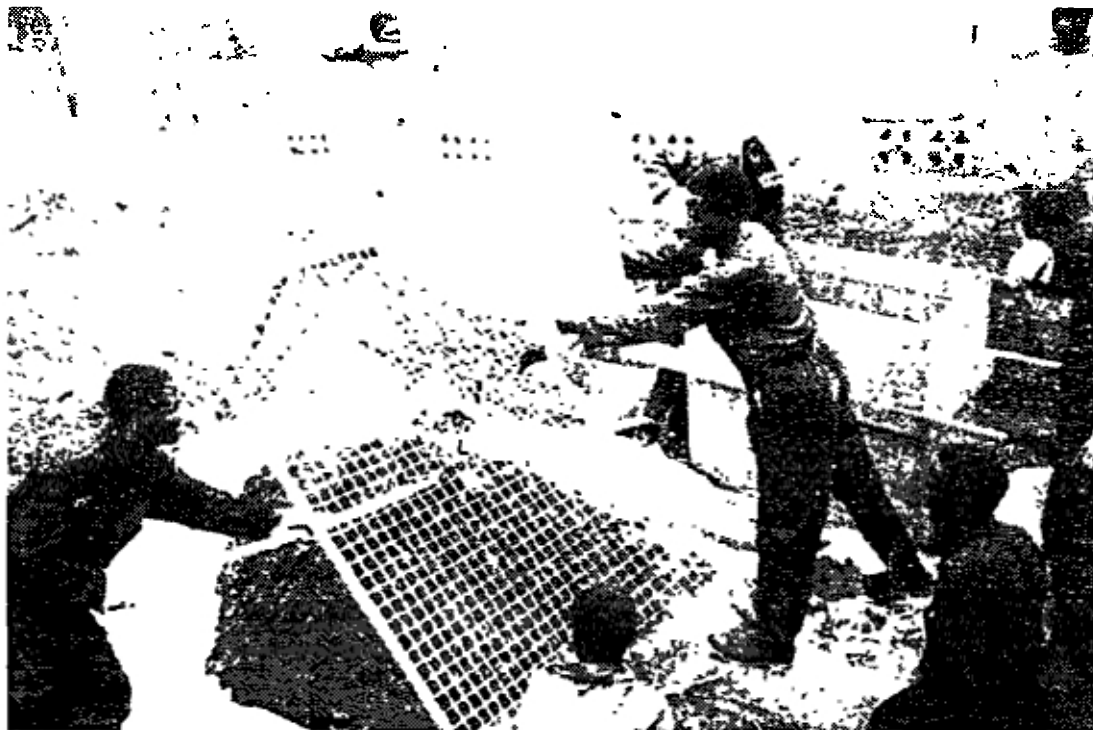


Community Based Solid Waste Management In Luanda's *Musseques*

A Case Study

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In Luanda's *Musseques*
A Case Study

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Foreword

'Exploding cities' in the developing world have left urban inhabitants living in slums or shantytowns with hardly any amenities. Worldwide between 10 and 25 million deaths each year are caused by the lack of safe drinking water and poor sanitation. Municipal authorities face major environmental challenges prompting calls for alternative models of providing basic urban services to be developed.

In the city of Luanda, Angola 75 percent of the population lives in informal, spontaneous settlements popularly known as *musseques* under extremely unhealthy conditions with little or no services and few income opportunities. Overwhelmed by chaotic urban growth and decades of war, waste collection services have become infrequent or nonexistent in many *musseques* of Luanda which in some cases are so congested that even if trucks were unavailable, they would not be able to enter to collect refuse. The solid waste problem has become a humanitarian crisis as huge accumulations of uncollected waste become breeding grounds for disease. To merely remove the backlog of accumulated waste from the *musseques* would require a 500 to 600 percent increase in collection capacity of the under funded, provincial sanitation company

In 1997, Development Workshop with funding support from Canadian and Swiss development organisations implemented a pilot project to develop alternative models for managing solid waste in Luanda's *musseques*. The project was part of an emergency intervention but specifically sought to ensure that local capacity was built up in the process so that the stakeholders involved can learn skills to address problems beyond the emergency intervention

This case study of the project was prepared as part of Development Workshop's ongoing effort to document and learn from its experience in developing appropriate models and community based approaches to the provision of basic services such as water supply, sanitation, solid waste removal and housing

Development Workshop

Acknowledgements

An earlier version (June 1998) of this paper was prepared with financial support from the Habitat Environment Subcommittee of the Habitat International Coalition, a coalition of NGOs promoting public awareness about human settlements problems and the right to adequate housing. The project on which this case study is based was implemented in partnership with Alternatives, an NGO based in Montreal, Canada. The International Humanitarian Assistance Programme of the Canadian International Development Agency and Swiss Humanitarian Aid provided financial support for the project. The Canadian Baptist Ministries and the Canadian Foodgrains Bank provided food for the food-for-work programme.

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Acronyms

ADRA	Acção para Desenvolvimento Rural e Ambiente (Action for the Development of Rural Areas and the Environment)
CBOs	Communtiy based organisations
DW	Development Workshop
ELISAL	Empresa de Limpeza e Saneamento de Luanda (provincial sanitation company responsible for waste collection)
EPAL	Empresa Provincial De Agua De Luanda (provincial water company)
EU	European Union
FAA	Forças Armadas Angolanas
IDPs	Internally displaced persons
INAROE	National Institute for the Removal of Obstacles and Unexploded Ordnance
INE	Instituto Nacional de Estatística (Institute of National Statistics)
L.P.	Lixiera principal (main garbage dump)
NCRP	National Community Rehabilitation Plan
NGO	Non-governmental organisations

Executive Summary

Urban population growth of 470 percent over the last twenty years, coupled with the effects of a lengthy civil war on existing infrastructure, have resulted in serious solid waste management challenges for the city of Luanda, Angola. Population growth has occurred mainly in the unserviced *musseques* (informal, spontaneous settlements) of the city's peri-urban areas where difficult access, and widespread, unauthorised dumping render the waste management problem even more difficult. Traditional solutions are not feasible in this situation, to merely remove the backlog of accumulated waste from the *musseques* would require a 500 to 600 percent increase in collection capacity of the under funded, provincial sanitation company (ELISAL)

With assistance from Canadian and Swiss organisations, Development Workshop developed and tested a model for the management of solid waste in Hoje-Ya-Henda a *comuna* (urban ward) in Luanda not serviced by environmental sanitation programmes (the pilot was part of a larger emergency sanitation project). A 300-metre radius around the largest unauthorised dumpsite within the project area (with about 3,000 people) was the focus of the project's activities. Methods of reducing the daily waste production at source before it becomes refuse, reusing what can be reused, and recycling what can be recycled were examined to reduce the amount of solid waste requiring collection. These made it easier to manage waste removal, saved on costs of hauling waste out of the *musseques* into the landfill, and increased the feasibility of providing continuous waste removal services. The project brought together all stakeholders—the community as users of the service, the local authorities who should be regulating and supervising, and the service providers who collect the waste, with the Development Workshop playing an intermediary role.

