediaries" (e.g. NGOs);
- institutions, other than those directly affected, lack of incentives to participate;
- financing difficulties, in particular for the involvement of private companies or the founding of cooperatives;
- existing waste management agencies inhibit the implementation of new project approaches for fear of losing their monopolies.

## Problems for Participation and Self-help

- lack of social cohesion within the area, and the lack of collective decision-making or coordinated action abilities;
- lack of possibilities for stakeholder involvement, and the lack of experience with organizational methods and participative problem-solving techniques;
- lack of identification, and the wrong approach to problem solving (top-down);
- limited financial capacity of the affected inhabitants;
- distrust of external interventions and new proposals;
- projects are not fully acknowledged or even distrusted by authorities and service providers.

# TYPICAL CONDITIONS AND PROBLEMS

The problem statements apply to most settlements, whatever their type, and can be only indirectly ascribed to their location or legal status.

## Financing Problems

- Public services are usually highly subsidized.
- Public services are assumed to be free services provided by the city or state.
- Private investors consider urban poor settlements to be risky and financially unattractive.
- Costs of waste management (especially wastewater management) cannot be covered by fees.
- Fees for services are not accepted by the inhabitants, they are not affordable, or impossible to collect.
- For the poor, securing their personal livelihood takes priority over financing communal services.
- Recycling waste in an economically viable way is only possible in certain project situations (e.g. when it is subsidized and/or when there is a market for recycled material).
- Financial reserves to secure the sustainability of a project are difficult to obtain (no tradition or "culture of saving").
- Funding through external project sponsors is usually temporary.

## Technical Problems

- Official standards are unreasonably high and too expensive, and, given the financial capacity of the inhabitants, unaffordable.
- Adapted technical solutions are not known, not developed, or considered technologically backward.
- Urban poor settlements are often located in topographically difficult or precarious areas (e.g. on steep slopes or in areas prone to flooding).
- The ex-post-installation of sewage systems in urban poor settlements is technically complex and requires a high level of inhabitant cooperation.
- Narrow streets can make it impossible for normal city refuse trucks to operate in the area.

## Socio-cultural Factors

- Due to their rural origin, the residents of urban poor settlements do not consider waste management a matter of great importance.
- The urban or national elites may have a different ethnic background, which can exacerbate the neglect of urban poor settlements.
- Matters concerning waste and feces are taboo, and attributed to specific social groups.
- Willingness to organize self-help collectively is limited because of traditional hierarchies and dependent relationships among inhabitants.
- Socio-cultural conflicts in the area hamper cooperation (e.g. ethnic rivalries or feuding clans).
- Enforcing fees is especially difficult in societies with a tradition of clientele based patterns of supply.
- Democratic decision-making procedures can contradict paternalistic traditions.

# TYPICAL CONDITIONS AND PROBLEMS

## CONSIDERATIONS FOR PROBLEM SOLUTIONS

The experience of the past decade has shown that relying on technical improvements alone does not produce sustainable solutions. Equal attention is being increasingly given to organizational, fiscal and participatory aspects, as the perception of problems has evolved into a broader understanding of the complex interrelationships involved. Previous one-sided technical portfolios on solutions to waste management problems are being supplemented and enlarged accordingly.

The fundamental realization is that none of these aspects alone can lead to sustainable improvements - neither the support of a stakeholder such as the city administration, nor organizational measures such as the involvement of the private sector, nor the participation of affected inhabitants.

The projects discussed in the following chapter represent a generation of innovative problem solving approaches that has accomplished significant improvements in the waste management sector by successfully experimenting with a combination of factors. In light of the obvious current inadequacy of any single factor (technological, administrative, participatory), the projects demonstrate that cross-sectoral approaches potentially yield far better results than one-sided solutions. Consequently, local agencies and consultants are confronted with an expanded range of competency requirements. Organizational and managerial skills, besides mere professional know-how, have become increasingly necessary.

**Important components of possible intervention strategies that will have to be developed according to context-specific conditions:**

- **technical suitability;**
- **administrative and political anchoring;**
- **cooperative forms of organization, which includes key local actors;**
- **securing of financial sustainability by fees and other user contributions**
- **local identification through participation (local ownership).**

Typical peripheral informal settlement, Namibia

/10/



# 2

## CASE STUDIES

*This chapter describes the **concrete experiences of initiatives or projects** dealing with the improvement of waste management in urban poor settlements in various parts of the world.*

- *As an introduction, background information is given on the more **important criteria** used **for the selection of the examples**. The projects chosen use innovative and successful approaches that encompass not only technical aspects, but also include an organizational and a financial dimension.*
- *The main body of the chapter consists of descriptions of **seven case studies**, aspects of which are categorized under the headings:*
  - *initial situation and general conditions;*
  - *implementation;*
  - *technical solutions applied;*
  - *form of organization;*
  - *financing;*

# SELECTION OF CASE STUDIES

## Concrete Examples and Experiences

Seven case studies are presented in the following chapter for the purpose of illustration and reference. 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 each case study here has been based on a fixed set of criteria, in order to facilitate comparison as much as possible.

## Selection Criteria

The following 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 canalization or the establishment of a system of regular refuse collection. Although some projects also display typical mistakes, such as the disregard of cultural or social distinctions, 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 very complex and individual combination of causes that unfold in a specific scenario. Because learning from other projects' errors is therefore only partially possible, the following section **focuses on "positive"** rather than "negative" **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.

## Different Sized Settlements and Cities

Almost all of the selected cities are inhabited by an **average of one million or more residents** and are characterized by steadily increasing populations. Their urbanized 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

### 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.**



## SELECTION OF CASE STUDIES

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. In some of these cases, forms of urban agriculture contribute an overall nutritional benefit, but simultaneously exacerbate problems of waste management and hygiene.

Concepts and recommendations presented in this publication 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 specialized administrative 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 of the Case Studies

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.

Latin America is slightly over represented – although a substantially smaller fraction of the world population lives there – because of the high degree of urbanization in this region.

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.

### 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 the present volume. Of the 30, seven were chosen for in-depth examination. They were analyzed with the help of on-site examinations, interviews with the people involved and further information.

### Location of the case studies presented



# COMPLEX WASTE MANAGEMENT PROJECTS

## WASTE MANAGEMENT AS A COMPONENT OF A CITY-WIDE UPGRADING PROGRAMME

Ahmedabad – **India**  
Capital of Gujarat Province

23.0° N; 72.8° O;  
53 m above sea level  
average yearly temperature: 28.6° C  
average yearly precipitation: 870.8 mm

### Inhabitants (1999):

City: 4,788,000  
Metropolitan Area: 11,212,000



/11/

### Project Profile

The city administration initiates an effort to rehabilitate informal settlements in cooperation with private investors and the affected inhabitants.

### Project Data

- 1994: establishment of the Sharada Trust for a pilot project in the slum settlement of Sanjaynagar, with funding from a private corporation (Arvind Mill Company);
- 1997: beginning of the rehabilitation of Sanjaynagar;
- By mid 2000, 9 settlements with a total population of 2,875 inhabitants are rehabilitated. Another 8 settlements with a total population of 16,050 inhabitants are in process, and 3 further areas with 26,000 inhabitants are in preparation.

### Stakeholders

- The city administration as initiator and agency of the program;
- Private corporations as sponsors;
- NGOs: organization and support for the affected inhabitants;
- Formal community organizations: co-financing of rehabilitation measures.

### Types of Settlement

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

### Background and Context

Ahmedabad is the seventh largest city in India with a population of 4.8 million inhabitants. It is a traditional industrial city with a large number of textile factories. Since the late 1970s, it has experienced several economic crises and has consequently undertaken economic restructuring measures. These economic changes have, among other things, involved the consolidation of Ahmedabad's finances and, since the mid-nineties, the reorientation of the city's policies towards previously ignored informal settlements.

In 1991, 41% of the urban population lived in desperate conditions in more than 2,000 slums scattered all over the city. Over half a million inhabitants lacked access to proper toilets. Hundreds of thousands of people depended on public latrines whose unsanitary conditions posed a severe threat to their health. In addition, most settlements had no organized refuse disposal arrangements. The combination of high population densities and the absence of waste disposal and sanitation systems seriously endangered public health.

More than 70% of Ahmedabad's slums are built on private land, and because of a lack of clear property rights a large number of slum dwellers were excluded from any upgrading measures. Slum-like states of decay, rising population densities and lack of infrastructure occur not only in these settlements, but also in the historical center of the city.

During the mid 1990s, the housing and living problems of the poor and the impact this was having on the entire city, persuaded local businesses, NGOs, the city administration (Ahmedabad Municipal Corporation - AMC) and the inhabitants to launch a joint initiative.

# COMPLEX WASTE MANAGEMENT PROJECTS

## COOPERATION OF RESIDENTS, NGOS, PRIVATE SECTOR AND THE MUNICIPALITY

### Implementation

The pilot project in Sanjaynagar was partially financed by a textile corporation, the Arvind Mill Company, and involves 181 households. It is considered a successful prototype of the so-called Parivartan ("transformation") or Slum Networking approach, which is supposed to cover 40,000 households over five years. It was initiated and is still coordinated by the city administration, and primarily involves small settlements in different parts of the city.

Measures are often supplemented by accompanying programs, such as the central government's Toilet Subsidy Scheme and a credit program for house building introduced by the

NGO Mahila Housing SEWA Trust. Among other things, this program promotes the construction of additional floors within buildings, thereby supporting an economically sound densification of inner-city slums.

The Clean Ahmedabad Campaign initiative organized the collection of waste paper, which gave 2,000 women in the city a stable income.

The success of these various initiatives also encouraged the business sector to get more involved: one big international corporation, for example, has supported the construction of a recycling facility with financial aid, and has passed on technical know-how.

### Technical Solutions

Technical components included:

- road construction and the paving of existing pathways;
- water connections for every house;
- installation of sewage systems with individual connections for every house;
- street lighting;
- decentrally organized refuse collection (provision of refuse bins);
- planting of greenery.

Individual sanitary connections can usually be offered at low cost, because most slum settlements are located on natural inclines and simple piping systems, which function by gravity without pumps, can be used. The cost and quantity of rainwater drainage installations can also be minimized if secondary roads are not paved and slopes are secured with plants. Plants also have a positive effect on the microclimate of in the settlements: trees provide shade and reduce the amount of dust in the air. In some settlements, residents have even made their own vegetable and herb gardens.

### Slum Networking

**Slum Networking began in the southern Indian city of Indore in 1989, and was subsequently adopted in the cities of Baroda and Ahmedabad. In all three cities, various actors from civil society were slow to take it up at first, but eventually sturdy networks were established, and their attitude towards informal poor settlements whose living conditions need to be improved is positive. The idea is that the city administration, the private sector, NGOs and inhabitants should work together. In the case of Ahmedabad, networking means not only bringing the activities of various stakeholders together, but also making linkages between settlements that are scattered all over the urban area.**

**The intention is to improve slums and informal settlements in a sustainable way, and assure their long-term integration into the surrounding city structure. They are not seen as isolated islands, disconnected from the formal city, but rather as components of an urban network consisting of economic and social interrelationships. Slum networking aims at connecting institutions and coordinating projects and programs so that they are not implemented in isolation in particular areas, but are integrated into a larger common context. Initiatives and programs are meant to reach the poorest districts of the city, although priority has been given to measures in areas with secure land rights.**

Water connection with meter in Hanuman Nagar

/12/



# COMPLEX WASTE MANAGEMENT PROJECTS

## Operational Organisation

The Ahmedabad Municipal Corporation (AMC) is the initiator and main agency for the Slum Networking Program. A special department of the city administration, with about 30 employees, receives proposals from community based organizations and NGOs, and also takes direct action itself in selected areas of the city.

Participation in the program requires confirmation of property rights – usually in the form of a legal title. When this pre-requisite has been clarified, an NGO can begin organizing residents. The objective is to establish a formal community based organization (CBO), which can function as the city administration's official partner.

Of the three NGOs involved in the program so far, the SEWA-Bank (Self Employed Women's Association Bank) has taken over the special role of financial intermediary. It is responsible for mobilizing and administering the people's contributions, and an associated mandatory savings program.

All the building measures are carried out by the city administration: the inhabitants are not involved.

In practice, the success of refuse disposal measures depends very much on the respective CBO's ability to engage private refuse collectors to remove refuse from the area and take it to common collection sites on the main roads.

Because of the cooperation between the city administration, NGOs and community-based organizations, conditions in the project areas have improved noticeably. In addition to physical improvements, other NGOs have introduced a series of social measures, including youth and health programs, savings schemes, private schools, educational programs and credit support for micro-enterprises.

## Limitations for Implementation

**The implementation of the Slum-Networking Program is greatly inhibited by the legal status of settlements. 70% of slums are located on privately owned land, whereas only 30% are built on land owned by the city or state. In spite of the fact that AMC has the right to install infrastructure on privately owned land without prior consultation, unsettled legal situations have proven to be an obstacle for long-term solutions.**

**Residents cannot be evicted for ten years if they have registered with the authorities. During this time, they have an entitlement to rent. Although this provisional solution potentially grants the security needed for implementing upgrading measures, it has had little application in practice.**

Street after rehabilitation with problematic, semi-open drainage duct in Hanuman Nagar /13/



Water connection in Hanuman Nagar /14/



# COMPLEX WASTE MANAGEMENT PROJECTS

## Financing

The estimated total cost of all physical rehabilitation components adds up to 6,000 rupees (approximately US\$ 150) per household. According to the so-called "partnership" concept of the Slum Networking Program, these expenses are divided equally between the city administration, the residents and private sponsors.

A savings program by the SEWA Bank oversees the money provided by residents. Each family must pay an additional 100 rupees (US\$ 2.5) for the primary installation of equipment.

In the past, AMC has managed a total investment sum of approximately US\$ 10 million, partly donated by the World Bank, and international and bilateral development agencies, such as UNDP, DIFID, and USAID. The costs of social and other measures implemented by other NGOs have not been included. They are valued at approximately 1,000 rupees (app. US\$ 25) per household.

The private sector's contribution is harder to estimate. Apart from local banks and businesses, the Lion's Club has also made a contribution. In particular cases, the AMC contributes a share of a private benefactor's donation.

Refuse collection is organized at the street community level, and privately contracted services take the refuse in containers to collection points on the main arterial roads.

## Lessons Learned

The Slum Networking Program's innovative character lies less in new technical solutions, but more in the alliance of the various stakeholders it draws in.

The program proves how cooperation between city administrations, NGOs and residents can lead to the effective realization of waste management and sanitation strategies within the context of extensive rehabilitation programs.

A vital component of the concept lies in the cooperation with NGOs, whose role as mediators includes the establishment of community organizations in affected areas as well as the provision of a variety of other social services.

Acquiring funds through sponsors is also a crucial and innovative element of the financial concept, although amounts may fluctuate with general economic circumstances.

In spite of its obvious success, the Slum Networking project has not managed to eliminate the traditional mistrust of residents when faced with government-based activities in their settlement. This may relate to the unequal distribution of competences: the city administration still holds the key position in all planning and implementation issues and there is little room left for public participation.

From the city administration's perspective, the limited capacities of local NGOs restrict the program's possibilities for future expansion. During the early stages of the program, overcoming different modes of operation posed another challenge for the partners involved.

Joint training programs substantially contributed to the development of mutual trust and effective working relationships among stakeholders. The idea of forging a coalition between the city administration, NGO's and community-based organizations in order to tackle waste management issues, is not fundamentally new and can easily be applied in other cities. The cities of Delhi and Lahore in Pakistan have already signaled their interest.

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# COMPLEX WASTE MANAGEMENT PROJECTS

## WASTE MANAGEMENT AS A COMPONENT OF AN UPGRADING OF FAVELAS

Fortaleza – **Brazil**  
Capital of Ceará Province

3.73° S; 35.5° W;  
19 m above sea level  
average yearly temperature: 26.8° C  
average yearly precipitation: 1,443.3 mm

### Inhabitants (1999):

City: 2,089,000  
Metropolitan Area: 2,800,000



/15/

### Project Profile

Improvement of overall living conditions by strengthening self-management and through the development of participative instruments for upgrading technical and social infrastructure.

### Project Data

PRORENDA Urbano-Ceará:

- Exists in Fortaleza since 1990;
- Preliminary end in march 2001, possible extension until December 2003;
- Directed at nine urban favelas in Fortaleza and 5 favelas in smaller towns in the inland of Ceará;
- Bilateral organization (GTZ) in cooperation with state and municipal bodies, especially Ceara's provincial Ministry of Planning.

### Stakeholders

The city administration established district and municipal councils in which residents are actively involved. The Deutsche Gesellschaft für technische Zusammenarbeit (GTZ - German Technical Cooperation) has a consulting role.

### Types of Settlement

Predominantly peripheral settlements with densities between 160 and 506 persons/ha, with an average of approximately 280 persons/ha.

### Background and Context

Fortaleza is the capital city of the Brazilian Province of Ceará. Apart from being an economic center of the country, Fortaleza's coastal location makes it an important fishing harbor for the north. Many people from the Sertão, the dry heartland of Ceará, move to Fortaleza in search of better incomes. However, prospects here are not much better because only about a third of the city's inhabitants has regular paid employment. More than half of its economically active population works in the informal sector, as jobs in the formal sector are scarce. A steadily increasing proportion of the urban population lives in slums, so-called favelas, a majority of which are located on the periphery.

The most pressing problem in these informal settlements was the absence of regular systems of waste management and sanitation, which led to health problems, exacerbating their already precarious situation.

### Simple street drain for rainwater

/16/



# COMPLEX WASTE MANAGEMENT PROJECTS

## COOPERATION BETWEEN CITY ADMINISTRATION, FEDERAL STATE AND RESIDENTS

### Implementation

PRORENDA is a German-Brazilian poverty reduction program that currently runs 13 projects in 7 federal states of Brazil. In the State of Ceará, PRORENDA supports a number of rural-based projects as well as an urban component called *PRORENDA Urbano-Ceará*, which is directed at favelas in the city of Fortaleza and four more communities in the state's interior.

Since December 1996, the city administration has set the legal parameters of rehabilitation programs by establishing residential areas of special social concern (*ZRE - Zonas Residenciais Especiais de Interesse Social*). In 1995 only 15% of Fortalezas population was connected to a sewage system. Since then, with the help of international financing, the number of connections has been raised to approximately 75%. In many cases, however, the sewage network does not reach the poorer settlements. Statistics in the countryside are usually worse.

The project consists of three phases. In the first phase (1990-94), a successful attempt was made at convincing community based organizations to take part in the project and to mobilize the affected public. Special participatory tools for planning and realization were developed for this purpose.

Building on the results of the first phase, in the second phase (1995-1997), it was possible to extend the project area and complete the development of project tools. The implementation of upgrading measures is now in progress in nine favelas: sewage networks are being built or expanded, houses connected and septic tanks installed.

Where sewage networks are not located near to a settlement, independent sewage systems become necessary. These generally consist of so-called *esgotos condominiais*, which are made up of a local network, a separation device, and a septic tank for every 100 housing units.

Additional measures for the improvement of social infrastructure are also being implemented. 18 community centers and kindergartens have already been built, renovated or enlarged.

The medium density settlements affected by the program so far are located on the city's periphery. Their built area covers approximately 50-80% of the total available land. Houses in these favelas are normally between one and three stories high; streets and footpaths are between 1 m and 25 m wide, with an average of about 5-8 m. Population densities range from 160 persons/ha (Conjunto Palmeiras) to 506 persons/ha (Alecrim), with an average of about 280 persons/ha.