The project challenged the widely held notion [in Luanda] that trucks and containers were the only way to get rid of garbage and to keep the *musseques* clean. Waste reduction and waste reuse were identified as viable strategies in the *musseques* and a continuous removal system managed by the community was set up. Channels of communication, which were previously largely non-existent, were opened up among the community, local authorities, and service providers to dialogue and negotiate.

By teaching residents that sand is not a waste but rather a useful commodity to be separated from the other household waste, the waste generation at source was reduced by at least 50 percent (by weight). In the unauthorised dumpsites where a backlog of uncollected waste accumulated, a reduction in the range of 75 to 90 percent (by weight) was achieved. The separation process used simple hand tools and a labour-intensive manual process of passing the waste through metal screens.

The sand recovered from the waste was reused as infill material to improve roads through a food for work programme that employed community members. Sixteen sections of roadway with a total area of 1800m² were improved and potholes that filled with pools of stagnant water during the rainy season were eliminated.

The local market expanded as the illegal dumpsite was cleared. This increased employment opportunities and generated revenues from permit fees for the local government to use in maintaining the area free from garbage.

A new site was identified for a new collection depot where residents could deposit their waste. Regular removal was arranged with Urbana 2000 (a private company contracted by the Provincial Government to manage the sanitation company, ELISAL).

For Luanda's peri-urban poor who have been marginalised from the political decision-making, the project provided a forum to identify problems and solutions, and linked them with resources that helped catalyse corrective actions. Involvement in the project boosted the confidence and improved the management capacity of local authorities and community leaders. Now six months after the pilot, the municipal authorities have an active dialogue with Urbana 2000/ELISAL and have managed to extend the coverage of waste removal without any NGO assistance. Finally, the project demonstrated the potentials of cooperative action in solid waste management among the community, local authorities, the private sector (Urbana 2000) and NGOs such as Development Workshop.

The positive results have renewed the confidence and willingness of both *musseque* residents and the government (service providers and local authorities) to address what had been viewed as an almost insurmountable problem. At the local level, this has contributed to the development of some 'democratic space' and the feeling of a growing number of people in the *musseques* that they have a right to have more control over different aspects of their lives.

But at the same time, the project had to confront deep-rooted views on the "proper" methods of waste removal in the *musseques*, reluctance of the residents to take action, and skepticism about the government's ability to sustain the improvements. Changes in the institutional context as the project got underway, the weak capacity at the local level, and the difficulties of financing and cost-recovery for waste removal services posed added challenges.

Solid waste management includes technical, institutional and social issues and the participation of all stakeholders needs to be analysed. Promoting the active engagement of the community, local authorities, and service providers is important even in an emergency intervention so that capacities for longer-term development efforts are developed as remedial, emergency action is taken.

Valuable lessons for replicating and for scaling up the activities have been learned. Further work is required to investigate and to ensure that key factors affecting the sustainability of operations and maintenance of a community based solid waste management programme are in place. These factors include the financing of solid waste services, the continued support by the local leaders and by the community, and the availability of removal services from Urbana 2000.

1 GENERAL PROJECT INFORMATION

Project Name: Emergency Peri-Urban Sanitation: Community Based Solid Waste Pilot Project in Luanda's *Musseques*

Location: Comuna Hoje-Ya-Henda, municipality of Cazenga, Luanda Province, Angola

Budget: 100,000 US Dollars (note: does not include value of food)

Project Duration: 12 months

Implementing

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Donors: Alternatives (a Canadian NGO)

International Humanitarian Assistance Programme, Canadian
International Development Agency

Canadian Foodgrains Bank (food component)

Canadian Baptist Ministries (food component)

Swiss Humanitarian Aid

1.1 Project description

The Community Based Solid Waste Pilot Project was part of Development Workshop's broader Peri-urban Emergency Sanitation Project which implemented a household sanitation programme to construct dry pit latrines and provide health education within the same area. The two components were linked in a strategy of providing comprehensive environmental sanitation in the project area. This case study focuses only on the solid waste management component.

The project was a pilot initiative to develop and test a solid waste management programme appropriate for the informal, spontaneous settlements of peri-urban Luanda, commonly known as *musseques*, that were not served by environmental sanitation programmes. The project's strategy was to study methods of reducing the

daily waste production at source before it became refuse, reusing what can be reused, and recycling what can be recycled. Through reuse, recycling and minimisation efforts, the quantity of solid waste requiring collection could be reduced. Reduction makes it easier to manage the waste, saves on collection costs of hauling waste out of the *musseques* into the landfill, and enhances the feasibility of providing continuous waste removal services for unserved areas. Promoting the active participation of the community was a key component. Research and social mobilisation activities for the project started in November 1996 and project implementation started in April 1997.

1.1.1 Origin of the project

This project grew from the concern of the Provincial Government of Luanda about the garbage crisis in the peri-urban areas. The Provincial Government originally intended to operate a subunit of ELISAL, the provincial para-statal company responsible for solid waste removal, to serve specific areas of peri-urban Luanda. ELISAL approached Development Workshop to develop a pilot initiative in solid waste collection for one of the peri-urban *musseques*. The pilot was originally to be a part of the Luanda Emergency Water and Sanitation Project under the government's Infrastructure Rehabilitation Engineering Project, but funding for the larger project did not work out. Development Workshop sought alternative funding to proceed with the project albeit at a reduced scale.

Lessons from Development Workshop's previous project experience in sanitation in the *musseques* combined with findings of research on water and sanitation helped shape the programme plan. A beneficiary assessment involving 60 focus group discussions in peri-urban areas throughout the city done in 1995 provided baseline information on current practices, views on feasible and desired improvements, potentials for community organisation and willingness to pay for services (Development Workshop, 1995).

1.1.2 Overall objective

- To develop and test a model for the management of solid waste in the peri-urban *musseques*.

1.1.3 Specific objectives

- To research waste generation and waste management practices at the household and community levels.
- To reduce the quantity of waste generated at source
- To explore the potential for the reuse of waste
- To remove solid waste accumulations at main informal (unauthorised) dumping locations.
- To design a continuous removal system managed at the community level.
- To mobilise local administrations, community leaders, and residents to act on the solid waste problem.

- To form a partnership with ELISAL, the provincial sanitation company, and Urbana 2000, a private sector company contracted to manage ELISAL

1.1.4 Project area

The project area lies within the *comuna* (an administrative jurisdiction roughly equivalent to an urban ward) of Hoje-Ya-Henda in Cazenga municipality within the capital city of Luanda. It is located on a slightly elevated region approximately 2.5 kilometres from the Bay of Luanda. The terrain is flat with a small escarpment between the project area and the bay. The second largest informal market in Luanda – *Mercado Dos Kwanzas* market – is located within the *comuna*

Figure 1 shows a map of the city of Luanda's administrative boundaries, the municipality of Cazenga and, within it, the *comuna* of Hoje-Ya-Henda. Figure 2 shows the project area and reference points in greater detail.

Seventy percent of the population over 30 years old in Luanda was born outside the city compared to only 44 percent for those under 30 years (INE, 1993). The Municipality of Cazenga has an estimated population of 510,000 people while the *comuna* of Hoje-Ya-Henda has an estimated total population of about 200,000 (Dar Al-Handasah, February 1996). Some 3,000 people live in the project area inner zone, which was the focus of the project activities.

Although there is no reliable population data, estimates would put the density at about 350-500 persons per hectare. Because of the high population density, little land is available for supplemental urban food production.