The last project phase, concluded in March 2001, consisted of extending the project area and securing the sustainability of already completed measures.

Self-help and the decentralization of responsibilities are core elements of the project and are intended to strengthen the beneficiaries' self-management abilities.

### Technical Solutions

Because the city's infrastructure network is incomplete, independent sewage systems were installed in project areas that were impossible to connect to the formal networks. Construction work was carried out in part through paid self-help. Septic tanks for sewage purification were installed in cooperation with the local government and residents. The financing of the second project phase was shared equally between the GTZ, the city administration, and the provincial government.

In one favela, refuse collection included the separation of domestic refuse, so that organic matter could be composted for communal gardens. Groups of young people organized themselves and were trained in waste separation and in the production of medicinal herbs. Part of their earnings help support the project's newly built community center.

In all districts, technical solutions were supplemented by campaigns and long-term educational measures. During the first months of cooperation with community based organizations, groups of residents convened around topics like the environment, hygiene, waste and so on, which was a useful starting point for the application of other relevant project modules (local environmental diagnosis, hygiene and environmental education, establishment of long-term working groups).

Together with UNICEF, initiatives to do with refuse management were supported with the aim of reducing child labor in this sector.

# COMPLEX WASTE MANAGEMENT PROJECTS

## Operational Organization

The Fortaleza city administration was partner in the first phase of the technical cooperation planning, and the project was integrated into the executive department of its housing division. The Ministry of Planning of the Province of Ceará, SEPLAN-CE, which is normally responsible for coordinating matters of federal policy, is the project's coordinating partner. For work outside of Fortaleza – in communities in the interior of Ceará – the federal Ministry of Labor and Social Welfare (SETAS) was included as a second project partner.

In this way, the administrations of the city of Fortaleza and the state of Ceará were involved in planning and implementation, contributing especially to the establishment of residential councils and to the promotion of neighborhood responsibility.

Brazilian institutions are considered to be relatively well equipped. The participation of both the Housing Directorate and Ceará's Ministry of Regional Planning helped develop the necessary instruments competently, and apply them at the implementation level.

Where residents were unorganized, support was given to establishing community associations. If a community was already organized, the project enhanced its "internal democracy" by working on the organization's by-laws. For local level implementation, development councils consisting of deputies from community associations and other organized groups, were set up and are permanent representatives in all nine project districts. They discuss the implementation of infrastructure

measures on a weekly basis, and their conclusions are forwarded to local groups to be executed by them independently.

There is an informal network of these local development councils, known as the Slum Federation of Fortaleza (*Federação de Bairros e Favelas de Fortaleza*). The councils have learned how to be articulate, how to contact the right people and institutions, and how to make use of their political influence. The councils participated in designing local development plans, the so-called PDLIs (*Plano de Desenvolvimento Local Integrado*), for all the project areas, together with other relevant institutions.

It is very probable that the councils will continue to exist even after the project ends, since they have proven to be effective in acquiring new sponsors for specific tasks during lulls in project activity.

**In many areas, untreated wastewater is directly discharged into canals** /17/



## Financing

The planning and implementation capacities of each development council determine the scope of measures to be financed. Different financing plans with individual procedural guidelines are provided for this purpose. Residents take on maintenance costs (approximately 1 EUR per month (1 US\$) per household). In Fortaleza a total of 3,717 households were connected. In the project areas of Fortaleza, approximately US\$ 750-1,000 were spent per household for the entire rehabilitation process. Otherwise, sewerage rehabilitation expenditure is between US\$ 1,000 and 1,500 per family.

In the different town quarters, residents are offered, among other things, training courses in self-help techniques, accounting and financial planning.

PRORENDA Urbano-Ceará started out with approximately US\$ 2 million in its first project phase. Half came from Germany and the rest was paid in equal parts by the City of Fortaleza and the Province of Ceará.

**Primary sedimentation basin**

/18/





# COMPLEX WASTE MANAGEMENT PROJECTS

## Lessons Learned

In the second phase, the total sum was approximately US\$ 3 million, each donor contributing a third.

Each residential council is provided with a small fund (*Fundo Fixo*) for use in self-managed micro-projects, particularly in the cultural and educational fields, and this can be spent according to the council's own ideas - within the limits of certain mutually accepted parameters. These funds were originally conceived as continuous subsidies, but, in cooperation with the council groups, they are now being restructured into a revolving credit fund. This way, stable financing is assured for the long-term implementation of socio-cultural activities by the inhabitants of the region. The existence of credit funds encourages residents to use democratic decision-making methods and helps them practice techniques of self-management.

Effective cooperation requires a high level of overlap between institutions, community organizations and residents. A network was planned and established in order to secure fruitful working relationships between all stakeholders. In this way, the necessary links connections were institutionalized and made clearly understandable to all.

The organization and training of residents in urban poor settlements is especially important. Without its effective results (e.g. local identification, neighborhood solidarity) improvement measures are not sustainable. Involving community-based organizations in the activities of local government is another essential component in the successful urban development of poor districts.

PRORENDA is acknowledged by institutions throughout Fortaleza and the Province of Ceará and widely accepted as a package of measures for participatory action to ameliorate the living conditions of the poor. Organizations of those affected by bad living

conditions, or their representatives, are increasingly demanding action and referring to PRORENDA's work. A currently proposed concluding phase is aimed at establishing the hitherto successfully applied project tools on a state-wide level and using them as guides in the implementation of other programs and projects.

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## Sources

[www.gtz.de/prorenda/](http://www.gtz.de/prorenda/)  
[www.seplan.ce.gov.br](http://www.seplan.ce.gov.br)

# COMPLEX WASTE MANAGEMENT PROJECTS

## WASTE MANAGEMENT AS A COMPONENT OF AN URBAN UPGRADING PROJECT

San Salvador – **El Salvador**  
National Capital

13.70° N; 89.2° W;  
699 m above sea level  
average yearly temperature: 23.2° C  
average yearly precipitation: 2,129.1 mm

### Inhabitants (1999):

City: 1,398,000  
Metropolitan Area: 1,780,000



/19/

### Project Profile

Extensive rehabilitation of an inner city informal settlement through the cooperative work of various stakeholders.

### Project Data

- 1984: Establishment of the community based organization ADESCO (also project executing agency, FUNDASAL, begins activities in the settlement;
- 1992: Land is acquired by the community-based organization ADESCO;
- 1997: Beginning of rehabilitation funded by the Kreditanstalt für Wiederaufbau (KfW - German Development Bank);
- 2000: Completion of upgrading measures.

### Stakeholders

- NGO FUNDASAL (project executing organization);
- Community based organization ADESCO;
- City administration of San Salvador;
- Sector institutions responsible for water, sewage and electricity;
- KfW (financing).

### Type of Settlement

Inner-city informal settlement; average density: 530-550 inhabitants per ha; 5,300 inhabitants total

### Background and Context

Las Palmas is one of the largest and oldest inner-city slums in San Salvador. The settlement is located in the direct vicinity of formal housing and commercial areas close to the city center, and is built on a steep riverbank prone to seasonal flooding.

The settlement's origins date back to the 1940s. After the failure of repeated efforts at evicting and resettling its residents in the 1970s and 80s, housing rights were officially recognized before the rehabilitation project was initiated. The battle that arose because of the settlement's location bonded the residents together, and the community-based organization *Asociación de Desarrollo Comunal*, ADESCO, was formed. It was legally accredited by 1984 and became the legal owner of the land in 1992.

Because of Las Palmas' extremely high residential density (approximately 530 inhabitants per ha.) many houses are only accessible via narrow footpaths. Decades of inappropriate waste and sewage treatment heavily polluted and contaminated the soil in many areas. In addition, effluent and rainwater from the adjacent formal areas ran through the settlement in open canals. Areas bordering the riverside were frequently flooded during the wet season and landslides occurred where slopes were not effectively secured. Old, inadequately sealed latrines, partially filled and built upon, posed a serious health hazard. Refuse disposal consisted of simply burning or burying waste on an informal dumping ground near the settlement.

The NGO *Fundación Salvadoreña de Desarrollo y Vivienda Mínima* – FUNDASAL, which specializes in housing projects, has supported the residents of Las Palmas, particularly on legal and organizational matters, since the mid-1980s.

# COMPLEX WASTE MANAGEMENT PROJECTS

## NGO-SUPPORTED COMMUNITY SELF-HELP

### Implementation

From 1997 to the end of 2000 a settlement rehabilitation project was implemented with financial support from the KfW (contributing approx. 85% of the total costs of approximately US\$ 9 million), with smaller sums coming from FUNDASAL, sectoral institutions and from the residents themselves.

The project's objective was to further consolidate the settlement and to improve the housing and living conditions of its residents. The integrated rehabilitation approach included a renewal of the water and electricity supply, renovation and construction of communal institutions (community center, clinic, communal laundry, sport facilities etc.), extensions of roads and footpaths, and the legalization of housing sites (by surveying boundaries and awarding legal titles). In addition, the following activities and measures were supported and funded:

- sewerage renewal (including loans for replacing latrines with toilets connected to the sewage system);
- improvement of surface water disposal (rainwater drainage);
- protection against erosion and flooding, and ground decontamination;
- improvement of refuse management.

The necessary construction work was carried out in two different ways:

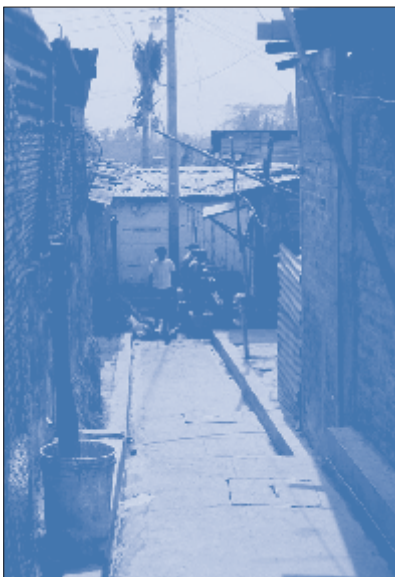
- sophisticated tasks (especially securing slopes, installing the sewage mains and rain water drainage) were conducted by local construction firms or FUNDASAL;
- technically less sophisticated tasks (such as paving footpaths and parts of the road surfaces) were carried out jointly by groups of residents (*ayuda mutua*).

### Technical Solutions

The technical solutions for individual waste disposal components were mainly chosen to be compatible with the city's formal networks and therefore aimed to meet the official standards of the responsible authorities. The following technical solutions were employed:

- Sewerage: an alternative network with conventional main sewers in the main roads. Where piping had to be adjusted to narrow footpaths and adverse surface conditions, PVC-pipes with a relatively small diameter (average 4") were laid near to the surface. Because these solutions deviate considerably from official standards, permission to carry them out had to be granted by ANDA (*Administración Nacional de Acueductos y Alcantarillados*), the public authority responsible for water supply and sewage management.
- Surface water disposal: depends on topography, width of roads and other local requirements; open brick rain water ducts along

Footpath paved in mutual self-help /20/



Newly constructed retaining wall to prevent landslides /21/



# COMPLEX WASTE MANAGEMENT PROJECTS

## Operational Organization

footpaths and roads as well as stretches of closed concrete piping with necessary outlets;

- Protection against erosion and flooding: retaining walls were mainly made of concrete or concrete blocks;
- Refuse management: internally organized drop-off systems and centrally located containers; final collection carried out by the city administration.

One of the most important components of the project's approach was its mobilization of inhabitant participation and self-help in the planning, preparation, implementation and later operation of rehabilitation measures. Successful target group participation was owed in part to the existence of 17 historically developed neighborhoods (parcelas) within the settlement, which FUNDASAL used as a basis for organizing community representatives. In addition, a steering committee (*Junta Directiva*) was established at the level of the entire settlement. These representative organizations voted on all planned rehabilitation measures and procedures for their execution.

During the building phase, every household was obliged to contribute two days of work per week. (However, this requirement could not always be met, and FUNDASAL had to resort in part to hiring its own personnel.) Communal construction groups were organized on a block-by-block or street-by-street basis, and generally fulfilled less technically sophisticated tasks in the direct vicinity of their

homes. These neighborhood groups also served as a base for educating and training residents in infrastructure maintenance, although, in the long run, this job is supposed to be taken over by sectoral institutions or the city administration.

The following waste management methods were chosen:

- **Sewage:** maintenance of sewer mains by the responsible public institution, ANDA, for which a surcharge of 25% is added to water fees.

Maintenance of secondary sewers with smaller pipe diameters is undertaken by neighborhood groups trained and supervised by FUNDASAL.

After a testing period of 5 years, maintenance of secondary sewers will be assigned to ANDA, although cost recovery procedures, currently in the hands of residents, are still unclear.

- **Refuse:** the previous refuse collection system run by collectors from the target group (who took money for collecting refuse and disposing it on informal dumping sites) has been replaced by a system of collection points, still serviced by the refuse collectors, but now using containers supplied by the project. Removal from the collection points is carried out by the city administration.

Refuse collected in containers: in spite of regular removal by municipal garbage collection they are often overloaded

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# COMPLEX WASTE MANAGEMENT PROJECTS

## Financing

With the exception of the credit financing for individual household connections, most of the investment costs were fully covered by financial cooperation subsidies: refinancing via the users was not envisaged.

The investment costs per household amounted to:

- approx. US\$ 625 for sewerage;
- approx. US\$ 414 for surface water disposal and rainwater drainage;
- approx. US\$ 995 for protection against erosion and flooding;
- approx. US\$ 17 for refuse disposal.

Therefore the total costs were approximately US\$ 2,000 per household.

Operation expenses are mainly covered by fees billed to consumers by the sectoral institutions. Maintenance of rainwater drainage and secondary sewers, as mentioned above, is carried out by residents.

The additional costs for removing refuse from the central collection points are payable to the city administration, and amount to approximately US\$ 1.20 per household per month.

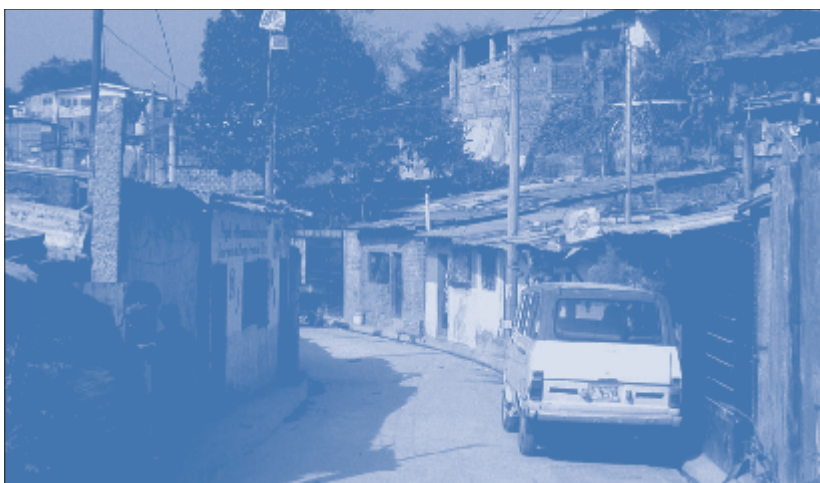
## Lessons Learned

A large amount of the building work was carried out by residents groups, and this required training, organization and supervision by FUNDASAL. The relatively high level of resident organization together with the Salvadorian tradition of team work (*ayuda mutua*), which was especially supported by FUNDASAL, were pre-given advantages for the success of resident participation in this case, which is therefore not necessarily replicable in a different socio-cultural context.

Coordination with the responsible sectoral authorities and the city administration at a fairly early stage was an extremely important condition for long-term operability of infrastructure improvements.

The project's general replicability is limited because a comparatively large portion of the investment costs were covered by subsidies. But this should also be seen in light of the especially difficult topography of the area and the pilot character of the project.

## Footpath paved in mutual self-help



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# WASTE WATER MANAGEMENT

## SELF-HELP SEWAGE SYSTEM

Karachi – Pakistan

24.8° N; 66.9° E;  
2 m above sea level  
average yearly temperature: 25.8° C  
average yearly precipitation: 188.2 mm

### Inhabitants (1999):

City: 10,867,000  
Metropolitan Area: 11,900,000



/24/

### Project Profile

Organized self-help for the construction and operation of a sewage system under adverse political circumstances.

### Project Data

- 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 organization with a key role in professional consultancy, investigation, and education;
- Parts of the city administration
- Residents;
- Other NGOs;
- The private sector.

### Type of Settlement

Informal Settlement on the urban fringe;  
Average density: approx. 800 inhabitants /ha;  
1.2 million inhabitants.

### Background and Context

Around 50% of Karachi's inhabitants live in informal settlements with population growth rates of 9%, twice those of the city as a whole. Many of these settlements are located in peri-urban areas alongside natural drainage canals or railroad tracks, and are prone to seasonal flooding. Over the course of years, an informal supply of health care facilities and small schools has emerged, which do not, however, cover demand sufficiently. In most areas, the biggest problem is the absence of a functional sewage system.

Orangi has 1.2 million inhabitants (at mid-2000) and is the largest informal settlement of the city. Both its extent and its internal density have increased since settlement began in this area in 1963. Although a legal regulation from 1979 (katchi abadi ordinance) protects Orangi's residents from eviction, technical infrastructures were not installed, or were inadequate or simply too expensive.

Residents resorted to using septic tanks, but overflowing sewage poured through the settlement in open canals, causing dramatic illnesses such as typhoid fever, malaria and dysentery. In Orangi, the natural composition of the ground does not permit the seepage of feces; at the same time, surface water and potable water are seasonal rarities. Nevertheless, it was decided to use the existing canals (nalas) - provided they were not filled with dumped refuse.

Since the mid-1980's, ongoing political instability affected even informal quarters, inhibiting solidarity and organization among residents and fostering an attitude of passivity toward the responsible authorities, in this case the WSC (Water and Sewage Corporation). WSC only supplies a small minority of the inhabitants and with excessively high standards.

An extremely fragmented allocation of responsibilities is as much to blame for extensive neglect as a political and administrative environment that does not in the least favor participative methods of water supply or waste management.

An elected communal self-management body, the KMC (Karachi Municipal Corporation) was established in 1979 but then abolished little more than a

# WASTE WATER MANAGEMENT

## INITIATIVE OF A NON-GOVERNMENTAL ORGANIZATION

decade later in 1992. And the elected mayor was replaced by a commissioner from the provincial government of Sindh.

In 1998, even the democratically elected provincial government was suspended and authority was given

over to a regional governor. The political instability during the years from 1986 to 1997 also took its toll on the relationship between the city administration and the informal settlement inhabitants.

### The Orangi Pilot Project - OPP

**In 1980, the social scientist Dr. Akthar Hameed Khan founded the Orangi Pilot Project (OPP) with support from the Bank of Credit and Commerce International Foundation, with the aim of finding sustainable solutions to Orangi's problems together with its population. The work of existing CBOs and NGOs was coordinated, residents were involved in ongoing activities, and the interface with the city administration was defined. In 1988, the original Orangi Pilot Project (OPP) evolved into four legally autonomous, yet conceptually related institutions:**

- **The OPP Research and Training Institute (OPP-RTI), which carries out programs in the areas of low-cost sanitation, housing, and education, as well as training, education and research in those fields.**
- **Since 1997, the Orangi Charitable Trust (OCT) operates a credit program for small family enterprises unable to fulfill normal credit requirements. It is sponsored, among others, by the World Bank.**
- **The Karachi Health & Social Development Association (KHASDA) has continued and extended a health care program that originally arose from cooperation with local women during the course of a sewage management project.**
- **The OPP Society secures each institution's financing.**

### Implementation

This case study only shows OPP-RTI's activities in the field of sewage management. OPP's planning is concerned with the entire settlement, i.e. an area of approximately 3,250 hectares. Since the beginning of operations in 1981 until February of 2000, roughly 90% of approximately 104,000 houses were connected to the sewage system.

The concept originally developed in and for Orangi is currently being replicated in 49 settlements in Karachi and in 5 other cities throughout Pakistan. It has been adopted by, among others, the provincial administration SKAA (Sindh Katchi Abadi Authority) and the KMC (Karachi Municipal Corporation), with whom OPP successfully cooperated. Besides a team of social workers, a core group of 13 technicians is responsible for research, planning, and developing new systems. Data for this is gathered using participatory techniques.

Sewage pipe laid by residents

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# WASTE WATER MANAGEMENT

## Technical Solutions

The successful concept basically relies on two components:

- the city administration's part: the conversion of drainage canals previously used as sewage collectors to sealed sewage ducts;
- the residents' part: the installation of a new system of sewage piping along the natural inclines of existing footpaths.

Compared to the standards used by the city, the concrete pipes installed by residents are smaller in diameter and laid more shallowly. The form and dimensions of control shafts were also optimized. Making use of existing systems and adapting standards can save up to 80% of the costs of official practices, such as constructing new main and secondary collectors, pumps and so on.

**Before renovation: open drainage canal used as a refuse dump** /26/



## Operational Organization

OPP considers itself an organization dedicated to the research and support of improvements in urban poor settlements. Neither financing nor political lobbying constitute part of its declared task. Because of this self-imposed restriction, OPP has been able to continue working unhampered even in times of political instability or ethnic conflict.

Organizationally as well as financially, the concept is based on a strict division of responsibilities between residents and the city administration. While residents plan, build, finance, and maintain the infrastructure within the settlement, the city administration is responsible for the sewer mains.

OPP mobilizes neighborhood groups, consisting of the residents of 30 to maximum 40 houses (lanes), each represented by a local leader, a so-called "lane manager". With training, supervision and technical support from OPP, a group is then able to

**After renovation: paving over sealed drainage canal** /27/



undertake all the work needed to install sewerage and domestic water connections in their lane. Maintenance is also part of the group's responsibility. The formation of these neighborhood groups also takes into consideration social and ethnic structures. The most significant of OPP's contributions is to plan professionally while using adapted standards.

OPP's employees are increasingly delegating planning, coordinating and construction supervision to the lane managers. The replication of reliable solutions has, in the mean time, become self-generating, since technical know-how and the administration of the project have been left in the hands of the residents themselves.

OPP does not put a high value on formal resident organization. Its success lies in establishing neighborhood groups based on particular shared needs and aims. The lane managers have an important role to play in this. They enjoy their neighbors' confidence and take on organizational tasks in the area.



# WASTE WATER MANAGEMENT

## Financing

The financing of each area of responsibility is also strictly separated. Measures within neighborhoods are financed by the dwellers themselves, whereas the necessary macro-level infrastructure (sewer mains and treatment plants) are paid for by the city administration. In each neighborhood, the lane manager is responsible for the organization of collective saving, for overseeing the entire financial process, and for supervising the construction work.

Residents finance all measures within their neighborhoods. For US\$ 25, program participants receive an indoor toilet, a connection to the sewage system, and their respective section of the sewage duct in the street. Collection of fees for the system's maintenance after its completion is organized by the lane managers. The intensive participation of the residents in the construction work drastically reduces costs, and an earlier savings scheme helps with any problems with reimbursements.

The construction and maintenance of the sewer mains are the city administration's responsibilities. After initial difficulties, the city administration has been honoring its obligations. Participating neighborhoods cover an estimated US\$ 1.7 million of the total costs, while the city administration's contribution is less than half of that, at approximately US\$ 750,000.

OPP itself is almost completely financed by external donors. Nonetheless, OPP's expertise is increasingly in demand for the planning of Karachi's sewage systems, as well as for planning and giving training workshops in other cities, financed by, among others, UNDP's LIFE program (see also the Egypt case study).

## Lessons Learned

OPP is considered one of the most successful examples of a professional consultant NGO whose approach is aimed at inhabitant empowerment and self-help. OPP's original, technically oriented consultancy has been extended, and now includes the education of multipliers who use and disseminate any results obtained through research and developments.

Participating workers and especially lane managers function as multipliers. The concept has endured even through times of political instability. However, the geographical extension of the approach into other provinces has revealed the limits of OPP's capacities.

In spite of OPP's obvious success, cooperation with the state-owned Water and Sewerage Corporation is still problematic, because they continue to ignore informal settlements and only offer unaffordable solutions with disproportionately high standards.

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### Problem: stagnant water in the streets of Orangi

/28/



# SOLID WASTE MANAGEMENT

## REFUSE COLLECTION AND URBAN HYGIENE ON THE PERIPHERY

Rosario – **Argentina**

32.92° S; 60.70° W;  
25 m above sea level  
average yearly temperature: 16.9° C  
average yearly precipitation: 980.1 mm

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



/29/

### 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.

### Project Data

- In 1999, with the GTZ's support, a cooperative was established to carry out domestic refuse collection, cleaning ditches and open sewer ducts, lawn mowing, and environmental education on behalf of the city.
- The affected area contains approximately 11,000 inhabitants.

### Stakeholders

- A cooperative of 12 residents of the affected district (as a small service company to organize refuse collection)
- The city administration (which supports the founding of the cooperative and awards it a contract)
- The GTZ (advisory assistance especially on organizational and financial issues)

### Types of Settlement

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

### Background and Context

Argentina has undergone significant restructuring in the course of the last decades, and has privatized almost all state-owned enterprises in the process. Basic services and environmental management have been increasingly given over to private companies. On the one hand, this has provided more opportunities for local entrepreneurs; on the other hand, competition in the cities is harsh and often favors big international firms with large capital assets.

In many Argentinean cities, waste management simply means refuse collection, whereas integrated approaches to waste management planning are hardly known. Even city administrations have little experience in this field, and therefore the privatization of services is generally limited to refuse collection and transportation. Private companies are not expected to offer intricate waste management solutions designed for specific local situations or settlement structures. In many cases "standard" solutions, copied from industrialized countries, do not yield the desired results. In addition, bidding procedures are mainly dominated by large, internationally active companies because of the very high initial costs for vehicles etc.

The city administration of the city of Rosario, an industrial and commercial center of supra-regional importance, has contracted two private international firms for refuse collection, urban hygiene, and street cleaning in all six districts of the city. The problems of these different districts are, however, more complex than the solutions either company has so far presented.

In large parts of Rosario, refuse collection is organized as a retrieval system. Inhabitants leave plastic bags with domestic refuse outside their homes on a daily basis. It is collected and loaded onto refuse trucks, so-called "compactors", and then disposed of on dumps without further treatment.

In poorer districts, with built environments of medium density and various degrees of consolidation, the compactors cannot access streets that are unpaved or too narrow. Residents must therefore bring their refuse to containers installed by the refuse disposal company.

# SOLID WASTE MANAGEMENT

## A SMALL-SCALE ENTERPRISE FOR REFUSE COLLECTION OPERATED BY RESIDENTS

### Implementation

Apart from the extra effort involved in this system, it is dependant in part on the residents themselves. Peripheral settlements especially have therefore encountered a variety of problems affecting urban hygiene. Container sites are frequently filthy and often the inhabitants do not appreciate the importance of dealing with their refuse properly. In most cases they are not directly aware of the negative consequences poor refuse management can have.

Informal refuse scavenging further exacerbates the problem: scavengers collect plastic bags and other waste materials in the commercial centers of the city, and bring them back to their homes on the periphery for separation and recycling. Because what remains of the garbage is often inadequately disposed of, peripheral housing areas frequently produce extremely large amounts of refuse in spite of relatively low population densities. Consequently numerous small dumping grounds eventually develop around peripheral settlements, and open drainage canals are commonly fouled up.

The city administration had not been able to develop appropriate refuse management solutions in cooperation with residents and private firms. Particularly poorer population groups have limited possibilities to make their voice heard in decision making processes on solid waste management or settlement development.

Communal Waste Management in Rosario is a joint project of the city administration of Rosario and the GTZ. The project began with an educational trip to Bolivia for employees of Rosario's environmental authority. They visited micro-enterprises for refuse collection in peripheral areas difficult to access with trucks because of their adverse topography. As a result of the trip, it was decided to adapt the Bolivian example and apply it to a poorly serviced district of Rosario as a pilot project. A group was already involved in hygiene education as part of an employment generation program in that district, and, in addition, the employment office was actively supporting micro-enterprises there, with construction projects, carpentry, sewing work etc.

When the employment generation program ended, the group was encouraged to take in refuse collection and the improvement of urban hygiene in the district. They were advised to start a business in order to ensure the sustainability of their activities.

With the help of the GTZ, the group organized themselves into a cooperative. The cooperative now offers services ranging from domestic refuse collection (using an adapted system), to street and sewage canal cleaning, as well as lawn mowing.

The contract with the company originally in charge of waste disposal in the area was canceled. It remains responsible only for transporting containers to the dumping grounds.

The district chosen for the pilot project is a poor residential area

located in on the periphery: most of its inhabitants work in the informal sector, some of them as collectors of recyclable material.

In order to give the pilot project a good chance of succeeding, it was not implemented in the poorest districts of the city. Instead, a settlement was chosen where there had already been experience of working with inhabitants who then later formed themselves into a cooperative.

**Reloading refuse from a pushcart into a skip** /30/



# SOLID WASTE MANAGEMENT

## Technical Solutions

Refuse collection is managed as a pick-up system. Members of the cooperative collect refuse bags at front doors and load them onto a special handcart that they push through the district, and in this way, even unpaved footpaths are accessible.

At the same time, streets and open sewage canals are cleared of refuse.

Personal contacts between residents and refuse collectors make it easy to arrange which time of day garbage bags should be left outside. This helps to avoid them being rummaged through by stray dogs, who spread their contents and leave it for the wind to scatter.

The collected refuse is taken from the handcart and loaded into containers - in this case, large open topped movable skips (also known as "dumpsters") - at collection points located at the edge of the district. From here, private disposal companies take it to the dump in trucks. The cooperative is responsible for the maintenance and hygiene of the collection points.

## Operational Organization

The project's goal was to create a micro-enterprise that could be officially contracted by the city administration. A contractual arrangement was used that did not require a new round of public bidding.

The founders of the cooperative had previously been involved in an 18 month employment generation program. Their tasks included educating the residents in the field of urban hygiene and organizing one-off cleaning up actions in some public places of the district.

Preliminary investigations to determine the size of the project area and for the founding of the cooperative company were taken over by the GTZ's Communal Waste Management Project Rosario. The utility and probable cost-effectiveness of the enterprise were checked by the city's employment office. After the company had been established, a contract was signed between the cooperative and the city's environmental authority - the commissioning institution in the field of waste management.

Training for the cooperative's original members was financed within the framework of a supra-regional GTZ project. Internal task allocation was managed by the members themselves. The GTZ supported the preparation of cost estimates and a business plan for services.

**With regard to the technical solutions - 18 months of experience with the micro-enterprise (*microempresa*) revealed the following:**

**The work is physically strenuous, especially for women. Pushing the loaded handcart and loading refuse into the containers needs a lot of physical effort. The possibility of exchanging the handcart for a sturdy wheeled refuse bin and purchasing a van able to lift this bin hydraulically, thereby avoiding the need to use an intermediate container (see below), are therefore being considered.**

**The micro-enterprise is currently dependent on private waste collection firms for transportation of refuse from the district to the official dumping grounds. This requires intermediate storage within the neighborhood, i.e. a container. It would be expedient to let the cooperative take charge of the entire process.**

**In order for the cooperative to buy a van and manage transportation to the dumping grounds in a cost-effective way, an expansion of the serviced area to cover at least 30,000 customers would be called for. This, however, would involve removing 19,000 inhabitants from the larger private removal company's concession, and putting them into the cooperative's jurisdiction - a step that the city administration has not yet decided to take.**

# SOLID WASTE MANAGEMENT

## Financing

The inhabitants of Rosario pay a property tax dependent on the size and location of their plot. This tax is used to finance communal services and is also charged in "informal" areas of the city. No extra charges are made for refuse collection, which is directly financed through the city budget.

The cooperative's basic equipment was financed through an interest-free GTZ loan (3,000 US\$), repayable within three years. Wheelbarrows, uniforms and tools were purchased with this money. After only 18 months of work, 50% of the loan had been repaid. The provincial government of Santa Fe awarded an additional US\$ 2,500. The city's environmental authority is the contract partner.

## Lessons Learned

A residents' poll taken 18 months after the cooperative's business started operating confirmed that the project was able to improve general living conditions and hygiene in the district.

The members of the cooperative are residents of the area, and therefore

### Cleaning the container site

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there is a close relationship between refuse collectors and other inhabitants, which facilitates environmental education and awareness. Conventional refuse collection does not usually have this advantage.

This small cooperative enterprise offers the city administration a system of waste management especially designed to meet the district's needs. At the moment, however, the arrangement means that the city has additional costs and additional administration work, because a suitable form of contract has yet to be worked out. The rules of competition prohibit a long-term contract, so the current agreement has to be renewed on a monthly basis: this hinders the optimization of the technical processes. Under these circumstances, the cooperative is unable to make long-range plans or, for example, invest in a van.

While the city administration profits from the advantages of a small local enterprise and its benefits to the community, the cooperative has received little recognition in other respects. Its members have not yet

### Garbage bag collection and simultaneous street cleaning

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been allowed to join the union of sanitation workers, and its economic significance is seen as minimal compared to that of the large, internationally organized companies. This results in a high level of dependence on the city administration, and encourages paternalism and the exercise of influence.

An important factor in the city administration's role in waste management is the design of its bid invitations. These openly favor large private firms in spite of the fact that the cooperative's specialized services are unquestionably competitive.

The competitiveness and profitability of the cooperative would however be improved if the area they serviced was bigger, and the technical equipment and the number of people employed were optimized. But pragmatism, i.e. doing what can be done under the circumstances, is inherent to such small and flexible projects.

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# SOLID WASTE MANAGEMENT

## REFUSE COLLECTION IN PERI-URBAN SETTLEMENTS NEAR CAIRO

Qanater City near Cairo – Egypt

30.13° N; 31.4° E;  
64 m above sea level  
average yearly temperature: 21.9° C  
average yearly precipitation: 24.8 mm

### Inhabitants (1999):

City: 10,800,000  
Metropolitan Area: 15,000,000



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### Project Profile

A technical cooperation project for the establishment of a refuse management system through community development organizations in collaboration with the city administration.

### Project Data

- 1997: Beginning of technical cooperation
- 1999: End of support through the GTZ
- Target population: 7,300 inhabitants

### Stakeholders

- International and bilateral organizations (GTZ/UNDP);
- The city administration of Qanater City;
- CDA (Community Development Association);
- Volunteers from the districts.

### Types of Settlement

Peri-urban settlements,  
average density: 500-700 inhabitants per hectare;  
approximately 7,300 inhabitants.

### Background and Context

The German contribution to the UNDP/LIFE project (Local Initiative Facility for the Urban Environment) consists of supporting waste management initiatives in different locations of the urban area of Cairo and Fayum. Geziret El Sheir is the most successful project area to date. The settlement is located on an island in the Nile about 30 km north of Cairo. The island officially belongs to Qanater City, a small town within the catchment area of the Egyptian capital. Its inhabitants are socially diverse. Although the majority of its 7,300 residents has a low income, only one tenth of families lives in extreme poverty.

Because the island is located outside of the actual city, municipal refuse disposal services are sporadic or non-existent. Residents disposed of their garbage on the banks of the river. During high tide, the contents of cesspits flooded into houses and public open spaces. This appalling situation affected all the five peri-urban settlements of Geziret El Sheir equally, and caused illness and high child mortality rates.

The project is linked to a local community development organization (CDA). CDAs are legally authorized to take responsibility for a variety of tasks in their district, although their work does not usually extend beyond social activities and charity. The political-administrative system in Egypt is extremely centralized and city administrations have hardly any leeway for policy development. Elected representatives at the city level consider themselves lobbyists for their own constituency, and show little interest in issues concerning the living conditions of poorer sections of the population. Before the project started, Geziret El Sheir had therefore been excluded from public waste management services in spite of the city administration's formal responsibility.

# SOLID WASTE MANAGEMENT

## LOCAL - LOCAL DIALOGUE

### Implementation

The technical cooperation project was implemented in four relatively small areas (Kohafa/Fayum, Qanater City, Kassabgy/Gizeh and Boulaq el Dakroul/Gizeh) over a period of two and a half years. It aimed at establishing decentralized systems of refuse management in urban poor settlements by mobilizing young volunteers and cooperating with existing community associations.

The most successful project was in Qanater City, where it was possible to establish both a refuse disposal system and a sewage management system on the island of Geziret El Sheir. This case study presents only measures pertaining to the project in Qanater City. Its implementation was based on the following components:

- mobilization of the local Community Development Association (CDA);
- activation and education of volunteers for mobilizing the population;
- financing of a small refuse truck and a pumping vehicle for feces disposal;

#### Residential street on the island of Geziret el Sheir



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- participative development of organizational and financial concepts in cooperation with the city administration.

Twice a week, public employees collect domestic refuse from specific locations and transfer it to the municipal dumping grounds with a CDA truck. According to the estimates of those responsible, approximately 80% of the population is actively involved in refuse collection and reliably pays the fees charged.

### Technical Solutions

Refuse disposal is handled through a drop-off system: rubbish bags are brought to collection points located near to the houses. A remodeled pick-up truck then takes the refuse to the authorized dumping grounds. Distances are kept short by using small vehicles with the ability to maneuver in the narrow streets of the settlement.

A CDA pumping vehicle empties private latrines for the normal fee for such services.

#### Loading refuse onto a remodeled pick-up truck in a narrow alley in Kohafa (Fayum) 135/



# SOLID WASTE MANAGEMENT

## Operational Organization

The project is innovative especially because it is based on a division of labor that involves a range of stakeholders. Empowering the local CDA (Community Development Association) is of central importance for mobilizing the population. As a quasi state-controlled CBO, the CDA is as much the local executing organization as its project counterpart.

The input of the group of young volunteers makes a substantial contribution to the project's success. They work as mediators for the population, by collecting fees (whilst selling plastic rubbish bags door-to-door) and motivating residents to get involved. A total of 32 youths regularly participate in the different project areas. In this way, loyalties and

personal inter-dependencies are fostered, and the problem of corruption is virtually eliminated from the fee collection process.

Ultimately the system is based on cooperation with the city administration, which pays the refuse truck workers whilst being relieved of its (formal) street cleaning obligation. The cooperation of the city administration was achieved through intensive discussions, which also involved local politicians, in what is called local-local dialogue, a conceptual element of UNDP/LIFE's project approach.

In all, the following stakeholders became seamlessly integrated:

- the city administration and political representatives;
- the local CDA;
- youth volunteers for carrying out awareness campaigns, fee collection, and encouraging local participatory data collection and surveys;
- the inhabitants.

**Before refuse collection was introduced, Geziret el Sheir's narrow alleys were filled with rubbish and seasonally flooded with sewage**

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# SOLID WASTE MANAGEMENT

## Financing

The refuse truck and latrine clearing vehicle were financed by the GTZ. The CDA organized a secure parking place.