Luanda: Administratives boundanes / limites administratives

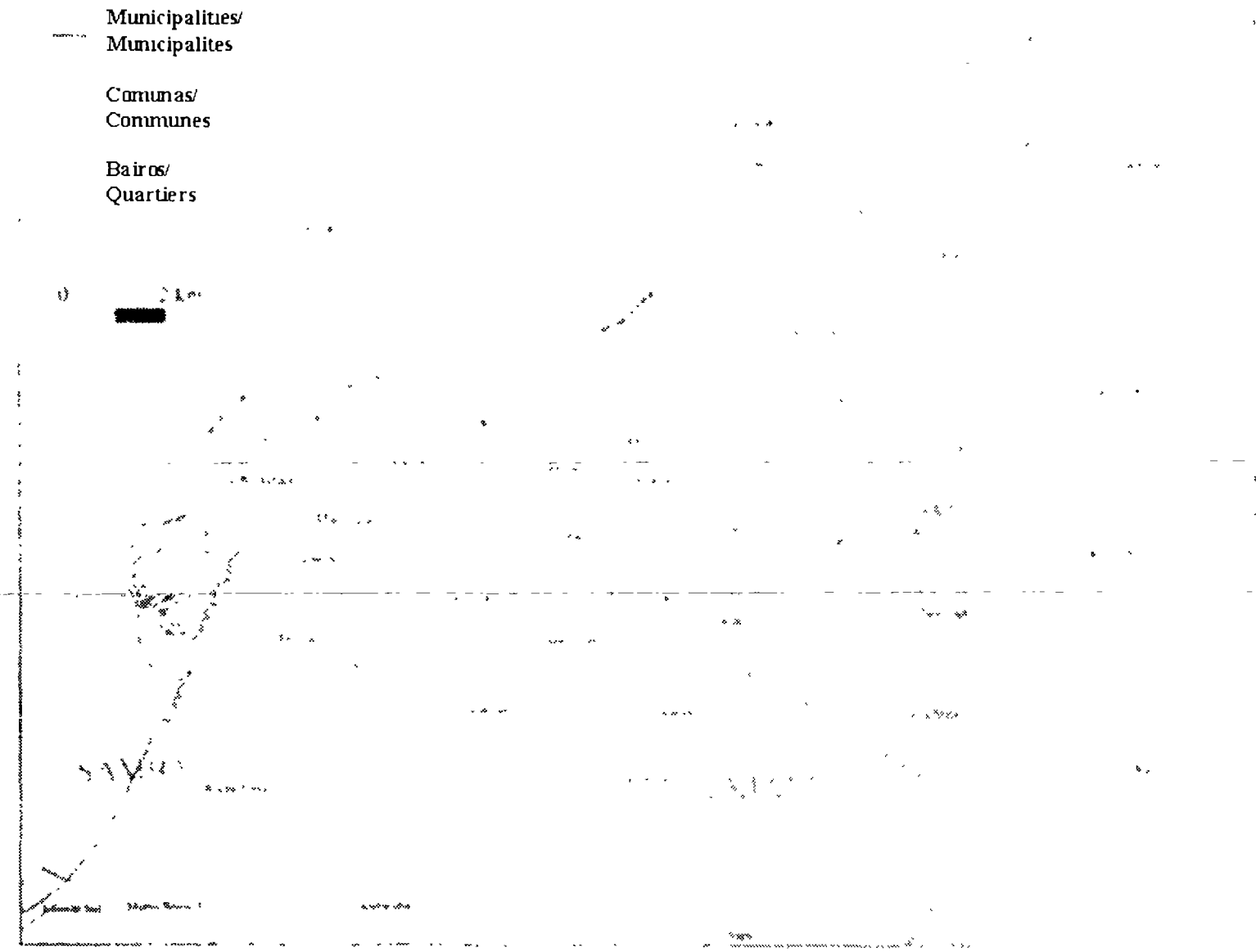


Figure 1 Map of the city of Luanda and administrative boundaries

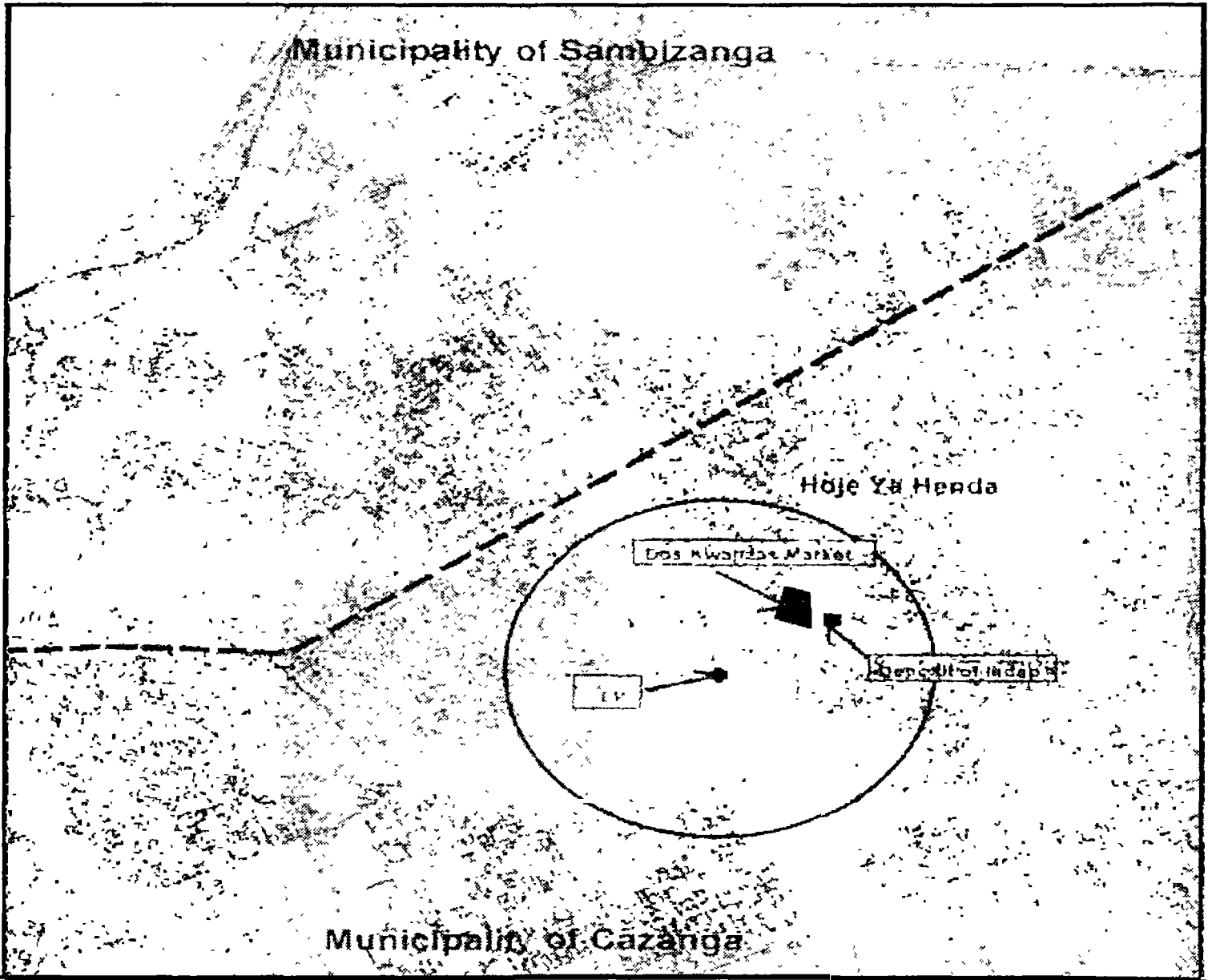


Figure 2 The project area and reference points in greater detail. LP is the *lixiera principal*

Hoje-Ya-Henda was selected because it was part of a previous Development Workshop project and it was within the municipality of Cazenga, the planned site for ELISAL's subunit for waste collection in the *musseques*. The project was designed to work with the ELISAL subunit in Cazenga that was to provide waste removal

Within the *comuna* of Hoje-Ya-Henda the criteria for defining the project area were.

- the existence of an informal (unauthorised) dumpsite;
- availability of reasonable access from the main road for heavy equipment,
- previous project involvement in the area by Development Workshop or a partner organisation (and therefore baseline information and contacts were available),
- proximity to Development Workshop's field office.

Working with the local authorities, the project selected the largest informal dumpsite in the area known as the *lixeira principal* (main dumpsite) as its focus. The dumpsite is shown in Figure 3. The area within a 300-meter radius of the dumpsite was defined as the inner zone, identified for intensive solid waste removal at family/neighbourhood level and accompanying health education. The 300-meter cut off is based on research findings that this was the maximum distance users of the dump walked to take their rubbish to the dump.

Without waste removal at the site in the past five years, over 1400 m³ of waste and some twenty abandoned car frames had accumulated. The dump completely blocked vehicular traffic while pedestrians had to walk up and over the mountain of rubbish to negotiate the intersection. The intersection also provided access to the Kwanzas market (*Mercado dos Kwanzas*).



Figure 3 The *lixeira principal*, the largest informal dumpsite in Hoje-Ya-Henda

Typical of conditions in the *musseques*, the project area is informally settled. The area is strictly residential with mostly one-story dwellings, built with cement blocks (Figure 4). Roads are uneven dirt roads without surface drainage. The rains further erode the roads leaving pools of stagnant water for weeks during the rainy season. Less than five percent have access to piped water supply through a neighbourhood standpost. Residents in the main thoroughfares have access to electricity but the supply is of low voltage and irregular.

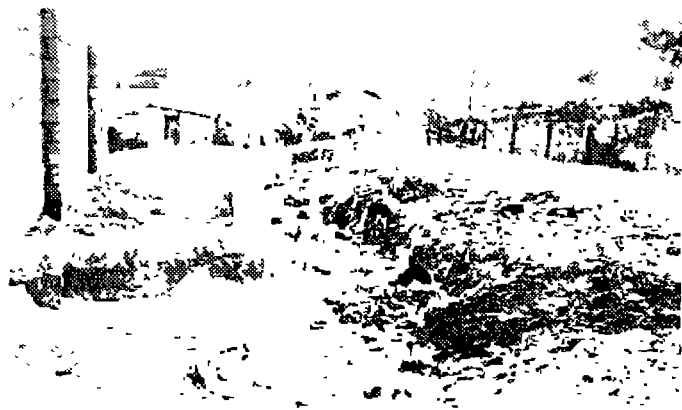


Figure 4 The project area within the *comuna* of Hoje-Ya-Henda in Cazenga municipality, Luanda