The city administration provides the project with four workers to collect refuse bags. In addition to their slim wages, the CDA pays them a bonus of EUR 3.00 per month. The CDA employs one manager for organizing refuse collection, and an additional supervisor is employed by the city administration. The project is therefore currently (March 2000) relatively well staffed.

Contributions made by the CDA are financed by a fee of EUR 0.6 charged per household per month. It is collected by volunteers by way of "selling" refuse bags. The fees cover operating expenses as well as the bonuses for public employees. These revenues are large enough to pay for maintenance and vehicle replacement, and even cover approximately 50% of the garbage truck's amortization costs. Financial sustainability is therefore at least partially secured. These financial provisions are unusually high by Egyptian standards, but stem from the conscious recognition of the advantages the project brings.

In return for its "accommodation", the city administration is released from formal street cleaning duties, which are now organized by the CDA and carried out by residents.

## Lessons Learned

The GTZ contributed to the UNDP /LIFE program by helping local CDAs (Community Development Associations) become competent waste management operatives, working with local volunteers and with the city administration.

The project is successful, because it offers advantages to all stakeholders:

- relief for the city administration;
- the solution of sanitation problems for the residents;
- and for the CDA, a strengthened local community.

Because of the strategic capabilities of the project's approach, the CDA has currently become involved in a number of its own projects and has successfully acquired financial support from other international donors.

At other GTZ project locations in Egypt, alliances between other kinds of stakeholders have also worked successfully: for example, in Kassabgy (Gizah), private companies were involved, and in Kohafa (Gizah), there was cooperation with an international NGO, CARE.

## Contact

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# REFUSE RECYCLING

## INNOVATIVE REFUSE MANAGEMENT

### Cotonou – Benin

23.00° N; 72.8° E;  
53 m above sea level  
average yearly temperature: 28.6° C  
average yearly precipitation: 870.8 mm

### Inhabitants (1999):

City: 500,000  
Metropolitan Area: approx. 1,000,000



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### Project Profile

Waste disposal and recycling measures in urban districts.

### Project Data

- 1993: A system of domestic waste collection is initiated;
- 1995: *Développement Communautaire et Assainissement du Milieu* (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)

### Type of Settlement

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

### Background and Context

Cotonou is Benin's most important seaport, and also the country's economic and industrial center. Democratic reforms together with economic restructuring resulted in relatively high economic growth at the beginning of the 1990's. However, economic imbalances within the population increased.

Many Benin city administrations, handicapped by a lack of resources, were unable to provide urban inhabitants with basic services. NGOs, such as the *Organisation Confessionnelle de Développement* (OCD), attempted to bridge the resulting gap. OCD is financed by the country's protestant church and administers a hospital (*Centre de Santé de Bethesda*) in the St. Rita quarter.

The hygiene situation in this urban area is extremely precarious and was held responsible not only for the general population's poor state of health but is also regarded as an obstacle to overall development. Rotting refuse on public streets polluted the air and caused infections and the breakout of epidemics.

## COOPERATION OF AN NGO WITH PRIVATE REFUSE COLLECTORS

### Implementation

As early as 1993, a door-to-door system of domestic refuse collection was established with approximately US\$ 115,000 of French development aid. Part of this money was also used to improve the necessary infrastructure and for the construction of a landfill. This funding enabled the OCD to found an initiative called *Développement Communautaire et Assainissement du Milieu* (DCAM) to take over waste management tasks. DCAM organized door-to-door collection, contracting about 20 refuse collectors, supplying them with the necessary carts, supervising their work and arranging transport to the refuse disposal site. They were partially financed through subscription fees and recruited workers from the area.

After the initial funding was exhausted, DCAM continued collecting refuse, but could no longer afford to transport it to the dump, which meant that refuse had to be stored on the settlement's periphery. A grant from the Protestant Development Service (EZE) in 1997 was aimed at helping restore the project's independence. Working together with representatives from the town quarter and the local administration, residents were to be made

more aware and more involved. Extending the refuse collection system was to generate new employment. Educational measures were an important part of the program. The refuse collection system in the St. Rita town quarter was established successfully and because it was able to sustain itself through fees, it could be partially privatized. Each former employee was assigned a certain area of the settlement and managed it independently. Former employees now also collect fees, and, after subtracting DCAM licensing charges and credit repayments for the pushcarts, are allowed to keep the fees as profit. DCAM still monitors the work, in addition to distributing licenses and administering small reserve accounts for the refuse collectors, in case an old pushcart needs to be replaced.

While the first phase of the project was mainly concerned with setting up a collection system, the focus has shifted towards refuse separation and reuse of recyclables. The capacity for separating plastic, paper, waste oil and biodegradable waste is now established. The notable success of these measures has resulted in a contract between the city administration of

Cotonou and DCAM that covers all the refuse collected in the community. 400 cubic meters of refuse are sorted daily by more than 100 people and then transferred to different institutions for further processing. Costs are borne by the city administration.

Refuse collection and separation site



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Sifting refuse for composting



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# REFUSE RECYCLING

## Technical Solutions

Transporting domestic refuse on pushcarts through unpaved, sometimes muddy streets proved to be difficult. The high costs of its subsequent transfer to central separation points or refuse dumps was another problem. DCAM therefore tried to reduce the amount of unsorted refuse by promoting separation in households.

The following materials are collected separately: paper, plastic, metal, glass, organic substances, and – for environmental reasons – batteries. Because of the large amounts of refuse that still reaches the central separation point unsorted, the use of future investment in equipment such as wheel loaders, sieve drums and conveyor belts is being considered. Appropriate methods for disposing of the remaining refuse are being examined.

Hazardous waste from the local hospital was treated in a small waste incinerator until its use was found to carry environmental and health risks. A contract was therefore signed with the largest hospital in the city, which has a modern incinerator where waste from other hospitals was also being handled. DCAM now collects refuse from hospitals across the whole city.

## Operational Organization

DCAM took up work in 1995. Its connection to church institutions through the OCD created a relationship of trust and thus simplified the lead-in to the work. Awareness-raising activities and environmental education were conducted at the level of residents and schools, and also at the level of the local authorities.

Without the local district representatives' ready and willing support for DCAM's work, the project would never have materialized. Participation in the project is voluntary and linked to the payment of fees. An average of over 60% of all households has subscribed to DCAM's refuse collection services, although the number of subscribing households varies between settlements, and ranges from 30% to nearly 90%.

Almost 80% of participating households pay their monthly fees of 1000 FCFA, or US\$ 1.4 regularly. DCAM has evolved into a highly professional NGO in its field with close to 130 employees.

**Pushcarts used for refuse collection**

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## Financing

Transportation to the refuse dump is extremely costly because of the distances involved, the vehicles required, their gasoline consumption and their maintenance. It was impossible to cover these costs in the first phase of the project. About US\$ 1,750 were needed to transport the monthly load of then 1,300 m<sup>3</sup> of refuse to the dump. Now that DCAM separates all the refuse collected by communal agencies in its processing center about 25 km outside the city, the city administration has taken over transportation costs, and even pays US\$ 10 per cubic meter for separation and processing.

Recently, however, Cotonou city administration has exhibited a bad attitude towards payment. It has not honored its obligations for months. Only a storm of protest from workers could make it do so.

Additional funds are generated through the sale of recyclables and secondary raw materials (metals, bones, compost, plastic chips, plastic agglomerates, fuel briquettes, etc.). Within a year of its inception, the

project is expected to be self-financing. This not only implies an increase in efficiency and an expansion of the project area, but above all, developing a market for recycled raw materials. Furthermore, economic independence is a precondition for possible future privatization in favor of current workers.

## Lessons Learned

The population has proven its willingness to pay a cost-covering fee for refuse collection after they have been adequately informed.

For organizational reasons, local self-help groups were unable to take over waste management as originally planned. It seems necessary therefore, to revert to a central institution, like DCAM. Such an institution should not, however, be itself the local refuse collector, but, after an initial testing period, its activities should be privatized. This way, the NGO could continue to operate in the educational field, and extend the project to cover other districts.

Recycling of waste materials has demonstrated that financially self-supporting structures are possible and attractive enough to be extended to other districts or even cities.

Dissemination of the concept is the responsibility of the NGO.

### **Problems in establishing an effective refuse collection system**

**In Cotonou, domestic refuse is frequently used for small-scale landfills or the leveling of sites that are regularly flooded because of their low-lying location and their proximity to the lagoon. The owners of such sites may, for example, ask their neighbors or refuse collectors to leave refuse on their land, in order to level and/or raise it. These kinds of private dumping grounds make it difficult to collect refuse management fees from households in their vicinity.**

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# 3

## COMPARATIVE ASSESSMENT

*The case studies described in the previous chapter are compared in the following tables. A simple set of criteria has been used to show technical, organizational and financial aspects. The tables relate to each of the three topics covered by the modules of this publication, namely: Technical Solutions, Participation and Financing.*

- *The **Technical Solutions** table compares the specific local conditions, and the technology employed.*
- *The **Organization** table compares the roles of the participants, and the organizational performance of the different projects.*
- *The **Financing** table shows the financial models and the degree of cost recovery.*

# TECHNICAL SOLUTIONS

<b>Project /Location</b>  <b>Topic</b>	<b>Waste Management as a Component of a City-Wide Upgrading Programme in Ahmedabad, India</b>	<b>Waste Management as a Component of an Upgrading of Favelas in Fortaleza, Brazil</b>	<b>Waste Management as a Component of an Urban Upgrading Project in San Salvador, El Salvador</b>
<b>Physical Conditions</b>	<ul style="list-style-type: none"> <li>- inner-city slums, often with high population densities</li> <li>- locations not always suited for permanent settling</li> </ul>	<ul style="list-style-type: none"> <li>- relatively consolidated areas with medium built densities (favelas), mostly on the urban periphery</li> <li>- municipal sewage (treatment) facilities are often located at great distances from the settlements</li> </ul>	<ul style="list-style-type: none"> <li>- densely inhabited, largely consolidated, approx. 50 year-old informal settlement (housing rights already accredited by city and government)</li> <li>- difficult topographic situation on slope vulnerable to erosion and landslips, and partially to flooding</li> </ul>
<b>Technical Solutions</b>	<ul style="list-style-type: none"> <li>- waste water canalization (simple gravity-based systems without pumps) including individual domestic connections</li> <li>- refuse disposal using installed containers (drop-off system)</li> <li>- unsealed surfaces for rain water drainage</li> </ul>	<ul style="list-style-type: none"> <li>- system of sewage canals; connection to collector tanks (septic tanks) per 100 households in out-lying areas</li> <li>- domestic refuse separation (retrieval system) and composting of biodegradable waste in one favela</li> </ul>	<ul style="list-style-type: none"> <li>- construction of a new sewage network (with minimized pipe sizes for cost-reduction)</li> <li>- replacement of existing latrines with domestic sanitary connections and indoor toilets</li> <li>- construction of retaining walls and rainwater drainage</li> <li>- connection of the settlement to municipal refuse removal service</li> </ul>
<b>Comments and Problems</b>	<ul style="list-style-type: none"> <li>- not very innovative; standard technical solutions (canalization)</li> <li>- relatively low costs for individual sanitary connections through use of natural inclines</li> </ul>	<ul style="list-style-type: none"> <li>- use of composted biodegradable waste for community gardens</li> <li>- additional measures for environmental and hygiene education</li> </ul>	<ul style="list-style-type: none"> <li>- water supply, social organization, and legalization of the settlement (awarding legal land titles) complimented by waste management and sanitation measures</li> <li>- necessary eviction of about 5-10% of the inhabitants of areas vulnerable to erosion and flooding (construction of alternative housing within the project area)</li> </ul>



## COMPARISONS

### Self-help Sewage System in Karachi, Pakistan

- medium to high density
- precarious hygienic initial situation
- large, predominantly homogeneous area
- natural canals are used as sewage collectors

- OPP\* plans an overall concept for the area that makes use of canals, natural inclines and existing piping
- the city administration converts natural canals to covered sewers
- development of simple, adapted standards for street canals, control shafts, and connections

- practical self-help by residents (for ground work)
- building work supervised by residents
- cost reduction of up to 80% through using existing systems and adapted standards (small pipe diameters, laid shallow)

### Refuse Collection and Urban Hygiene at the Urban Periphery in Rosario, Argentina

- mostly medium built densities
- informal area in peripheral location
- diverse condition of houses
- unpaved, narrow roads, difficult for trucks to access

- refuse collected with handcarts and unloaded into removable containers
- cleaning and maintenance of container sites
- lawn mowing on vacant lots
- cleaning of sewage ditches
- environmental education

- refuse collection and measures for urban hygiene in an area with 11,000 inhabitants organized by a cooperative
- Transportation of refuse to municipal dumps depends on private contractors with motorised vehicles

### Refuse Collection in Peri-urban Settlements near Cairo in Geziret el Sheir, Egypt

- medium built density
- high groundwater table
- location on a Nile island, therefore danger of uncontrolled refuse disposal in the river
- poor accessibility for municipal refuse trucks

- local door-to-door collection of refuse in plastic bags (retrieval system)
- delivery of refuse to municipal dump

- sewage disposal carried out through regular, paid emptying of latrines and cesspits

### Innovative Refuse Management in Cotonou, Benin

- formal peripheral settlement with relatively low built density
- located at the border of a lagoon; therefore often partially flooded
- refuse is sometimes used as fill to raise the ground level

- establishment of door-to-door domestic refuse collection financed through subscription fees
- refuse collection with handcarts; further transportation by responsible NGO
- central refuse separation and retrieval of recyclables
- establishment of recycling activities to finance the system

- not all inhabitants subscribed
- informal dumping grounds still used
- recycling necessary to cover high costs of transporting refuse out of the city
- project has become a model: refuse from other districts is being sorted and recycled

# ORGANIZATION

Project / Location Topic	Waste Management as a Component of a City-Wide Upgrading Programme in Ahmedabad, India	Waste Management as a Component of an Upgrading of Favelas in Fortaleza, Brazil	Waste Management as a Component of an Urban Upgrading Project in San Salvador, El Salvador
<b>Stakeholders and their Roles</b>	<ul style="list-style-type: none"> <li>- city administration (organization and establishment of cooperation, implementation of technical measures)</li> <li>- NGO (residential participation, social services, micro-credits, data collection)</li> <li>- community based organizations (local partners of the city administration)</li> <li>- private sector (cofinancing of technical measures)</li> </ul>	<ul style="list-style-type: none"> <li>- city administration and the federal state administration (for preliminary research and financing)</li> <li>- GTZ for organization of development cooperation; PRORENDa Urbano as executing organization</li> <li>- residential councils (participating in planning, implementation and administration)</li> </ul>	<ul style="list-style-type: none"> <li>- NGO FUNDASAL as project executing organization</li> <li>- community association and neighborhood self-help groups</li> <li>- city administration of San Salvador</li> <li>- sectoral institutions for water supply, sewerage, and electricity</li> </ul>
<b>Organizational Problems</b>	<ul style="list-style-type: none"> <li>- problems of cooperation between different agencies</li> <li>- unclarified site ownership initially inhibited upgrading measures</li> <li>- residents' insecurity and lack of trust</li> </ul>	<ul style="list-style-type: none"> <li>- highly fluctuating contributions from voluntary workers</li> <li>- low neighborhood identification and little willingness to participate</li> </ul>	<ul style="list-style-type: none"> <li>- relatively large effort needed for education and supervision of neighborhood self-help groups</li> </ul>
<b>Organizational Achievements and Services</b>	<ul style="list-style-type: none"> <li>- comprehensive approach to city rehabilitation; improvement of overall living conditions</li> <li>- coordination of multiple stakeholders</li> <li>- training program aimed at all stakeholders encouraged cooperation</li> <li>- horizontal and vertical exchange of experience</li> </ul>	<ul style="list-style-type: none"> <li>- support for residents' participation through establishment of local development councils at the neighborhood level, as well as superordinate organization at the city level</li> <li>- institutionalization of stakeholder participation</li> <li>- training program for inhabitants</li> <li>- establishment of micro-credit program</li> </ul>	<ul style="list-style-type: none"> <li>- establishment, education, and supervision of neighborhood self-help groups by social workers and the executing organization's technical staff</li> <li>- inclusion of city administration and sectoral institutions in the planning and implementation of measures</li> </ul>

### Self-Help Sewage System in Karachi, Pakistan

- the NGO, OPP as project executing organization (initiation, planning, training, organization, consulting)
- residents (implementing, maintaining and extending the systems)
- city administration (converting existing canals into main sewage ducts)

- large informal settlement neglected by authorities
- hitherto, cooperation with the responsible authority (Water and Sewerage Corporation - WSC) was not possible

- drafting of a master plan for Orangi through OPP
- decentralized, extremely participative organization of building work and management
- individual house groups responsible for individual sections of canalization
- dissemination of the concept through training of key persons

### Refuse Collection and Urban Hygiene at the Urban Periphery in Rosario, Argentina

- city administration (employer and consultant in the founding of the cooperative)
- GTZ for organization of development cooperation; as consultant for planning and defining the project area, as well as interest free loan for start-up financing
- members of the cooperative service enterprise

- complex form of organization (for the cooperative) in terms of contractual arrangements with the city administration and social insurance
- is to be handed over to the private sector

- city administration renews the cooperative's contract on a monthly basis, which puts sustainability into question, unless the contract and/or the organizational arrangements are optimized to better suit the cooperative's activities

### Refuse Collection in Peri-urban Settlements near Cairo in Geziret el Sheir, Egypt

- city administration (transportation of refuse to municipal dump, administrative support, financing of truck drivers)
- CBO, local community development association (CDA): responsible for all measures, including the operation of refuse trucks
- youth volunteers (fee collection, street cleaning, cleaning campaigns)

- system dependent on youth volunteers
- problems with determining fees for large households, and with animal waste

- strong resident identification with the system (local ownership)
- voluntary input together with a "modern" organizational format (CDA)
- functioning refuse collection system
- extensive cost-recovery through fees
- good cooperation with city authorities (local-local-dialogue)

### Innovative Refuse Management in Cotonou, Benin

- local NGO (motivating residents' participation and organizing refuse disposal)
- residents (pay for refuse collection); the city administration (finances transportation of refuse to central refuse sorting facility, and pays for sorting refuse from other districts); foreign donors (finance initial phase)

- residents association unable to manage refuse collection system as originally planned
- inefficient fee collection
- difficult coordination with city administration
- NGO sometimes unable to cope with rapid expansion of activities

- establishment of a self-financing refuse collection system
- partial privatization of refuse collection
- sorting and recycling large amounts of refuse from other districts
- new skills and technologies required as recycling capacities built up

# FINANCING

<b>Project / Location</b>  <b>Topic</b>	<b>Waste Management as a Component of a City-Wide Upgrading Programme in Ahmedabad, India</b>	<b>Waste Management as a Component of an Upgrading of Favelas in Fortaleza, Brazil</b>	<b>Waste Management as a Component of an Urban Upgrading Project in San Salvador, El Salvador</b>
<b>Financing Model</b>	<ul style="list-style-type: none"> <li>- the city administration, the inhabitants and the private sector each carry one third of the investment costs for technical infrastructure (total costs: US\$ 150 per household)</li> <li>- mandatory savings to ensure residential contributions (savings program is administered by an NGO bank)</li> </ul>	<ul style="list-style-type: none"> <li>- the program is financed by the GTZ, the city administration, and the federal state administration (during the last phase)</li> </ul>	<ul style="list-style-type: none"> <li>- most of the project costs are financed by grants from external donors (KfW, German financial cooperation)</li> </ul>
<b>Cost Recovery</b>	<ul style="list-style-type: none"> <li>- external support for the city administration from the World Bank and other donors</li> <li>- donations from local industry</li> <li>- maintenance of neighborhood facilities through residents' contributions</li> <li>- refuse disposal by private contractors who charge fees</li> </ul>	<ul style="list-style-type: none"> <li>- financing includes residents' contributions</li> <li>- maintenance costs for sewage systems are borne by residents (approx. US\$ 1 per household per month)</li> </ul>	<ul style="list-style-type: none"> <li>- only small contributions from target groups; credits only available for connection to sewage system</li> <li>- sectoral institutions charge the usual (subsidized) fees upon taking over sewerage management tasks</li> <li>- maintenance of canalization is done through residents' groups</li> </ul>
<b>Comments and Problems</b>	<ul style="list-style-type: none"> <li>- waste management as a "joint effort " by the city administration, residents and the private sector</li> <li>- financial support from the private sector depends on the general economic situation</li> <li>- in some cases, residents had difficulties in paying the agreed contributions</li> <li>- the NGO bank, SEWA, proved to be a reliable intermediary in the financing of residents' contributions</li> </ul>	<ul style="list-style-type: none"> <li>- costs for rehabilitating sewage systems reduced through use of appropriate technical standards (US\$ 750-1,000 per household; otherwise usually between US\$ 1,000 and 1,500)</li> <li>- nevertheless, the state, the city and the external donor (GTZ) carry relatively high costs for financing the individual sewage systems</li> </ul>	<ul style="list-style-type: none"> <li>- traditional financial plan that largely relies on external donors</li> <li>- relatively high total costs per household (approx. US\$ 4,000, including water supply), especially because of expenditure on retaining walls and erosion protection</li> </ul>

## COMPARISONS

### Self-help Sewage System in Karachi, Pakistan

- planning and advice to residents provided free of charge by OPP
- main sewage ducts financed and operated by the city administration
- residents pay for toilets, domestic connections and "their" section of the canalization in cash (no credits)

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

- almost no external financing
- an example of economically viable solutions in very poor areas

### Refuse Collection and Urban Hygiene at the Urban Periphery in Rosario, Argentina

- city administration finances waste disposal for the entire city
- a cooperative services the project areas on behalf of the city
- start-up financing and partial financing of equipment with interest-free credit from the GTZ
- grant for financing equipment from provincial government

- cost recovery through property tax
- the cost of refuse collection by micro enterprises or large companies costs the same

- short-term contracts inhibit investments for building up activities (e.g. for buying a vehicle to transport refuse to the municipal dump, which would avoid depending on a large waste disposal company)

### Refuse Collection in Peri-urban Settlements near Cairo in Geziret el Sheir, Egypt

- city administration (transportation of refuse from neighborhood to municipal dump, administrative support and financing of refuse truck drivers)
- CBO, and community development association (CDA) organize the operation of the system (operation of refuse trucks)
- youth volunteers collect fees by "selling" refuse bags

- ongoing operation of local system is financed through fees
- approx. 80% of vehicle purchase costs are covered by fees

- problems with determining fees for large households and animal waste
- refinancing of refuse collection vehicle not fully secured
- partial subsidization by city administration

### Innovative Refuse Management in Cotonou, Benin

- initiation and testing of activities (collection, separation, recycling) with start-up financing from external donors
- activities are restructured into economically viable units
- partial or complete privatization of economically active units
- limited finally to supervisory functions and disseminating the idea

- refuse collection system covers its costs
- refuse separation covers its costs, if the city administration pays regularly
- recycling activities are being established and economically tested

- unreliable payments from the city administration
- prices for recyclables fluctuate
- market for recyclables needs to be developed
- highly professional work demanded of NGO employees

# COMPARATIVE ASSESSMENT OF THE CASE STUDIES

## SUMMARIZED ASSESSMENT - GENERAL CONCLUSIONS

### ORGANIZATION

1. Participation of residents in target districts is a decisive factor in initiating and operating the systems. A sense of identification and ownership is particularly necessary in those cases that depend on the input of residents. When it comes to waste management and sanitation, the value of this kind of local ownership cannot be underestimated.
2. Modern types of organization, such as clubs, CBOs, and associations, usually provide a more effective basis for organizing waste management than traditional forms (councils of elders, clans, caste groups etc.). The volunteers in Geziret El Sheir, the new councils in Fortaleza, or the NGO in Benin are examples of such modern organizational structures.
3. It is important that all participants are suitably trained and that actors are able to negotiate and cooperate. Referring to positive examples, by, for example, visiting projects, can play a highly motivating role in this.
4. Successful projects have usually established vertical and horizontal connections to other groups and with state authorities.

### FINANCING

1. Some successful projects finance their running expenses through fees, but the ways they are raised vary greatly. Directly linking payments to usage, as in the case of refuse collection in Geziret El Sheir, is an exception. Indirect payments, through taxes or other fees, are more common.
2. None of the project examples has secured complete cost recovery. Even in the case of OPP in Karachi, neither the city's contribution to the infrastructure, nor OPP's consultancy services were included in the accounting.
3. Willingness to pay mainly depends on the extent of resident participation and their identification with the system. Advantages are not appreciated until they are experienced at the individual level. While the importance of a functional sewage system, for example, is often only felt by the community as a whole, individual sanitary connections provide an immediate, personal improvement, which people will readily invest into. A combination of both aspects - as in Geziret El Sheir or in Karachi - will lead to the realization that benefit to the community also benefits the individual.

### TECHNICAL SOLUTIONS

Successful technical systems meet the following fundamental criteria:

1. They provide services comparable to conventional systems, but at a lower price, or provide higher quality at the same price (see Geziret El Sheir, Egypt and Rosario, Argentina ).
2. They are adapted to the level of technical expertise and organizational capabilities of the inhabitants and other project stakeholders. Equipment and installations must be easy to maintain.
3. The larger the project area (or envisaged project area), the more systematic and rational the technical solutions should be. The work of OPP in Karachi is an impressive example of how this should be done.
4. Practical experience is a prerequisite for the successful application of technical systems or their use in different situations.

# 4

## CONCLUSIONS

*This chapter presents the most important conclusions derived from practical experience to date. In addition to general conclusions, **political-institutional, socio-cultural and technical considerations** are discussed.*

*The conclusions in this chapter are based on a **limited number of case studies**, described in detail in the previous chapters. Their implications cannot always be generalized, and therefore, as a supplement, **other project experiences** are documented in the annex.*

# GENERAL CONCLUSIONS

## **Variety of formal and informal solutions**

The projects described earlier, as well as those in the annex, illustrate the enormous variety of current solutions. This is especially true in the areas of organization 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.

## **Broad spectrum of stakeholders**

## **Social acceptance and participation as pre-condition for waste management measures**

Social acceptance of, or residents' identification with a system, seem to among the most important requirements worldwide for their introduction, and ensuring their financial and organizational 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 also possible in difficult situations**

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

## **Sustainable solutions through secure financing of operational costs and integration with city level super-ordinate systems**

In addition to financial security, organizational 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 preparation processes because of the number of stakeholders and the variety of aspects involved (technical, financial, and organizational). Possible short-term success should not however, take precedence over securing the sustainability of improvements.



## GENERAL CONCLUSIONS

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 (see Karachi), assuming that projects in large areas or entire districts are carried out in manageable, socially coherent segments.

**Higher chances of success in socially and economically homogeneous areas**

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; utilization of feces /wastewater for irrigation; utilization 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.

**Economic incentives for waste management measures**

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

**Preference for locally adapted technologies**

## POLITICAL AND INSTITUTIONAL ASPECTS

### **Willingness of responsible authorities to cooperate is more important than decentralization 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 decentralization or the autonomy of self-management groups is secondary. Projects such as Geziret El Sheir, which are carried out in the context of extremely centralized administrative systems, show that upgrading projects are possible in nearly every kind of bureaucratic environment. The case studies further illustrate that 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 recognizing 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 organizations 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 (Ahmedabad) to mere toleration (Karachi). 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 formerly 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 organizations 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. In many project areas, the ability to cooperate in this way was something new to the authorities. Moreover, many sectoral authorities – e.g. in Karachi – disapprove of self-help, despite their own lack of resources and their subsequent inability to perform the tasks themselves.

### **Ability to recognize and cooperate with self-help initiatives**

## POLITICAL AND INSTITUTIONAL ASPECTS

Interactions between those at the local (project area) level and the administration level differ and hardly ever follow a common pattern. Although central institutions can effectively coordinate cooperation – as does the city administration of Ahmedabad, for example, which has taken over responsibility for organizing potential partners for urban upgrading – their distance from the problems can slow down or inhibit local organization. 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.

**Various forms of cooperation between local initiatives and city administrations**

**The role of local administrations**

Cooperation between official authorities and CBOs or NGOs can entail conflict. In the Indian city of Bangalore, for example, government or administration representatives claimed jurisdiction and encountered resistance from a community group involved with participation. 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.

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

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 neighborhood are not feasible unless the local administration takes part. New forms of democratic legitimization have mobilized politicians' interest in "their" electoral constituencies, which can have an operational effect on waste management projects in urban poor settlements.

**Possibility of sustainable improvements through cooperation with responsible public institutions**

The private sector is becoming increasingly important for waste management projects in neglected districts. In some cases, existing private service providers were contracted, as in the settlement at Kassagby in Gizeh (Egypt). In other areas, such as Rosario (Argentina), a cooperative company was founded as a micro-enterprise (microempresa) that offers commercial waste disposal services in lieu of the city administration.

**Increasing importance of the private sector**

# SOCIO-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 organizational potential inherent in the Community Development Associations (a kind of state-controlled CBO) that are the equivalent of traditional Islamic city organizations, 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 organize themselves according to their rural origins and maintain contact with the hinterland. In many countries, groups, especially ethnic groups, organize 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 neighborhood organizations for mobilizing residents**

Neighborhood organizations 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.

## SOCIO-CULTURAL ASPECTS

In many countries Non-Governmental Organizations (NGOs) have diversified, professionalized, and developed beyond the narrow scope of religious, philanthropic, or charitable aid organizations. Many of the organizations involved in environmental issues are also involved in refuse management (e.g. CARE, ENDA). The case studies show that most successful projects involve NGOs, some even in pivotal positions, as in Karachi for example. 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 organization. The international NGO, ENDA, for example, was responsible for everything from preliminary research to the acquisition of international loans in a project in Sale, Morocco. NGOs often initiate or replicate successful project concepts and have accumulated considerable detailed knowledge of their fields.

**Specialized and socio-culturally attuned NGO experiences**

# 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 under Typology, in Chapter 1 of this volume, 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 organized, have a strong sense of local identification and social regulation, are less likely to suffer from gentrification despite substantial increases in property values following legalization.

## **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 canalization, in highly consolidated, densely built environments, because of the intense organizational and participatory effort involved.

## TECHNICAL ASPECTS

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. (Short term alleviation measures are not, however, the subject of this publication.)

**Short-term emergency measures in vulnerable and hazardous locations**

Geographical factors, such as soil conditions, precipitation, temperature and topography, influence system design. Drainage systems, for example, are easier to realize 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.

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

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.

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





# 5

## RECOMMENDATIONS

*This final chapter compiles **recommendations** for the design of waste management and sanitation projects in urban poor settlements.*

*The 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 always contribute.*

*Pointers are given for the **planning and preparation** of projects, the **implementation** of measures, observing their effects and disseminating their results.*

***Fundamental principles** regarding **technical solutions, participation, self-help, financing and operational organization** of waste management and sanitation projects are illustrated in table-form. Each of these topics is additionally described in further depth in the separate modules of this publication series.*

# INTRODUCTION

The case studies clearly reveal that **improving waste management** in urban poor settlements **in sustainable ways requires more than the solution of technical problems** alone. Various other aspects of urban management must also be considered. Waste management issues are usually tackled within the context of more comprehensive measures of urban rehabilitation or administrative restructuring processes.

"Projects", in the sense of short-term interventions, often occur within the framework of official technical cooperation. Under favorable conditions, a project can initiate and test new approaches, and support their dissemination. However, projects are also subject to conditions and restrictions imposed by their respective donors. For this reason, measures that secure quick, presentable success are unfortunately often prioritized over more gradual, but more sustainable solutions.

A **project** should principally try to operate at two levels:

- **at the local level** by noticeably improving living conditions for inhabitants of a project area.;
- **at the structural level** by testing and disseminating new organizational forms, procedures, and technology.

The recommendations made in this chapter apply to "projects" in the sense mentioned, and only indirectly to the long-term restructuring processes of which they are commonly a part. References to the GTZ's directives for technical cooperation projects have been deliberately omitted here. The following recommendations can

neither replace them, nor be considered sufficient material for project implementation alone. **Generic formulas** for the successful establishment and sustainable operation of innovative waste management and sanitation systems **do not exist**. Nevertheless, general recommendations can be expressed for consideration in the local, participative context.

The following pages include a summary of recommendations for project planning and implementation. More detailed information can be found in the separate modules of this publication series.

## Three especially important principles:

1. **A spatially or contextually limited perception of waste management projects can have unexpected and undesirable side effects.**
2. **Sustainable systems require the inclusion of local stakeholders as project agents and partners in planning as well as in implementation.**
3. **Sustainability depends on linking potential solutions at the local and supra-local level with city-wide systems.**

# INITIATION AND SUPPORT

The case studies show that waste **management measures** are originated **in a wide variety of ways**.

- **Grass roots pressure** is a frequent reason for initiating upgrading. A community organization might, for example, drive forward waste management improvements during the consolidation of a settlement.
- One of the most successful examples (OPP, Karachi), shows that extensive and replicable measures can also be initiated **by an NGO**, acting as an intermediary between the urban administration and the inhabitants.
- Waste management projects are often undertaken **as components of more extensive rehabilitation programs**, because their chances of success are usually better when combined with legalization and infrastructural upgrading.
- When waste management projects are parts of international technical cooperation programs, they are not necessarily limited to single neighborhoods or areas, but can develop **general system solutions**.

## Recommendation

**A new project should tie in with existing trends, initiatives, and potentials. Projects that support ongoing reform efforts with organizational, financial and technical know-how have good chances of success. Insisting on novel mechanisms despite resistance from project partners or important stakeholders is much less promising.**

**The motto could be: "Go with the flow!"**

# PLANNING AND PREPARATION

Making projects appropriate to local circumstances requires a **careful analysis of expectations, problems, and the potentials** of possible **partners or stakeholders**. These include:

- **political representatives** (at the local and national levels);
- **ministries** and their local counterparts (so called line ministries), as well as technical departments that, in some countries, offer technical services or products (e.g. construction of drainage, toilets, etc.);
- **city administrations** or those administrative departments concerned with waste management and sanitation;
- relevant **research or development institutions**;
- **non-governmental-organizations** (NGOs);
- **inhabitants and their organizations** (CBOs, associations, neighborhood groups, etc.);
- **private companies** involved in waste management (ranging from large firms to informal sector enterprises);
- **local experts** for technology, participation, financing, etc.;
- Representatives from "reference projects" in the country or region.

## Questions central to project preparation:

- Which **problems** can be identified (e.g. specific health risks, seasonal flooding, impaired open spaces, etc.)?
- What **needs** to be done (drainage, sewerage, refuse collection)? External and internal perception of priorities may differ. Careful attention should be paid to target groups' opinions.
- Which **possible solutions** are available, and what are their expected consequences (cause-and-effect analysis)? Financial feasibility and operability should have a high priority.
- What are the **potentials of different stakeholders** (examined individually), and what kinds of cooperation or difficulty might be expected? These usually do not appear until implementation begins, and organizational structures have already been established. It is therefore recommended that respective tasks and expected contributions be clearly defined at the beginning.
- How much **training and education** do the various stakeholders need in order to contribute to the system?
- To what extent are residents **willing to participate** in planning and implementation? If high levels of participation (personal contributions) are expected, residents should be involved as early as possible.
- What are the **financing possibilities**? How much are residents able and willing to contribute financially? It should be born in mind that the source of financing for planning and preparation is usually different to that for implementation and operation.
- What **information** is needed and what is accessible?
- Which **technical solutions** are feasible under the given circumstances?

## Recommendation

A careful problem / stakeholder analysis is indispensable, because stakeholder groups and their respective problems are extremely heterogeneous.

**The aim of preparation: to identify potential partners and/or realistic alliances in order to solve problems!**

# SELECTION OF APPROPRIATE PROJECT PARTNERS

## Choosing the "correct" project agencies is critically important.

Often a number of institutions take over subsystems cooperatively (e.g. local community organizations manage refuse collection within a settlement, while a municipal refuse disposal service deals with its transportation to the dump).

In the least favorable case, appropriate **agencies need to be set up**, or, if they exist but are not capable of the task, they should be given **targeted support**.

## The following criteria are relevant for selecting project partners and implementing agencies:

- **"Self-interest"**: agencies must have a vital interest in the solution of the problem so as to be a "driving force" in project implementation.
- **Capability**: agents must be legally and otherwise able to implement measures in their political-administrative and social environments. If an agency's power is derived only from its association with the project, the long-term sustainability of the solution is unlikely.
- **Cooperation skills**: agencies must be able to operate in participatory and cooperative ways, and base their organizational structures on the horizontal as well as the vertical division of responsibilities.
- **Professional performance**: project agents must have either minimal professional qualifications or experience, or be in a position to acquire the necessary competences (from private consultants, NGOs, government organizations, etc.).
- **Acceptance**: project agencies must be trusted by target groups, or recruit its members from the target group.

# IMPLEMENTATION

## COOPERATION WITH LOCAL ADMINISTRATIONS AND MUNICIPALITIES

**Local governments** or city administrations are **traditionally responsible for technical infrastructure** in waste management arrangements. However, excessive bureaucracy and corruption have greatly damaged their reputation in many countries. Because of their refusal or even occasional inability to offer adequate solutions, popular skepticism toward public rehabilitation programs has increased, while willingness to contribute through taxes or fees has simultaneously diminished. Although **increasing cooperation with the private sector, NGOs, and with inhabitants** has resulted in a slight shift of responsibilities, city departments remain the central decision-makers in all waste-related issues.

With regard especially to the provision of **macro-infrastructure**, local administrations cannot be circumvented. Only **strong legitimate administrations**, with a capacity for cooperation and performance, have the ability to implement effective solutions at the city level.

City administrations and institutions must, therefore, **increase their efficiency and flexibility**, adapt their **standards** to local conditions and international developments, and enable residents to take an active part in the improvement of their living conditions.

City administrations may see participative approaches and cooperation with private agencies and NGOs as a loss of power. This can result in conflicts between projects and administrations, although their responsibilities are relieved. City administrations should definitely be involved in decentralized and participative waste management approaches, but they

should not claim an exclusive leadership role.

The possible **scope of action of a local government** or municipality is **determined by its performance** as well as its **degree of autonomy**.

In highly centralized systems, the local arms of the central authority (the so called line ministries) can become important. Among these are, for example, Public Works Departments, which are often responsible for drainage construction and canalization.