1.1.5 Beneficiary population

Many of the residents in Hoje Ya-Henda's come from the immediate Luanda hinterland, mostly from the Kimbundu ethnic group. Unemployment is high and many survive through petty trading and vending in the informal market. Experience of working together to address community needs is minimal as residents' focus on family survival (ADRA, Alternatives and Development Workshop, 1997)

1.2 DW's Peri-urban upgrading programme in Angola

Development Workshop has worked since the early 1990s in community based water and environmental sanitation programmes in Luanda's *musseques* and in several other provinces. It has built and strengthened relationships within the *musseques*, with parts of government and with service providers. Currently, its upgrading programme in Luanda has projects in all of the nine municipalities, benefitting some 250,000 people. Its strategy in *musseques* upgrading is to start with actions articulated by communities as their top priority (the provision of water in Luanda, for example) but which at the same time has a positive pull for all the stakeholders. The process of achieving the agreed output reinforces dialogue and leads to other opportunities. This physical intervention is used to evolve a broader programme addressing interrelated needs of the community and capacity building of community organisations, state agencies, and local authorities. Central to this strategy is social mobilisation by training community animateurs (*activistas*) and mobilisers.

Its successful Sambizanga Peri-urban upgrading project --among the "100 Best Practices" at the 1996 United Nations Habitat II Conference--involved installation of public standposts, construction of latrines, environmental improvement and health education. In the Sambizanga project, Development Workshop developed a

community management system for public standposts and a model for improving basic services in the *musseques* through a tripartite cooperation among the community, local authorities, and the provincial agencies providing services. In 1998 the community management system for public standposts was adopted for citywide use in a World Bank funded government project that will benefit a million people over the next three years.

2 BACKGROUND CONTEXT

2.1 Urban development and population growth

Built during the colonial period for 400,000 people, Luanda—Angola’s capital city—today houses an estimated 2.8 million people—a 470 percent increase over 20 years accompanied by little change in infrastructure. Ongoing civil war and massive rural-urban migration marked the post-Independence period (1975 onwards).

Over 1 million internally displaced persons (IDPs) that fled the long civil war are concentrated mainly in urban or peri-urban areas, the largest concentration being in Luanda (UN estimates, 1996). The greatest influx, an estimated half a million people, was recorded in 1992-93 after the breakdown of the peace process. Since then, conditions in Luanda particularly in the *musseques* have deteriorated considerably. Low-density areas prior to the 1992 war have been built up with no infrastructure to support them. Population densities in the peri-urban areas now vary between 500 and 1000 persons per hectare. Seventy five percent of Luanda’s population lives in the *musseques* under extremely unhealthy conditions with little or no services and few income opportunities.

Many of the most recent IDPs who moved to Luanda in the 1992 war push lost all their possessions and resources. A 1996 study shows that most IDPs are most likely to remain in the peri-urban settlements (ADRA, Alternatives, and Development Workshop, 1997). Having integrated into the peri-urban areas and the informal sectors, they are reluctant to risk moving back to their zones of origin.

2.2 Socio-economic conditions

Thirty years of war have left Angola’s social and economic structures in ruins. Health status indicators have become over the recent years, some of the lowest in Africa and among the worse in the world as shown below.

Indicator (year)	
Infant Mortality rate (1995)	195/1000 live births
Under five mortality rate (1995)	320/1000 live births
Maternal Mortality rate (1995)	1500 per 100,000 births
Life expectancy (1995)	42.4 years
Daily Calorie supply per capita (1992)	1840

Malaria and diarrhoea, the two major public health problems in Luanda, both relate to the poor sanitation and environmental conditions. Furthermore, cholera and dysentery have become endemic in the last few years, showing yearly epidemic surges between December and May. The incidence of diarrhoeal diseases in the *musseques* is up to thirty times higher than that of the city core. Defecating in public spaces and accumulating mountains of rotting garbage contribute to maintaining a persistently contaminated environment that facilitates transmission and retransmission of disease.

In 1990, 37 percent of the city's population was living below the poverty line with 10 percent of these living in extreme poverty (UNICEF, 1990). By 1996, 61 percent of the urban population was living below the poverty line with a monthly expenditure of \$39 (U.S.) per adult-equivalent; 12 percent was living in extreme poverty with a monthly expenditure of less than \$14 (U.S.) per adult-equivalent (INE, 1996).

On average, urban households devoted a high proportion— 78 percent— of expenditure to food (INE, 1996). Salaries in the public sector have been hardest hit by the severe economic conditions. The official minimum monthly wage reported for February 1996, was 29 US cents. Upward adjustments of salary brought some relief but this has generally been negated by hyperinflation. Workers' salaries have progressively declined in real terms. Moreover, the government is consistently several months in arrears in the payment of salaries.

The economic situation makes things worse by eroding household incomes, and hence people's ability to access public services. Inflation during 1995 was 3,800 per cent. It peaked at more than 12,000 percent in mid-1996 (INE, 1996) and is estimated at 92 percent in 1997 (Vines, 1998).

National resources have been primarily diverted to defense related sectors. Forty-eight per cent of the state budget was devoted to defense and public order in 1993. By 1994 the overall contribution to defense had fallen to 26 percent but the comparable sectoral contributions to social sectors: health (4 %), education (5%) and social welfare (7%) remained low. Much of the programme support in the social sectors is sustained by international aid contributions.

2.3 Urban basic services

Because of the prolonged diversion of resources to defense expenditures and the general policy and planning vacuum in the state sector, until very recently there was

very little public investment in new infrastructure and maintenance of basic urban services. Combined with rapid and chaotic population growth, the situation deteriorated by the late 1980s to being an environmental crisis for Luanda and especially for the population living in the peri-urban *musseques*. The few services that exist are only available mainly in Luanda's city core.

2.3.1 Water supply

Seventy five percent of Luanda's residents have no access to the formal water supply system. Water is the top priority need, residents are willing to invest resources to get access to water. Half of all water piped into the city is estimated to be lost in leaks and illegal connections. In 1994 there were less than 50 functioning standposts for over 2 million people (World Bank, 1995). By the end of 1997, this had increased to about 220 standposts. About 85 percent of the total was built through the Peri-urban Water and Sanitation Programme implemented by EPAL (the provincial water company) and Development Workshop. Each standpost provides treated water for about 60-100 families (600-1,000 people)

The informal sector provides an estimated 30 percent of all of Luanda's water supply. Tanker trucks deliver water from the River Bengo 20 kilometers away. Water vendors store water purchased from trucks in tanks on their private property and resell in smaller quantities at higher price per unit. Depending on the location, the poor pay from 800 to 3,000 times more for untreated water than the official tariff rate for piped water in the city core: a high of \$17.00 U.S. per cubic meter versus \$0.002 U.S. per cubic meter in the formal sector (Development Workshop, 1995).