### Principles for cooperation with local governments and municipalities

- Local governments as well as city administrations must be prepared to cooperate with other agencies. Because a **broad understanding of project goals cannot be assumed at the outset**, training and awareness programs should therefore be addressed not only to administrative departments, but also to their political leaderships.
- Work with the city administration should not be limited to informal meetings and arrangements, but be as **formalized and result-oriented** as possible.
- Small, local projects should also **support processes of decentralization**. Influence can be exerted by direct cooperation with the authorities in the locality, even if good contacts at the central level exist.
- Publications, guidelines, and regulations should be as **simple and easily understandable as possible**, even if they are not meant for wide distribution. This facilitates the participation of the various different stakeholders in the decision-making process.
- **Participative approaches** or cooperation with private agencies or NGOs should be **agreed on with the city administration** or at least adequately communicated **at an early stage** of the project, so that possible differences with the administration are not seen as competition or conflicts over the distribution of power, even if the administration is being relieved of some of its responsibilities.
- In cases where the local administration is not supposed or not able to participate, it should at least be able to communicate its opinion on a regular basis. Without a **minimal amount of official recognition**, the efforts of residents might come to nothing.

## COOPERATION WITH NGOS AND COMMUNITY-BASED ORGANIZATIONS

Local **NGOs and grass roots organizations** can play a significant role in waste management activities. Their acquaintance with local conditions and, even more importantly, their direct connections to residents, as well as their contacts to other projects and project agencies, should be utilized. Possibilities of cooperation vary greatly according to the different systems involved:

NGOs and/or grass roots associations are especially suitable for the organization and operation of **refuse collection and disposal** systems. They hold a key position as mediators between the population and super-ordinate organizations.

Depending on the technology used, **wastewater management** can be highly localized and/or a municipal undertaking.

A complete sewage system requires, for example, functioning main sewers and centralized operation. The installation and regular emptying of latrines, on the other hand, or the construction of canalization in a residential area, can be effectively accomplished by a local NGO or a private self-help company.

It is normal for **rainwater drainage systems** to be interconnected with district or citywide drainage networks. This affects planning, responsibilities and financing possibilities. Unlike refuse disposal systems, drainage cannot usually be financed directly, but needs to be covered by communal tax revenues. Compared to municipal authorities, NGOs and grass roots organizations play a secondary role in this. Nevertheless, they can make significant contributions to mobilizing the population for the construction and possibly the maintenance of the system.

**Non-Governmental Organizations (NGOs)** are increasingly involved in urban rehabilitation or waste management projects around the world in leading roles, or in cooperative endeavors, or as contributors. They operate as professional intermediaries, with consultancy, mediation, and/or technical implementation functions, and are indispensable as local partners. In some countries, however, the work of NGOs is limited because of a lack of official recognition. In addition, NGOs with differing political views can complicate cooperation with administrations or with each other.

**Community Based Organizations (CBOs)** can be very different in their structures and purposes. Their only common characteristic is that they support the local inhabitants. Cooperation with CBOs can be especially productive in the mobilization of residents' participation. Their partnership can be vital for building confidence, determining local priorities, and for establishing participative community associations. Occasionally, CBOs are entrusted with responsibilities for implementing important components of sewage or refuse management systems in a settlement. They are an invaluable source for defining problems quantitatively and qualitatively via participatory data collection and appraisal techniques (see Module 2 - "Participation and Self-Help").

# IMPLEMENTATION

## COOPERATION WITH GLOBALLY ACTING ORGANISATIONS AND INTERNATIONAL NGOS

Effective communication between multilateral, bilateral, and international organizations in the country can support innovative approaches, and minimize conceptual confusion among partners. In ideal cases, the financing or co-financing for replicating local initiatives elsewhere can also be achieved.

This is also true for communication with supra-regional NGOs, especially the so-called “northern” NGOs (see box) from industrialized nations.

**International NGOs**, such as CARE, Misereor, ENDA, etc., function as donors or mediators. Most of them are based in the north. As "support-NGOs" they fund training and capacity building, and also direct measures, such as refuse disposal. In recent years, they have established extensive networks in parallel to those of official bilateral and multilateral development cooperations.

## COOPERATION WITH NATIONAL GOVERNMENT INSTITUTIONS

National governments are not responsible for dealing with projects at the implementation level, but for providing the necessary **legislative and financial framework conditions for improving local systems**.

Public institutions, as policy-making entities, can be of critical importance, not only because of their direct responsibility for societal development, but also because of their indirect influence on a project's outset.

Projects can be affected above all by:

- **reforms to a country's legal and administrative frameworks;**
- the **recognition**, promotion and “official” support **of new innovative approaches;**
- indirect **influence on a project's surrounding circumstances;**
- **complementary measures** that improve framework conditions.

Nevertheless, waste management projects in urban poor settlements should not depend on reform by, or indeed of central authorities, or even

their support. New concepts are usually generated by the need for innovative problem solutions, and these generally precede the introduction of reforms.



## COOPERATION WITH THE PRIVATE SECTOR

Although the private sector is primarily interested in profiting financially from their participation in a project or measure, the city and the population can also benefit from their involvement. **Private businesses** are not only able to relieve the city administration of service provisions, but often **can work much more effectively**.

Private businesses have the following advantages:

- They are **oriented towards efficiency and performance**, which, because of contractual obligations, results in greater dependability.
- They are **willing to apply** new and **innovative** (especially cost-efficient) **solutions**, because residents are thought of as "customers".
- Their **capital resources and equipment** relieves the city administration from, for example maintaining a fleet of refuse trucks.

Despite these advantages, it is neither financially nor otherwise advisable to assign waste management in urban poor settlements entirely to the private sector. **Private businesses should only take on particular tasks**, bearing the following in mind:

- **Tasks that neither the city administration, nor participating community organizations are able to fulfill** should be assigned to the private sector. These tasks can include the construction of cesspits or main sewage ducts, or the maintenance of drainage systems, or the transportation of refuse to the municipal dump. Occasionally local, private micro-enterprises do take over waste management within a district. When they do, it is important that they should be a complement to, but never substitute for participative approaches;
- It is **important who works with private sector companies**. An NGO may have different expectations from the arrangement than the administration – different attitudes towards “customer requirements” could, for example, produce clashes of concern.

# IMPACT MONITORING

As projects intervene in complex societal relationships, they are subject to numerous influences that can threaten their long-term sustainability. It is therefore sensible to monitor implementation carefully in order to react quickly to any problems that may arise.

The following typical **risks** can occur during project implementation:

- **loss of social cohesion** between residents groups and involved institutions;
- **threats to economic sustainability** due to the absence of open or hidden subsidies, dwindling willingness to pay fees etc.;
- **breakdown of cooperation** between stakeholders due to the personalization of relationships and collaborations.

The following **indicators** can be used for monitoring the impacts and effects of waste management projects:

- **System malfunction** is not necessarily a result of technical deficits. There can be circumstances when behavioral changes are necessary for systems to operate properly but these changes have not happened. When, for example, refuse is habitually dumped in drainage canals, the flows the canals are there to provide become blocked, and this leads to the collapse of the drainage system.
- The **emergence of informal dumps** indicates that people are circumventing the project, and that its acceptance among inhabitants is low.
- Decreasing **cleanliness of public spaces** indicates either a lack of local project identification or organizational deficits.
- **Sustainable financing** must be regarded as one of the central indicators. Without long-term security – from subsidies or otherwise – systems are bound to fail as soon as externally funded projects end. Careful monitoring of the finances of newly established decentralized agencies and training in financial management are therefore indispensable.
- Indicators of health can establish whether the occurrence of **typical diseases** has **diminished** in certain areas. This can point to the success of a project, although a direct correlation is difficult to prove. Other measures, such as hygiene education, can also contribute to health improvements.
- **Projects taken over by local organizations** indicate a high level of local **ownership**.
- Intensive **use and care of public spaces** indicates that inhabitants regard streets and open spaces as fit and safe, and as extensions of their often cramped private houses. .
- A further indicator of success is when a project becomes a **stimulus for local initiatives in other areas** of life quality improvement, and has the ability to acquire funds from third parties, locally, nationally or internationally.

# DISSEMINATION OF PROJECT EXPERIENCE

The **dissemination of successful concepts** must be among any project's fundamental concerns.

This can occur through a variety of ways and at very different levels.

## Possible activities for disseminating project experience

- **Project excursions and study tours** (visiting successful projects in the region), especially during the start-up phase, are a tried method for arousing interest and motivation among inhabitants, NGOs and the local administration.
- The **establishment of local networks** and information systems can facilitate a horizontal exchange of experience (also, if possible, via the Internet). Local networks provide information about projects, solutions, sources of funding and "local experts" (recruited from community based organization, NGOs and private companies), and the networks can encourage horizontal technical cooperation. Local leaders and community based organizations, with their practical experience, can, for example, act as consultants in other projects.
- "**Horizontal learning**" can be acquired through national, international, and regional workshops, and from visiting experts from other projects.
- The **practice-oriented training** of private micro-enterprises, local consultants, community based organizations and NGOs can contribute substantially to the dissemination of successful approaches.
- **City administrations** can especially function **as multipliers** of successful project approaches by applying locally developed solutions in other districts.
- Projects must be **presented in suitable local media** (newspapers, television) in ways appropriate to the target groups.

# RECOMMENDATIONS FOR TECHNICAL SOLUTIONS



The case studies and the recommendations derived from them so far, reveal a number of important principles for the development of technical concepts for waste management projects, which are relevant to their planning as well as their implementation.

The following tables provide a general overview of possible technical solutions along with an assessment of their respective advantages and disadvantages.

Extensive and detailed information for each of the solutions can be found in:

## **Module 1: Technical Concepts**

### **Basic principles for the technical application of waste management measures**

- Tasks in the field of refuse, sewage and rainwater disposal can require very different technical systems, procedures, facilities and equipment, according to the resources and the financial means at hand.
- As a general rule, these should not be regarded individually, as separate instruments, but always in the greater context of a complete system in which socio-cultural, financial, and technical aspects play a role.
- The choice of a suitable technology is generally unproblematic. It is rather factors such as social acceptance, the ability to operate the equipment and the associated procedural structures and economics, which are decisive for the sustainability of each solution approach.
- In order to achieve the desired economies in waste management, technology and procedures must be adapted to local conditions.

# RECOMMENDATIONS FOR TECHNICAL SOLUTIONS

## SOLID WASTE

System Component	Advantages	Disadvantages	to be considered
<p><b>Drop-off systems</b> Individuals bring refuse to central collection points; emptying and disposal by service providers</p>	<p>inexpensive; possible even in very poor areas; vehicle wide streets not required; suitable for self-help; potential for refuse separation</p>	<p>requires user interaction; fees not related to quantity (no financial incentive to reduce amount of refuse); no control of refuse at collection points</p>	<p>refuse collection points should be restricted to specified areas; capability of those responsible for further transportation should be checked</p>
<p><b>Pick-up systems</b> Door-to-door collection; refuse transported directly to dump or reloaded onto truck for disposal</p>	<p>creates employment; fees related to quantity and/or households; control over where refuse is; intermediate storage in households facilitates separation and composting</p>	<p>some infrastructure is needed; space for, and acceptance of intermediate storage in houses; willingness to pay fees is required</p>	<p>regular removal needs to be ensured so that user acceptance is not jeopardized</p>
<p><b>non-motorized systems</b> Refuse transported from households with simple vehicles (hand or animal drawn carts, bicycle rickshaws, etc.)</p>	<p>suitable for self-help; easy handling; versatile; first step towards self-help based refuse management</p>	<p>limited transporting capacity; limited range</p>	<p>loads and routes should be adapted to capabilities of persons and/or animals involved</p>
<p><b>motorized systems</b> Waste transportation with motorized vehicles with bigger load and distance capacities</p>	<p>efficient transportation of large amounts of refuse over long distances</p>	<p>high investment and operational costs; limited application in poor settlements because of maintenance and personnel requirements, and the need for vehicle accessible roads</p>	<p>regular maintenance needs to be assured; overloading of vehicles needs to be avoided</p>
<p><b>Sorting and recycling</b></p>	<p>part financing of refuse management by separating out and marketing recyclables</p>	<p>requires users to know about recycling; marketability of recyclables is necessary</p>	<p>requires careful checking of marketing possibilities; recyclable materials should be separated as well as possible in order to maximize their sales potential</p>
<p><b>Composting</b></p>	<p>reduction of residual refuse; less transport and dump volume; production of valuable fertilizer; low investment costs</p>	<p>requires separate collection of biodegradable refuse; acceptance and marketability required; basic knowledge of composting process needed</p>	<p>climatic conditions need to be considered; the temperature and humidity of composting material should be carefully controlled</p>

# RECOMMENDATIONS FOR TECHNICAL SOLUTIONS

## WASTE WATER

System Component	Advantages	Disadvantages	to be considered
<p><b>On-site solutions</b> <b>latrines</b> Feces disposal without water; collection of feces in outhouse and / or covered pits</p>	simple and cost-effective system; construction with local materials possible; low technical requirements	not suitable in areas built on bedrock, with high ground water levels, danger of flooding or high housing densities; danger of soil contamination	cultural factors need to be taken into account; use patterns, cleaning and maintenance determine success and avoid illness
<p><b>dry toilets / urine separation</b> Division of urine and stools; drying and use as fertilizer</p>	simple and inexpensive; use of local materials possible; no seepage (therefore no danger of soil contamination); production of fertilizer; low technical requirements	careful use necessary; requires knowledge of composting; not widely spread to date; problems with acceptance	attention to hygienic aspects of use of separated feces needed to avoid transmission of illness
<p><b>septic tanks</b> Environmentally safe sewage disposal without connection to canalization; suitable for joint use by several households</p>	widely used technology; requires little maintenance; part conversion of feces into less problematic products; mostly odorless; later connection to canalization possible	relatively high initial investment costs; requires regular paid emptying; minimum flow of water from toilet, bath or kitchen is necessary	attention to be paid to chemical contamination especially from chlorine based disinfectants, which can hamper bacterial conversion of solid waste
<p><b>Off-site solution</b> <b>transportation of effluent using vehicles</b> Emptying of on-site installations (latrines, septic tanks etc.), transportation and disposal of effluent</p>	emptying ensures the regular utilization of on-site toilets; can generate employment; can be done through self-help	vehicle accessibility determines whether emptying is possible; possibility of carrying effluent to accessible collection point by hand, in buckets, barrels etc., is limited	attention to hygienic, technical, and ecological aspects needed; cultural or religious factors in some countries need to be considered
<p><b>unconventional sewages systems</b> According to the solution: shallow laid ducts, ducts across properties, small gradients and pipe diameters, intermediate separation of solid material</p>	low costs because pipe work is simple	requires high user / inhabitant willingness to participate and organize	high maintenance required; users and those carrying out maintenance need to be qualified
<p><b>conventional sewage systems</b> large-volume sewerage ducts with individual household connections laid in streets</p>	"traditional", hygienically unproblematic solution for high density areas; technically simple maintenance; high degree of acceptance	high investment costs; requires regular minimum quantity of wastewater flow; high costs for maintenance and repair	requires maintenance and repair; usually requires connection to the overall sewage system

# RECOMMENDATIONS FOR TECHNICAL SOLUTIONS

## RAINWATER DRAINAGE

System Component	Advantages	Disadvantages	to be considered
<p><b>Rainwater drainage in roads</b> gutters or channels along roads and pathways (normal case in urban settlements)</p>	use of levels and surfacing for run-off drainage	intake capacity of gutters or channels can be limited; flood sluices and possibly rainwater retention tanks may be necessary	requires regular maintenance and cleaning
<p><b>closed and open gutters or channels</b> discharge of rain water through (supplementary) sealed gutters</p>	systematic prevention of flooding and damage through erosion, especially where there are heavy seasonal rainfalls	danger of blockage by refuse and sand; regular maintenance is needed	intake capacities should be determined by costs and maximum expected rainwater (in some cases flooding may have to be accepted on occasions)
<p><b>Rainwater collection in households</b> collection and storage of rainwater from roofs</p>	water supply for domestic use (for washing, watering plants and irrigation, and boiled for drinking water)	high costs for rainwater receptacles where there are big fluctuations of rainfall	requires regular cleaning of roofs and tanks to ensure clean water
<p><b>storage above and below ground</b> collection and storage in larger facilities</p>	supply available for household and commercial use		careful planning and implementation, especially for tanks above ground because of high water pressures
<p><b>Erosion protection drainage for buildings</b> diverting rainwater from foundations and walls</p>	prevention of erosion and undermining of buildings; self-help measures possible	can entail complex and costly construction	
<p><b>terracing of ground</b></p>	slows water flows and prevents landslides; self-help with simple means possible	requires a certain amount of organization and community cohesion; requires regular maintenance	planting trees and bushes improves the way terracing works
<p><b>retaining walls</b> concrete or brick earth retaining walls</p>	securing steep slopes against landslides; possibilities for higher building density	high costs; complex construction; requires skilled construction work	cost-effectiveness of slope-reinforcement measures should be checked

# RECOMMENDATIONS FOR PARTICIPATION AND SELF-HELP



The case studies and the recommendations derived from them so far, reveal a number of important principles for the support of participation and self-help in the field of waste management measures, which are relevant to their conception as well as their implementation.

The following tables provide an overview of the possibilities and limitations of participation, self-help and public relations in the various phases of waste management measures and projects.

More detailed information on the different aspects involved can be found in:

## **Module 2: Participation, Self-help and Public Relations**

### **Basic principles for participation and self-help**

- Appropriate **participation** (involvement and contribution) in the various phases of waste management activities (preparation, planning, implementation and operation) is an important pre-requisite for the acceptance of measures by target groups and their identification with those measures (i.e. **ownership**).
- Personal contributions by the target group/beneficiaries by way of **self-help** can facilitate the financing of waste management measures and be a basis for local identification with the supported activities.
- Participation and self-help are important for the **sustainability** of measures, and also for the enlargement of the scopes of activity poor target groups (**empowerment**).
- Participative approaches involve those affected in the development and implementation of suitable solutions according to their interests and capabilities.
- **NGOs and/or community based organizations (CBOs)** are indispensable **intermediaries** for mobilizing popular participation and self-help in target areas.
- Where these do not exist, the **establishment of appropriate residents' councils or organizations** is normally necessary. A considerable part of a project's capacity should be invested into enabling intermediary organizations.
- The establishment and enabling of such community organizations requires **time, training and consultation**: this involves costs, which should be taken into consideration during the measure's concept phase.
- Every **contributing actor's capacity to participate** must be supported by targeted preparatory training. Appropriate **instruments to encourage residents** and those affected to become involved in planning and implementation should be used (public relations, campaigns, workshops, etc.).
- **Participative data collection techniques** can contribute significantly to project identification, to the effectiveness of planning and to the reduction of planning costs.
- Project **support agencies** should be selected from the numerous possibilities according to their suitability and should adapt to the specific conditions in each context



# RECOMMENDATIONS FOR PARTICIPATION AND SELF-HELP

## PARTICIPATION

Phase	Potentials	Limitations	to be considered
<b>Preparation and identification</b>	<ul style="list-style-type: none"> <li>timely identification of target groups' interests and needs, and potential contributions</li> <li>identification of formal and informal/traditional organizational structures</li> </ul>	<ul style="list-style-type: none"> <li>evoking unrealistic expectations</li> <li>participation depends on numerous sensitive factors</li> <li>possible resistance from state or communal agencies (also occurs in all other phases)</li> </ul>	<ul style="list-style-type: none"> <li>proceed with sensitivity and caution, considering all relevant institutional and socio-cultural contexts</li> <li>first contact should be with key people and/or traditional leaders, who will need to be identified</li> </ul>
<b>Planning and financing</b>	<ul style="list-style-type: none"> <li>improvement of acceptance; encouragement of identification with the projected measures (ownership)</li> <li>clarification of and agreement on target groups' and personal contributions</li> <li>supporting the taking over of responsibilities (empowerment)</li> </ul>	<ul style="list-style-type: none"> <li>target groups' lack of experience; overly high expectations</li> <li>overestimation of possible tasks and contributions</li> <li>high organizational effort, and possibly high costs</li> </ul>	<ul style="list-style-type: none"> <li>realistic estimations and appraisals of target groups' contributions should be made</li> <li>binding agreements on the roles and contributions of participating stakeholders should be made</li> <li>techniques and skills in planning and moderation as well as in decision-making procedures, should be imparted</li> </ul>
<b>Implementation</b>	<ul style="list-style-type: none"> <li>improvement of understanding of technical solutions and processes, as well as managerial and regulatory tasks</li> <li>encouragement of cooperation with different stakeholders (especially public institutions)</li> <li>gaining knowledge in operation and maintenance</li> </ul>	<ul style="list-style-type: none"> <li>most participants have little or no experience in implementing these kind of measures</li> <li>often requires greater organizational effort</li> </ul>	<ul style="list-style-type: none"> <li>appropriate organizational structures need to be established so that target groups can contribute to the supervision of work being carried out</li> </ul>
<b>Management and operations</b>	<ul style="list-style-type: none"> <li>target groups and/or other beneficiaries have better control over the quality and costs of waste management services</li> </ul>	<ul style="list-style-type: none"> <li>possible resistance from institutions responsible for waste management services</li> </ul>	<ul style="list-style-type: none"> <li>encourage target groups to see themselves as "clients"</li> </ul>
<b>Impact monitoring and performance control</b>	<ul style="list-style-type: none"> <li>realistic appraisal of impacts, considering target groups' interests and expectations</li> </ul>	<ul style="list-style-type: none"> <li>often requires greater effort for data collection and analysis</li> </ul>	<ul style="list-style-type: none"> <li>develop appropriate concepts for monitoring, possibly with special research and/or studies</li> </ul>

*in all phases: participants need to have specific, problem-related qualifications or access to advice*

# RECOMMENDATIONS FOR PARTICIPATION AND SELF-HELP

## SELF-HELP

Phase	Potentials	Limitations	to be considered
<b>Preparation and identification</b>	<ul style="list-style-type: none"> <li>development of proposals/ideas by target groups themselves</li> </ul>	<ul style="list-style-type: none"> <li>usually little or no experience with waste management initiatives</li> </ul>	<ul style="list-style-type: none"> <li>possibility of stimulating internal processes (e.g. by providing demand-oriented funding)</li> </ul>
<b>Planning and financing</b>	<ul style="list-style-type: none"> <li>undertaking planning tasks and identifying personal contributions (money payments, or payment in kind or manpower)</li> </ul>	<ul style="list-style-type: none"> <li>limited technical skills; little or no planning experience</li> </ul>	<ul style="list-style-type: none"> <li>ensure there is adequate planning advice and, if necessary, process moderation</li> </ul>
<b>Implementation</b>	<ul style="list-style-type: none"> <li>personal contributions (either financial, or in kind or manpower)</li> </ul>	<ul style="list-style-type: none"> <li>limited financial resources; little opportunity for extensive manpower contributions</li> </ul>	<ul style="list-style-type: none"> <li>support should be given to stakeholders to ensure that self-help contributions are made (and suitably monitored)</li> </ul>
<b>Management and operations</b>	<ul style="list-style-type: none"> <li>taking over maintenance and administrative tasks</li> <li>undertaking of waste management tasks by micro-enterprises or residents organizations (e.g. cooperatives)</li> <li>payment of fees or other contributions</li> </ul>	<ul style="list-style-type: none"> <li>little experience with maintenance and repair</li> <li>economic bases for the setting up of micro-enterprises is often weak</li> <li>lack of willingness to pay fees</li> </ul>	<ul style="list-style-type: none"> <li>qualifications for maintenance and repair, or administration are necessary</li> <li>check the cost-effectiveness of self-help undertakings</li> <li>explain the significance of fees</li> </ul>

## PUBLIC RELATIONS

<b>Preparation and planning</b>	<ul style="list-style-type: none"> <li>explaining the significance of waste management measures</li> <li>informing about support and its conditions</li> </ul>	<ul style="list-style-type: none"> <li>danger of raising unrealistic expectations</li> <li>socio-cultural and target group-specific ways of communicating</li> </ul>	<ul style="list-style-type: none"> <li>provide/obtain realistic information based on careful assessment of basic/framework conditions</li> </ul>
<b>Implementation</b>	<ul style="list-style-type: none"> <li>providing information on the progress of implementation;</li> <li>improving project transparency</li> </ul>	<ul style="list-style-type: none"> <li>additional work and possibly costs (applies to all aspects here)</li> </ul>	<ul style="list-style-type: none"> <li>techniques, instruments, and media should be appropriate to the socio-cultural circumstances and the local "communication culture" (applies in all phases of public relations)</li> </ul>
<b>Management and operations</b>	<ul style="list-style-type: none"> <li>providing information on the quality of waste management services</li> <li>instigating peripheral information campaigns (on payment of fees, health and</li> </ul>		

# RECOMMENDATIONS FOR PARTICIPATION AND SELF-HELP

## COOPERATION PARTNERS AND IMPLEMENTING AGENCIES

Organization	Advantages	Disadvantages	to be considered
<b>Local NGOs and CBOs</b>	<ul style="list-style-type: none"> <li>• good knowledge of conditions and needs</li> <li>• direct contact to target groups</li> </ul>	<ul style="list-style-type: none"> <li>• focus is only on region and/or area</li> <li>• more complex connections are not always identified or considered</li> <li>• sometimes in opposition to state agencies; not always recognized by state or communal institutions</li> <li>• limited capability</li> <li>• long-term cooperation not always possible</li> </ul>	<ul style="list-style-type: none"> <li>• indispensable for implementation of simple technical measures</li> <li>• effective in participative planning and participative data collection</li> <li>• supplementary qualifications and advice is, in most cases, indispensable</li> <li>• often not suited as sole agency, because the areas of responsibility are not always clearly defined</li> </ul>
<b>Nationally active NGOs</b>	<ul style="list-style-type: none"> <li>• often good contact to target groups</li> <li>• can be specialized organizations with professional staff</li> </ul>	<ul style="list-style-type: none"> <li>• not always recognized by state/communal institutions</li> <li>• dependent on external financing</li> </ul>	<ul style="list-style-type: none"> <li>• may require additional qualifications and advice; and, in some cases, financial support</li> <li>• basically well-suited as main agency, although cooperation with other stakeholders/agencies is usually necessary or advisable</li> </ul>
<b>Local governments, other national government departments and sector agencies</b>	<ul style="list-style-type: none"> <li>• usually have mandate or are responsible for waste management tasks</li> <li>• usable existing structures</li> <li>• available problem-solving experience</li> </ul>	<ul style="list-style-type: none"> <li>• often lack service capabilities</li> <li>• bureaucratic structures and hierarchies; influenced by local politics</li> <li>• not always trusted by the population</li> <li>• in some cases, lack of willingness to cooperate with target group</li> </ul>	<ul style="list-style-type: none"> <li>• generally well-suited as main agency, although cooperation with NGOs or CBOs is usually necessary or advisable</li> <li>• usually needs to be qualified and made responsive to cooperate with poor target groups and other stakeholders</li> </ul>
<b>Private sector</b>	<ul style="list-style-type: none"> <li>• operates cost-effectively</li> <li>• often more effective and flexible than public institutions</li> </ul>	<ul style="list-style-type: none"> <li>• mostly little or no experience in cooperating with poor target groups</li> <li>• little interest in working in poor areas, because of lack of financial incentives</li> </ul>	<ul style="list-style-type: none"> <li>• generally not suited as main agency or main cooperation partner; nevertheless important for individual tasks as well as long-term take-over of waste management operations; measures that provide awareness and qualifications are usually required</li> </ul>

# RECOMMENDATIONS FOR FINANCING AND ORGANIZATION



The case studies and the recommendations derived from them so far, reveal a number of important principles for the financing and operational organization of waste management solutions, which are relevant to their conception as well as their implementation.

The following tables give a general overview of advantages and disadvantages of various financial and operational options. In addition, important aspects that should be considered in the selection of appropriate solutions are pointed to.

More detailed information on financing and operational organization can be found in:

## **Module 3: Organization of Operations and Financing**

### **Basic principles for the financing and operational organization of waste management measures**

- Financing of waste management measures or systems is not just economically significant, it also has a great influence on the sustainability of improvements: sustainability-oriented financing keeps money moving in the settlement, which can benefit the entire consolidation process.
- Waste management measures are not normally directly financed, i.e. by users. Residents are usually not willing to contribute financially, especially if formal public systems are supposed to provide services. Inhabitants of poor settlements have limited resources, and will agree to paying small amounts of money only if they see tangible improvements and if fees are charged consistently.
- A frequently raised argument against fees is that it is the state's or city administration's responsibility to provide waste management services. Although correct in principle, this argument does not apply in most informal settlements, because in many countries such public services are often covered indirectly by property taxes, which informal settlers do not usually pay.
- Establishing paid for “services”, such as refuse disposal or maintenance of sanitary installations, is especially difficult in countries where, until now, private initiatives are not allowed. Where privatization of formerly public services has been carried out (as in some Latin American countries, for example), willingness to pay is generally higher.

# RECOMMENDATIONS FOR FINANCING AND ORGANIZATION

## FINANCING OF PLANNING AND IMPLEMENTATION

Possible Sources	Advantages	Disadvantages	to be considered
<p><b>Donors</b> from the "outside": external resources from state, non-state, or multilateral donors</p>	<p>secured financing; large start-off capital</p>	<p>high degree of dependence; specialty of measures; not replicable</p>	<p>external financing is frequently necessary for starting a measure, but is not recommended for longer-term operations</p>
<p><b>National or local government</b> from "above": resources from the public administration / from taxes</p>	<p>controlled, regular cash flow; targetting of larger population groups; extension of measures easily possible</p>	<p>bureaucratic administration; hindrance of self-help solutions</p>	<p>conventional model, limited applicability in poor settlements</p>
<p><b>Self-help</b> from the "grass roots": residents' resources</p>	<p>user ownership; responsibility encourages sustainability</p>	<p>few resources; high degree of management effort; requires voluntary commitment</p>	<p>financial participation is important for building social cohesion</p>

# RECOMMENDATIONS FOR FINANCING AND ORGANIZATION

## FINANCING OF OPERATIONS

Possible Sources	Advantages	Disadvantages	to be considered
<p><b>Fees</b>  <b>complete coverage of costs through fees</b>                      (including investment costs and amortization)</p>	<p>financial sustainability largely secured; transparency of actual service costs possible</p>	<p>difficult to realize because, until now, there has been little acceptance or priority given to cost covering fees for waste management (easier in refuse disposal than in sanitation)</p>	<p>general notes on financing through fees:</p> <ul style="list-style-type: none"> <li>• technical solutions with low investment, operation, and maintenance costs are preferable</li> <li>• aim for the lowest possible management and overhead costs</li> <li>• fees based on the amount of goods or services actually used are preferable</li> <li>• check possibilities for cross-subsidizing</li> <li>• check possibilities of personal contributions to operation (e.g. from user groups, see below and in table "Operational Organizations")</li> </ul>
<p><b>coverage of operating costs through fees</b></p>	<p>financial sustainability largely secured</p>	<p>requires financing investment costs from other sources</p>	
<p><b>partial coverage of operating costs through fees</b>                      either flat rates or subsidized consumer tariffs</p>	<p>financial sustainability of operations at least partially secured</p>	<p>requires supplementary financing of costs not covered by fees; maintenance may be problematic</p>	
<p><b>Grants / subsidies</b>                      complete financing of operational costs through public funding or by external donors</p>	<p>little or no financial burden on users</p>	<p>not financially sustainable; little incentive for waste reduction (refuse, waste water); maintenance and repair usually not secured</p>	<p>not recommended! Subsidizing operational costs is nevertheless common, at least for waste and rainwater disposal, and, to a lesser extent, for refuse disposal. If the project frame does not include the introduction of cost-covering fees, then attention should be given to potential sectoral reforms (the necessity of which is discussed nearly everywhere), which can result in financially overburdening the target group</p>
<p><b>Cross-subsidies</b>                      by charging higher or consumption-oriented fees in formal (better-off) neighborhoods</p>	<p>part financing of operational costs possible; lesser financial burden on poor target groups</p>	<p>usually requires tariff reform, which is difficult to influence at the project level</p>	<p>currently, cross-subsidies are more likely to function the other way around: poor households often pay more for public infrastructure than do the rich</p>

# RECOMMENDATIONS FOR FINANCING AND ORGANIZATION

Possible Sources	Advantages	Disadvantages	to be considered
<p><b>Self-help</b> e.g. maintenance or fee collection by user groups</p>	<p>alternative for more cost-effective operation and reduces the fee burden</p>	<p>requires high degrees of organization; supplementary qualifications usually needed; in the main, possible in stable communities only; personal contributions can only cover part of the operational costs</p>	<p>especially suitable for measures in particular districts that are not connected to superordinate systems (e.g. localized waste or rainwater disposal systems); in other cases, functional connections to superordinate systems are invariably needed</p>
<p><b>Commercialization of recyclables</b> refuse sorting, processing, and recycling</p>	<p>generates income and employment opportunities; part financing of refuse disposal costs is possible</p>	<p>requires certain minimum standards and usually supplementary qualifications, especially in business administration</p>	<p>depends on commercial situation and quality of recyclables; refuse in poor settlements does not often contain recyclable materials</p>

# RECOMMENDATIONS FOR FINANCING AND ORGANIZATION

## FORMS OF ORGANIZATION AND OPERATIONS

Operators	Advantages	Disadvantages	to be considered
<p><b>User groups</b> informal organizations without legal status</p>	easily established	not binding, tends to be short term	applicable for selective, temporary initiatives
<p><b>formal organizations</b> with legal status</p>	cost-effective and conducive to community-building; relatively stable organizational form	may require high level of consultancy and qualification; susceptible to social problems within community	applicable in small, manageable areas for measures that require a minimum amount of institutional stability
<p><b>Public authorities</b> <b>local government</b> offices or departments within city administrations</p>	relatively close to target groups; acquainted with local problems; institutional stability	capacities generally not very high, no independent budget, exposure to political influence	governmental or municipal authorities, or enterprises must in general be qualified and made responsive before being able to undertake waste management tasks in poor urban settlements
<p><b>national government</b> public sector agencies or institutions</p>	institutional stability with longtime technical experience (especially specialized sector institutions); relatively secure financing from state budget	possible exposure to state/political influence; standardized approaches; little interest in small decentralized, adapted solutions or working economically	
<p><b>Service providers</b> <b>municipal</b> municipal enterprises with separate budgets</p>	closeness to local problems and target groups; certain degree of economic transparency	capacities normally not very high; mostly dependent on funding from communal budget	
<p><b>national</b> state-owned or public enterprises with their own budget</p>	institutional stability; sometimes with longtime technical experience (especially specialized sector institutions); financed from state budget	often have standardized approaches; little interest in small, decentralized, adapted solutions	
<p><b>private</b> private operators</p>	activities based on cost-effectiveness; better financial sustainability; often better performance	large companies in particular, have little interest in working in difficult poor settlement environments,	micro-enterprises at the neighborhood level can undertake a number of waste management tasks, and generate income and employment opportunities; only reasonable if minimum financing is secured by fees or by public subsidies
<p><b>hybrid forms</b> Public-Private-Partnerships</p>	possibility of mobilizing private capital for joint ventures	possibly needs high coordination and cooperation effort	





## **ANNEX**

- further reference projects;
- literature;
- websites;
- index of abbreviations.

## FURTHER REFERENCE PROJECTS

There are countless projects and initiatives in the areas of sewerage, refuse disposal and recycling, and settlement upgrading in general around the world. The following compilation extends the list of case studies described earlier in this volume with a number of equally interesting projects, which could not be as fully documented as the others. Despite their widespread regional distribution, the selected cases cannot be said to be representative. Evaluations have not been made because

City/Country	Project Name and Dates	Organization	Project Profile
Sambizanga/ Luanda, <b>Angola</b>	Peri-urban upgrading in Angola Kiluanke, Sambizanga (1992-1996)	International NGO with local CBOs and NGO, and the local administration	Linkage between grass roots water, sanitation, and refuse disposal projects to provide the necessary infrastructure
Cairo, <b>Egypt</b>	Association for the Protection of the Environment (APE) - Zabalin (since 1995)	Run by private local stakeholders with support from international organizations	Improving the living conditions of Cairo's refuse collectors
El Alto/La Paz, <b>Bolivia</b>	EL Alto Pilot Project (1996- 2000)	UNDP-Water and Sanitation Program, private agency, local and national administration	Program run in Public-Private- Partnership, conceived for a duration of four years, including the extension and establishment of water-related infrastructure
Salvador, <b>Brazil</b>	Initiative for the urbanization of Favelas (since 1988)	University of Bahia, with support from state and city authorities, and local participation	Improvement measures in favelas

## FURTHER REFERENCE PROJECTS

information was either fragmentary or one-sided, or because authentic on-site experience was not available to this document's advisory team. These short descriptions include contact addresses for more information on the respective projects and the further dissemination of their approaches.

Background and Context	Solutions	Contact
<p>Due to an influx of war refugees, the population in Luanda's peri-urban settlements increased dramatically. Approx. 125,000 people lived in the project area without any infrastructure. Poverty and informality of settlements exacerbated the situation and hampered improvements.</p>	<p>The Canadian NGO Development Workshop, in cooperation with inhabitants, organized the supply of drinking water as well as the construction of latrines. Participants were provided with building materials. Refuse collection was organized on a voluntary basis. In all, the linkage of numerous different measures resulted in beneficial solutions that the inhabitants can finance themselves. Further educational measures complement the programs.</p>	<p>Development WS Angola Office, Rua Rei Katyavala 113, Luanda, Angola Tel: +244 -2-34 83 71</p>
<p>The informal district of Tora, near the city center, is mostly inhabited by Zabalin - the refuse collectors of Cairo. Temporary and even final storage of refuse within the residential area added extreme health risks to the poverty stricken district's existing problems.</p>	<p>Legalization of the district offered inhabitants the possibility of improving their sanitary facilities. Street widening and other associated projects (establishment of a hospital, literacy programs, etc.) are being carried out under the same initiative. As a next step, the Zabalin intend to establish small recycling enterprises outside the district so that, in the future, their housing areas will be free of collected refuse.</p>	<p>Mrs. Yousriya N. Loza, 3 El Nessim Street, Cairo, Egypt, Tel: +2-02-341 45 34 E-mail: merian@orascom.com</p>
<p>While most of the approx. 100,000 households of El Alto near La Paz already possessed domestic connections to drinking water, less than half were connected to sewage or refuse disposal systems. Only one tenth of all roads were equipped with rainwater drainage.</p>	<p>Promotion, financing and technology are being equally tackled by the project, and consist of educational campaigns, earmarked micro-credits, and unconventional sewage systems (as in Karachi) in combination with conventional mains canalization. The measures are, however, all implemented by Aguas del Illimani, a profit-oriented private firm. Inhabitants pay fees.</p>	<p>UNDP – World Bank Water and Sanitation Program – Andean Region, Casilla 8692, La Paz, Bolivia, Tel: +591-2- 31 67 18</p>
<p>In many parts of Brazil, favelas have been a result of rapid urban growth. They are often inhabited by a percentage of better-off families, who, for various reasons, acquire plots. The resulting social distinctions are an obstacle to community life; hierarchies make socially oriented improvement programs more difficult.</p>	<p>Based on in-depth research, a program aimed at improving living conditions in favelas was initiated by the local university. Inhabitants were supported with educational programs, and sanitation and refuse disposal measures were carried out; the authorities were brought into the work. Difficulties resulting from the heterogeneous make up of the population were overcome by their extensive inclusion in the project.</p>	<p>Roberto Luis Moraes Federal University of Bahia Salvador, Brazil Tel: +55-71-247 34 10</p>

## FURTHER REFERENCE PROJECTS

City/Country	Project Name and Dates	Organization	Project Profile
Sao Paulo, <b>Brazil</b>	Projeto Cingapura (1994-97)	City government supported by the Planning Department, and financed by national and international organizations	Waste management improvements as components of sustainable urban renewal
Tomé, <b>Chile</b>	Sustainable Urban Development Tomé (since 1994)	NGO, city administration, research institutions	Use of organic domestic refuse for the regeneration of agriculture, and social and economic sustainability
Bangalore, <b>India</b>	"Swabhimana" (since 1990)	NGO, CBO, and the city administration, with support from a university and an international organization	Improvement of urban hygiene, health, and living conditions, especially for those working in refuse disposal
Malang, <b>Indonesia</b>	Comunity-Based Sewer System - CBSS (since 1985)	Initially carried out by a local NGO alone. International donors and the local administration are now supporting further applications of the project approach	Small sewage system – self-financed by approximately 60 families

## FURTHER REFERENCE PROJECTS

### Background and Context

### Solutions

### Contact

As in many inner-city informal settlements, inhabitants protested against compulsory resettlement to areas distant from their current central locations. But living conditions in the districts were unbearable due to extremely high population densities; an improvement of the built substance was impossible.