2.3.2 Sanitation

In a 1989 baseline survey by Development Workshop in Sambizanga municipality an estimated 70 percent of the population had some type of household sanitation (i.e., a specific structure such as a latrine designed for the disposal of excreta). But since water was a problem many of the latrines, which were predominantly of the pour flush type, were poorly maintained. A follow-up study done in May 1996 in the same area showed that the population had grown by a third and the number of families with on-site sanitation had decreased to less than 50 percent of the population. Many of the families interviewed commented that those who had not built latrines before the 1992 crisis were no longer able to afford to build them due to the worsening economic conditions.

The beneficiary assessment study (Development Workshop, 1995) showed an unexpectedly high number of people were aware of the dangers of fecal-oral transmission of diseases and latrines were identified as "a basic necessity," families that did not have a latrine were considered "very poor." Since 1993 Development Workshop has been implementing a household sanitation programme promoting the construction and hygienic use of improved dry pit latrines.

Where they exist, most septic tank systems flow directly into the storm water drains (piped and open ditches) and from there, untreated into the sea and Luanda Bay. In the *musseques* raw sewage backing up from blocked sewage pipes, overflowing septic tanks and flooded latrines pose life threatening environmental problems

2.3.3 Solid waste disposal

Musseques residents start the day by sweeping their yards and cleaning their houses. The sweepings, consisting of mostly sand are then collected and stored in a container. Waste produced through the day (food scraps, paper, plastic) is then added and every second day or so, the container is taken, usually by children, to the informal dumpsite and emptied. Door-to-door collection has been non-existent since the colonial days.

Residents view the accumulation of rubbish as the most pressing sanitation problem but they are wary of investing in rubbish removal services because they doubt the capacity of the government to maintain such services in the long term (Development Workshop, 1995).

In 1992, Luanda's population generated and estimated 2,000 m³ of solid waste per day while the average daily collection by ELISAL was 1,000 m³ (DENCONSULT and Projectos de Consultoria AUSTRAL, 1995). Based on these figures, the volume of uncollected solid waste amounted to over 100 dump trucks per day. Since 1992, Luanda's population has doubled from 1.4–1.5 million to around 2.8 million without an accompanying increase in the removal capacity.

Without regular solid waste removal, an ever-increasing volume of untreated, unmanaged solid waste has grown in informal (unauthorised) dumps close to densely populated areas. The dumps also serve as open-air defecation areas for those who have no latrines. The rotting heaps become quagmires during the rainy season and are all too often the only playgrounds for children. Most areas have no extra space for storing garbage, residents can walk as far 500 meters to throw their waste.

Selecting sites where the waste should be deposited is not formally organised but people use the "best" locations given the few options available. Empty lots or the sides of the street away from dwellings are the sites of choice. These sites become well established and are seen as the "proper" disposal place.

Accumulated solid waste also blocks drainage ditches which further compounds the difficulties in the rainy season. In the drainage valleys, the garbage is carried out to the sea. When ELISAL does occasionally remove waste from the dumpsites, front-end loaders and dump trucks are used. In many *musseques*, however, poor road conditions and chaotic urban growth prevent entry of this heavy equipment into the community.

A 1994 ELISAL study found about 900 informal dumpsites across the city of Luanda. The dumpsites covered an area of 40 hectares with an estimated volume of around

170,000 m³ (Fillatre and Gubler, 1994) To eliminate this backlog alone would require ten dump trucks making three trips a day to the landfill, working seven days a week for two years.

Conditions have improved, particularly in the urban core areas, since a private company was contracted to manage ELISAL (see details in section 2.5 Institutional Context). But still, in the *musseques* removal lags far behind the pace of waste production due to lack of sufficient equipment (trucks and excavators) which are only available for removal on the weekends

2.4 Policy context

2.4.1 Land policy

Land ownership in Luanda is currently governed by a confusing (often, contradictory) set of laws, policies, and procedures Portuguese colonial (pre-1975) land laws and registration system supplanted African traditional forms of communal land tenure. Land was nationalised by the state in 1976 through a series of presidential confiscation decrees, but there is no formal system of laws to regulate these acquisitions. Since 1991 the private sector has gained increasing access to land but a land registration system and qualified staff are not yet in place to allow individual informal settlers to legalise their tenure Informal land occupation is thus accepted by majority of people. The lack of security of land tenure and ability to freely buy and sell property is a key factor that continues to inhibit investment in the urban sector today

2.4.2 Development policy

In the past the Government had been reluctant to invest in the *musseques* as these were seen as transitional settlements destined for replacement. In the late 1980s a short-lived government agency was created for rehabilitation of the *musseques* but it lacked political support and funding Currently, no specific central government agency has particular responsibility for the development of the *musseques*, but the programme for Luanda Province in the Government of Angola's National Community Rehabilitation Plan (NCRP) underscores specific priority interventions for the under serviced peri-urban areas.

The NCRP, which was prepared after the 1994 Lusaka Peace Accords, aims to assist communities rehabilitate roads and other basic infrastructure, and restore basic services such as potable water supplies, basic health services and primary education. Promoting popular participation and building capacity for management of rehabilitation and development by government authorities, NGOs and the private sector are related objectives (Government of Angola, 1995). The plan puts emphasis on community-based reconstruction and rehabilitation, using food-for-work, local labour, skills and organisation. The programme for Luanda Province underscores specific priority interventions for the under serviced peri-urban areas.

Recently, the Government adopted a policy of private sector participation in service provision and increased tariffs for urban services to pay for improvements

2.5 Institutional context

2.5.1 ELISAL

Waste collection and disposal were previously the direct responsibility of *Servicos Comunitarias* (Community services department) of the Provincial Government of Luanda. In 1990, the Provincial Government set up a para-statal company, ELISAL, to take over solid waste removal for the city of Luanda including the peri-urban areas. The Government's capacity to maintain a sanitary urban environment deteriorated over the years since independence and reached crisis proportions by late 1980s as cholera, malaria, and diarrhoeal diseases became endemic.