So as to give residents of the Cingapura inner-city slum the chance to remain there, multi-storey housing was built directly into the settlement. This "verticalization" eases the density problem. As to infrastructure, such as sewerage and refuse disposal, existing canalization and systems from the surrounding vicinity could be adapted to meet the new demands. In this way, the financial and ecological costs of new settlements in the hinterland were saved.

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Within a few months, almost half of the population of the small town of Tomé near Concepción lost their jobs in the local textile industry. Poverty increased dramatically. Attempts at subsistence farming failed due to the poor quality of arable land in and around the city. The soil was no longer fit for cultivation.

In order to restore the fertility of the soil in and around the city, an NGO organized the composting of organic refuse. All households separated organic material from their refuse. The city administration organized its collection. Self-cultivated foodstuffs are now a substantial part of the diets of the town's poor families. The approach was so successful that Tomé now works with other projects on sustainable urban development.

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Optimizing refuse management and recycling were among the project's priorities. The living conditions of children who had to work as scavengers were to be improved.

An NGO introduced an innovative citywide sanitation and refuse management system. Household refuse separation (paper, plastic, rubber, glass and metal) was promoted. Refuse transportation done with tricycles, composting in public parks and the selling of compost, formed the bases of the system. Educational programs supplemented the measures.

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The medium-sized city of Malang is located on East Java in a high valley laced with rivers. Their insecure banks are used as building sites. Flooding, absence of sanitary facilities and the polluted rivers caused the breakout of illnesses, such as a diarrhea epidemic in 1985.

The project was developed in the affected commune of Tlogomas on the initiative of one of its residents. The inhabitants built and financed the CBSS, which is a system of sewage pipes laid to falls and a purification plant. Purified water is discharged in the river. The CBSS has been and is being adopted in other districts of Malang. Financing is being increasingly taken over by the administration and international organizations.

Via the World Bank: Water  
and Sanitation Program East  
Asia and Pacific (WSP-EAP)  
Homepage: www.wsp.org

## FURTHER REFERENCE PROJECTS

City/Country	Project Name and Dates	Organization	Project Profile
Amman, <b>Jordan</b>	East Wehdat Upgrading Project (since 1985)	International Organization, state institutions and the private (sometimes informal) sector	multiple solutions for the overall improvement of a precariously established settlement
Kibera/Nairobi, <b>Kenya</b>	Comittee of Informal Settlements of Nairobi	CBOs and NGOs, with international support and financing	Establishment of an action-framework for the inhabitants of informal settlements
Inchon, <b>Korea</b>	Green Inchon 21 Programme	City administration (since 1995)	Refuse reduction by relating fees to quantity. Fees finance recycling
Karyan El Oued/ Sale bei Rabat, <b>Morocco</b>	Integrated Community Sanitation Programme	International South-South-NGO, neighborhood initiatives, multilateral financing	Program for stabilizing the housing situation in an area threatened by compulsory resettlement

## FURTHER REFERENCE PROJECTS

### Background and Context

### Solutions

### Contact

Approx. 400 families live in the informal settlement of East Wehdat. It lacked infrastructure, and, because of its illegality, none was provided. Huts were made of poor materials and illiteracy rates were high.

The Housing and Urban Development Corporation (HUDC) and Harvard University had already investigated sustainable approaches in 1990. Legalization was high on their agenda of measures, followed by sanitary and educational programs.

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Over half of Nairobi's 3 million inhabitants live in informal settlements without proper access to infrastructure. Until 1990 they were additionally threatened by eviction. A number of CBOs and other groups are active in these areas. However, lack of coordination between the initiatives was a basic problem.

A framework for potential improvements had first to be established. To that end, an organization was set up to tackle the problems from various directions – legalization, making plans of the settlements, educational programs, participation promotion etc., in addition to sanitation measures.

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Refuse recycling began in the 1970s in Korea because of a scarcity of raw materials. In the late 1980s, economic growth not only resulted in a general reluctance towards separating refuse, but also in a substantial increase in refuse volume. Nevertheless, the construction of a waste incineration facility on the outskirts of Incheon, a city with 2.2 million inhabitants, was met with protests.

The city administration initiated a program for refuse separation in households and re-established recycling. Cooperation of inhabitants was encouraged by charging fees on un-separated refuse by weight. A controlling division of the city administration supervises the functioning of the system and proceeds are invested in extending recycling activities. Fees are leveled according to the economic situation in each housing area.

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Health risks were rampant in the settlement. Sewage flowed through the streets in open channels accumulating refuse on the way, and inhabitants suffered from infections and epidemics.

The city administration wanted to resettle the residents against their will in a new housing area. With its own efforts, a neighborhood initiative constructed a covered sewage channel and also organized additional sustainable improvements.

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## FURTHER REFERENCE PROJECTS

City/Country	Project Name and Dates	Organization	Project Profile
Puerto Morelos, <b>Mexico</b>	Proyecto Nahi Xix (since 1993)	Neighborhood volunteers with support from an international NGO	Regulating decentralized wastewater disposal by using composting toilets. Improving health conditions in a small seaport town
Kathmandu, <b>Nepal</b>	Urban Hygiene and Environmental Education Programmes – UHEEP (since 1989)	GTZ and state institutions	Educational program for urban hygiene and a healthy environment
Villa El Salvador/Lima, <b>Peru</b>	Neighborhood operated sewage treatment plant	NGO and CBO	The wastewater from an informal settlement is collected and, after treatment, used to irrigate its green spaces.
Olongapo City, <b>Philippines</b>	Integrated Solid Waste Collection System (since 1989)	City administration with support from an NGO	Introduction of a refuse separation system, and subsequent recycling and/or composting (in a medium-sized city)



## FURTHER REFERENCE PROJECTS

### Background and Context

### Solutions

### Contact

Although the seaport of Morelos is relatively small, its population is increasing considerably every year due to tourism. Wastewater, especially human feces, had polluted the water in the bay and the rivers, which not only threatened inhabitants' health but also their sources of income.

Composting toilets were built with technical support from the North-American NGO, the Resource Institute, as a decentralized way of dealing with wastewater; in addition, high quality fertilizer was gained. Toilets are built by inhabitants, who help each other reciprocally. Meanwhile, technical know-how has spread far beyond the original project area.

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Nepalese cities are known worldwide to be exceptionally dirty. This situation is in part due to the population's ignorance of how to improve hygienic condition.

The GTZ initiated a program to raise public awareness with teaching courses in regular school curricula, through adult education and campaigns, etc. The possibilities for, and the importance of recycling and improving refuse collection were made known with the help of specially designed teaching material and books in Nepalese.

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Villa El Salvador was set up by the state approximately 25 years ago, and is located on desert at the south of Lima. It was entirely self-built and is densely populated, and has always been known as a well-organized model town. However, due to the general scarcity of water, the settlement of around 300,000 people has hardly any green spaces.

Wastewater is treated and used for irrigation. A small sewage treatment plant provides clean water to establish new green areas in a small city park. An NGO supervises the project. The district administration agreed to do the building work. The project also aims to raise the population's environmental awareness. The sewage treatment plant was built on one of Villa El Salvador's central roads, surrounded by new parks and green spaces.

The city of Olongapo has approximately 250,000 inhabitants, yet did not possess a regular refuse disposal system until the late 1980s. When the city administration set up refuse removal in 1989, a modern system of refuse separation was introduced.

The inhabitants separate their domestic refuse and pay a fee based on their financial circumstances for its collection. The system is partially decentralized. The NGO organizes the neighborhoods and volunteers take over street cleaning. The implementation of these comprehensive measures in so a short period of time was remarkable.

Environmental Sanitation  
and Management Office  
City Council of Olongapo  
Olongapo City,  
The Philippines

## FURTHER REFERENCE PROJECTS

City/Country	Project Name and Dates	Organization	Project Profile
Thiès, <b>Senegal</b>	Set-sétal (since 1993)	Local NGO in collaboration with the UNDP and the city administration	Project undertaken by women, based on refuse management but also active in other areas
Dalifort/ Dakar, <b>Senegal</b>	Settlement Upgrading Project (since 1987)	DUA/GTZ, various levels of the local administration, CBOs and NGOs, as well as the private (sometimes informal) sector	Housing improvement program through legalization, developing infrastructure, and refuse collection
Dar Es Salaam, <b>Tanzania</b>	Community Infrastructure Upgrading Programm (CIP) (since 1995)	Government, state institutions and CBOs, supported by Irish Aid	Sustainable Cities Project (SCP) and state reforms as trigger for decentralized solutions
Caracas, <b>Venezuela</b>	Projecto Catuche (since 1993)	Broad alliance of state and academic institutions, national and international organizations, and the private sector	River rehabilitation and ecological upgrading of the riverside in the proximity of an informal settlement in Caracas

## FURTHER REFERENCE PROJECTS

### Background and Context

### Solutions

### Contact

In the peri-urban suburbs of Thiés, refuse collection and sewage canals did not exist. Financing from international sources was available for infrastructure measures, but a basis for using the money was missing.

A refuse collection and separation system, which especially involved the female inhabitants, was introduced incrementally. Organic refuse is taken on cattle wagons to be composted; metal and plastic is sold. The women receive a steady income from the proceeds and refuse collection fees (of approximately US\$ 1.5). Using the same newly established arrangement, latrines have been built, and their regular emptying is supervised by the organization.

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Improvements in existing informal settlements used to be impeded by numerous economic and bureaucratic obstacles. But in 1987, the national government committed itself to a pilot project in Dalifort for the sustainable improvement of living conditions and to simplifying legal requirements.

Improved cooperation between the authorities and the population led to the legalization of plots and buildings, and to the establishment of simple infrastructural arrangements (refuse collection, individual wastewater connections). In order to secure the positive results of the measures and to encourage their independent dissemination, local organizations were given more autonomy.

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Pilot areas for the SCP were Tabata and Kijitinyama, two peri-urban settlements near the Tanzanian capital. Water supply and disposal, and domestic refuse were the most pressing problems

Infrastructure development was organized by existing CBOs. Sewerage was funded by fees. A decentralized approach to implementation and high degrees of self-reliance help to keep the systems running. Inhabitants regard the sewage system as their own. The CBOs were able to initiate further projects.

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The protection of special zones, including the banks and beds of rivers, is a super-ordinate concern, which leaves little opportunity for participatory initiative. Informal settlements within these areas, such as the Barrio Cartuche in Caracas, are usually not tolerated by authorities, who say they are a source of environmental risks.

In the case of Cartuche, a broad alliance of stakeholders was established including the local population. The informal settlement was "urbanized", i.e. sites were measured and mapped, the area was planned, roads were built, infrastructure was installed, and a local administration was created. Resettlements took place only within the settlement. Building boundaries were defined along the riverbanks in consultation with the inhabitants.

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## WEBSITES

The internet contains a wealth of information on the projects of various donors and institutions. To facilitate the search for up-to-date information, the following websites can be consulted:

### Information on the case studies presented in this volume

#### Ahmedabad

<http://www.ahmedabad-india.com/achievements/slum.htm>

<http://www.clicc.org/html/frames/cs3.htm>

<http://www.hsd.ait.ac.th>

#### Fortaleza

<http://www.gtz.de/prorenda/deutsch/t2ce.htm>

#### Karachi

<http://web.mit.edu/urbanupgrading/upgrading/case-examples/ce-PK-ora.html>

<http://pakdata.org>

### Organisations and institutions providing an overview on urban development issues

#### Cities Without Slums

Initiative of The Cities Alliance. (UN-Habitat, World Bank):

<http://web.mit.edu/urbanupgrading/>

#### Development Planning Unit

(University College London):

<http://www.ucl.ac.uk/dpu/>

#### Forum of Developing Countries

<http://obelix.polito.it/forum/welcome/>

#### Deutsche Gesellschaft für Technische Zusammenarbeit - GTZ

<http://www.gtz.de/>

#### Seite zu nachhaltiger Entwicklung

<http://www.sustainabledevelopment.org/>

#### Institute for Housing and Urban Research IBF

(Uppsala University): <http://www.ibf.uu.se>

#### Institute for Housing and Urban Development Studies IHS (Rotterdam)

<http://www.ihs.nl>

#### One World Initiative

[http://www.oneworld.org/iied/bookshop/td\\_urban.html](http://www.oneworld.org/iied/bookshop/td_urban.html)

#### United Nations

<http://www.un.org/>

### Best Practice Databases

Habitat Spanien:

<http://habitat.aq.upm.es>

UNCHS / Together Foundation:

<http://www.bestpractices.org>

### Overview on sanitation and solid waste management issues

#### Urban Waste Expertise Program

(umfangreiche Literaturlisten zum Thema Abfallentsorgung, Recycling etc.):

<http://www.waste.nl/publ.htm>

#### Water and Sanitation Program

(United Nations Development Programme

(UNDP), World Bank): <http://www.wsp.org>

#### Weltbank: Solid Waste Management

[http://www.worldbank.org/html/fpd/urban/solid\\_wm/swm\\_body.htm#partnerships](http://www.worldbank.org/html/fpd/urban/solid_wm/swm_body.htm#partnerships)

Water and Sanitation:

<http://www.worldbank.org/html/fpd/water/>

## Building technologies and materials, infrastructure, water supply and wastewater

### Centre for Alternative Technology

<http://www.foe.co.uk/CAT/>  
*An Eco-center to test, live with and display strategies and tools for to achieving the best cooperation between the natural, technological and human worlds.*

### GARNET - Global Applied Research Network

<http://info.lut.ac.uk/departments/cv/wedc/garnet/grntover.html>  
*GARNET is a mechanism for information exchange in the water supply and sanitation sector using low-cost, informal networks of researchers, practitioners and funders of research*

### Hyperbrick

<http://www.redestb.es/personal/hyperbrick/index.htm>  
*Un proceso innovador y nuevo en el mercado, que permite la construcción de alojamientos económicos en todas las regiones del mundo.*

### INTERWATER Guide to Information Sources

<http://www.oneworld.org/ircwater/iwginthro.htm>  
*The Guide aims to identify and describe a selection of useful sources of information relating to water supply and sanitation in developing countries. It includes sources available on the Internet as well as those published in conventional formats.*

### IRC - International Water and Sanitation Centre

<http://www.oneworld.org/ircwater/>  
*At the IRC International Water and Sanitation Centre, we believe that access to water and sanitation are basic human rights. Our mission is to help poor people in developing countries to get the best water and sanitation services they can afford.*

### ISAT - Information and Advisory Service on Appropriate Technology

[http://gate.gtz.de/isat/HP\\_isat.html](http://gate.gtz.de/isat/HP_isat.html)  
*Our objective is the increased use of Appropriate Technology in developing countries. This depends on an exchange of experiences and a transfer of knowledge.*

*We offer support for both North-South transfer and South-South exchange of technological knowledge.*

### Low Cost Incremental Housing for Developing Countries

<http://www.net-quest.onthenet.com.au/housing.htm>  
*A product made from a series of conventionally reinforced concrete shells, which are held together with tension cables.*

### Manual Design for Self-Help Building

[http://obelix/forum/manuali/default\\_g.htm](http://obelix/forum/manuali/default_g.htm)  
*It is a multimedia system aimed at cataloguing and discussing techniques and communication tools (e.g., manuals, videos, games, etc) for self-help building programmes all around the world.*

### MAPMAKER - De-mystifying GIS - GIS for Windows

<http://www.pcug.co.uk/~MapMaker/>  
*Map Maker has been designed primarily for development projects in developing countries. It is a simple Geographical Information System (GIS) designed to allow non-expert users to create and manipulate maps on basic personal computers. Using a variety of tools you can navigate around the map, measure distances and areas, draw polygons, lines and symbols, and display and edit data.*

### Sanitario ecologico seco

<http://www.laneta.apc.org/rds/bs/>  
*A system for building toilets*

### Solar Cooking Archive

<http://www.accessone.com/~sbcn/>  
*Informations, construction plans, links about solar cookers*

### Sperimentando l'autocostruzione

<http://obelix.polito.it/forum/autocost/indice.htm>  
*Esperienze degli studenti nel laboratorio tecnologico didattico di autocostruzione della facolta' di architettura di Torino*

### Sustainable Building Sourcebook

<http://www.greenbuilder.com/sourcebook/>  
*Information on alternative building techniques and sustainable construction materials*

### Sustainable Product Development - UNEP - WG - SPD

<http://unep.frw.uva.nl/>  
*A database of sustainable product and service examples*

### TechNet

<http://www.worldbank.org/html/fpd/technet/technet.htm>  
*TechNet is an initiative of the World Bank, designed to encourage understanding and promote the use of science, technology and information in development.*

### Think Tank: Water and Sanitation

<http://www.oneworld.org/ttank/water/front.html>  
*Articles and debate by oneworld*

### Volunteers in Technical Assistance

<http://www.vita.org/>  
*VITA has been helping people in developing countries improve the quality of their lives through the provision of information services*

## INDEX OF ABBREVIATIONS

<b>AMC</b>	Ahmedabad Municipal Corporation
<b>CBO</b>	Community Based Organisation
<b>DFID</b>	Department for International Development
<b>ENDA</b>	<i>Environnement et Développement du Tiers Monde</i>
<b>DC</b>	Development Cooperation
<b>FC</b>	Financial Cooperation
<b>GTZ</b>	<i>Gesellschaft für Technische Zusammenarbeit</i> (German Technical Cooperation)
<b>KfW</b>	<i>Kreditanstalt für Wiederaufbau</i> (German Financial Cooperation)
<b>NGO</b>	Non-Governmental Organization
<b>TC</b>	Technical Cooperation
<b>UNDP</b>	United Nations Development Program(me)
<b>UNICEF</b>	United Nations International Children's Emergency Fund
<b>USAID</b>	United States Agency for International Development
<b>SEWA</b>	Self Employed Women's Association

Abbreviations specific to the case studies presented are explained in the respective context.



# PHOTOS

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