ELISAL received external support from the European Union in 1992 and managed to improve conditions in the city core, but made no impact in the huge peri-urban zones of Luanda where the majority of the population live (Austral Projectos e Consultoria, 1995). ELISAL remains technically weak. Between 1994 and 1996, ELISAL's operating capacity was drastically reduced from 12 trucks (7 m³ roll-on/roll-off) to two and from 140 containers of seven cubic meters capacity to 24 (Austral Projectos e Consultoria, 1996)

ELISAL was in effect servicing only about 500,000 people, or just under a fifth of the 2.8 million population in Luanda. The poor road conditions mean long travel times to the landfill and high costs for equipment repairs and upkeep. Beyond the management and infrastructure problems, ELISAL has to deal with other hazards: occasional armed attacks and theft of ELISAL vehicles while en-route to the city landfill, and unexploded ordnance buried in the dumpsites in the *musseques*

With the new policy of private sector participation in service provision, the Provincial Government of Luanda in August 1997 awarded Urbana 2000, a private company, a three year contract to manage ELISAL. The private management contract is to provide better collection service to the city core of Luanda but does not cover the peri-urban areas. Urbana 2000 has drawn up a work agreement with the respective local administration authorities of peri-urban areas. On specified weekends, Urbana 2000 makes equipment available for a specific administrative jurisdiction. The Department of Community services for the area indicates the priorities and Urbana 2000 will work with them to maximise the use of the available resources.

Since the Urbana 2000 programme, there have been marked improvements: a noticeably cleaner central core of the city where new 1.1 m³ containers have been distributed and regular collection occurs. But in peri-urban areas removal of garbage from some of the informal dumpsites occurs only on a rotating basis on weekends.

2.5.2 Local government

Local government administration strongly centralised. The Salazar regime of the colonial Portuguese, itself lacking any democratic tradition, left a legacy of a centrally controlled government. This was further reinforced by the one party state, centralised planning model pursued after independence.

The first national elections were held in September 1992 but war resumed shortly after, local elections have never been held. The President appoints provincial governors who have the status of a Minister of State. The Ministry of Territorial Administration manages the local administrations. Decentralised local administration exists in a few pilot projects but these do not apply to Luanda province. Thus authority over decision making and resources largely flows from the top to the base

The province consists of municipalities (in urban areas, these are townships or districts, the city of Luanda has eight), which are, in turn, made up of *comunas*. Municipal administrations have limited budgets and, except for local fees, have no significant resource base such as local and property taxes. The province coordinates budgets for provincial and lower levels and channels them to the central government for approval and financing. In two provinces (Luanda and Benguela), para stataal companies provide water and sanitation services to the cities of Luanda, Lobito and Benguela. In all other provinces, this is done by the local administrations

The lowest level of government administration—*comuna* (or urban wards, previously called *bairros*)—is divided into sectors (normally 10,000–15,000 people) and the sector, in turn, into *quarterao* (groups of 15 to 20 families). The sector and *quarterao* normally have a coordinator chosen from among the residents. The communal administration barely functions. It is not uncommon for administrators to have not received a salary nor any budget to even operate and maintain the office.

2.5.3 Civil society

Outside of church based organisations, NGOs and “popular” organisations in Luanda have a short history. Workers’, women’s and youth groups were designated and dominated by the party as the main organisations of civil society after independence. National NGOs, political parties, and community-based organisations only came after 1991, when the formation of independent civil institutions was first allowed.

A 1996 study on community institutions found neither traditional organisational structures nor formally constituted organisations in Hoje-Ya-Henda. Local NGOs exist but these do not represent their constituencies, rather NGOs have restricted themselves to the provision of services the government cannot provide. Residents reported difficulties in the definition and practice of their relations with Government. They believe dialogue is necessary for the development of their communities but there are no organisations that represent the community’s interests to the state or to other outside bodies (ADRA, Alternatives, DW 1997).

Remnants of the former residents' committees exist throughout the city. Committees are headed by locally chosen coordinators, who are usually "elected" from among the residents but without formal procedures or mandates. The local government administrations are trying to reinvigorate the community level residents' committees. Regulations governing local assemblies and residents committees for Luanda were published in 1993. It is likely that in the future, local residents' committees will be key organs for community representation.

Musseque residents have spontaneously organised themselves on an ad hoc basis around tasks to meet a particular need but there is not a strong tradition of cooperative community activities. Joint action between the government and community is rare except for some cases involving water supply. The state's inaction has led to frustration and cynicism among residents.

3 OUTPUTS AND RESULTS

To achieve the objectives of the pilot project, the following actions were implemented:

- social mobilisation and advocacy,
- waste reduction;
- waste reuse for *musseque* improvement initiatives,
- elimination of the dumpsite;
- creation of a new collection depot;
- collaboration and partnership development.

In choosing specific project activities, preference was given to simple technologies, the use of local resources, and the involvement of local organisations. Planning of activities also had to allow for flexibility in the face of continually changing conditions affecting the project and its collaborating organisations.

3.1 Social mobilisation and advocacy

Local administrations have no resources to do projects with the community. Furthermore, they receive their orientation from their superiors in central government, rather than being accountable downward to their constituent communities. These conditions make it difficult to motivate *musseque* communities to engage in improving their environmental conditions. Demoralised by the war and the lack of services in their neighbourhoods, residents are reluctant to invest support in new initiatives until they are certain that the proposal works. "Much is talked about but little is done," is a commonly shared sentiment.

The social mobilisation efforts for the project built upon Development Workshop's successful intervention in the water sector which had the following key elements:

- strengthening local participation of the community,
- raising awareness and demand for improved services among the residents;
- mobilising community and other resources for the project, and
- sensitisation and developing support for project actions among key organisations and actors beyond the immediate project area.

Three groups were targeted for social mobilisation: 1) the local government administrators and community leaders (appointed officials at the municipal and *comuna* and the sector and *quaterao* leaders), 2) area residents, and 3) supporting and collaborating organisations (e.g., other NGOs, CBOs in the area, Kwanza market authorities, ELISAL, Urbana 2000, provincial government; and donors.

The project formed a partnership with a national NGO, Action for the Development of Rural Areas and the Environment (ADRA), which had been working in Hoje-Ya-Henda on a sanitation and health education project. Two ADRA personnel (later increased to three) with experience in community mobilisation were seconded to the pilot project and worked as mobilisers. These mobilisers worked exclusively in the community. They were responsible for liaison with residents, the government authorities and the community leaders down to the *quaterao* level (groups of 15-20 families). They also coordinated with community groups who were involved in community education related to the latrine component of the broader programme.

The training for mobilisers was part of Development Workshop's integrated training with the water and general sanitation programme, which include actions focused on solid waste management. The training covered such skills as planning and management of meetings, participatory techniques, negotiation and mediation, and gender analysis. Mobilisers were also trained in observation techniques and facilitation of focus groups. Personnel of other NGOs and CBOs were invited to participate.

3.1.1 Working with local leaders

A key element of the project's strategy was to work through the existing local administrative and leadership structure and to reinforce their legitimacy despite their limited capacities. Although *musseque* residents lack confidence in the state, they still do recognise the authority of their local leaders (both appointed and traditional).

The project began by contacting the local authorities starting with the municipality of Cazenga then all the way down to the *comuna* level selection (see sections 2.5.2 and 2.5.3 for a discussion of local administration and civil society). Project objectives were explained, discussed, and the municipal administration gave its support. Next the project met with the *comuna* administration of Hoje-Ya-Henda which offered its support and cooperation. The municipal and *comuna* administrations barely have resources to contribute to community development, but it is important to engage them very early on in the process to:

- allow them to develop a sense of ownership of the project;
- promote the pro-active engagement of the local administrations and community leaders in community development, and
- promote institutionalisation of lessons learned their application in other appropriate situations.

Mobilisation of the community leaders concentrated on working at the sector and *quarterao* levels. These are coordinators of residents committees normally found throughout the city. As mentioned previously, these coordinators are usually elected from among the residents but no formal procedure or mandate governs their selection. The community's traditional or respected leaders often assume the coordinator's role. While speaking from the authority of their constituent communities, the coordinators actually have no formal role in the local government administrative structure, which is appointed from the top-down. But they do carry influence and are consulted by the appointed local authorities on a regular basis.

The appropriate leaders were identified and contacted by the project. Monthly meetings with these leaders were held; meeting minutes from each were distributed. The meeting invitations were directed to the leaders of each sector, *quarterao* and to the Hoje-Ya-Henda *comuna* administrator but meetings were open to the public who were encouraged by the project to attend.

The meetings provided the main mechanism for dialogue and building relationships among the local administrators, community leaders, and the residents. It was also the main venue for all stakeholders to be involved in the decision-making process as project activities were organised on a sector or *quarterao* basis. During the meetings, the parties learned consensual politics and the art of compromise. Deciding on project priorities, addressing problems, and planning for project activities were done during the meetings. In addition, the meetings provided regular updates of project progress and obtained feedback on various project activities. To assist in disseminating information, committees were set up within the existing structures.

3.1.2 Mobilising the community

A combination of popular theatre performances and interpersonal communication through motivational efforts by mobilisers during house-to-house visits were used to mobilise the community.

At project start up, house-to-house visits were made so community mobilisers could meet with residents and to discuss the project's objectives and activities. The visits also collected baseline information for the project. Subsequent visits were made to follow up on specific activities in sectors or quarters and as a follow up to messages communicated by the theatre group.

A local community theatre group, Perola REAL, which emerged out of earlier project collaboration in social mobilisation with Development Workshop, was contracted to assist in education and mobilisation activities. The group prepared a repertoire of skits, songs and dance about the benefits of better solid waste management; the health impacts of untreated or improperly disposed solid waste; the need to reduce waste and the importance and benefits of waste separation. At a later stage of the project, the pieces focussed on identifying the new appointed waste deposit location at INDAP and promoting its use by the residents.

Local leaders arranged locations for theatre performances; the mobilisers advised the residents when the pieces would be performed. On the day of the performance, the group announced their arrival and drew a crowd through drumming, singing, and dancing. When a crowd had collected, the group began their performance. Audiences of around 60 to 100 people were common. Forty performances took place.

Community response to the theatre group was enthusiastic and discussions on solid waste often followed the theatre piece. The mobilisers were present at each presentation and were available to discuss issues and to answer questions. Feedback from residents during follow up house-to-house visits done by mobilisers the day following each performance indicated that the pieces were well received, informative, and the messages were communicated and understood.

3.1.3 Working with supporting organisations

Information and promotion activities were carried out so that the project's objectives were understood and accepted widely, to share the project's experience, and to help create a supportive administrative and political environment.

Visiting donor missions, international, and national NGOs were regularly taken to visit the project and raise awareness and support for community based interventions in solid waste removal. Provincial officials were invited to special project events. Other NGOs and CBOs were invited to participate in training programmes such as those for mobilisers. (Note. discussion of the work with the main state utility company responsible for solid waste, ELISAL, is covered under the section 3.5 Collaboration and partnership development).

3.2 Waste reduction

Given the backlog in solid waste removal and problems of solid waste collection in the *musseques*, reducing the quantity of waste generated is clearly a priority. To find ways to reduce waste, the project needed to first understand of the mechanics of waste generation and disposal in the *musseque*. Preparatory research activities were done from October through December 1996

3.2.1 Current practices

Development Workshop researched existing waste practices, attitudes and perceptions about garbage using a combination of questionnaires, interviews and observation. Information was collected through the house-to-house visits by mobilisers

Highlights of information collected from the community are:

- About 360 families or an estimated total population of about 3,000 people use the main dumpsite.
- The maximum distance traveled to get to the dumpsite is 300 meters
- Sixty percent of those in charge of bringing rubbish out of their homes are children between 10 and 15 years of age
- Over 50 percent of the people using the dumpsite throw out their rubbish one or two times per week, an average of five percent throw out their rubbish daily
- The majority of people go to the dumpsite in the early morning or late afternoon/early evening
- People generally recognised that the existing dumpsites were not acceptable but held little hope that the problem could be solved since ELISAL was not providing containers nor hauling waste out of the *musseque*.
- Residents were not opposed to the idea of separating yard sweepings from other household waste

3.2.2 Waste characterisation study

A waste characterisation study using Flintoff's (1984) methodology was done to determine the current and future quantities generated densities, moisture, and composition characteristics of solid waste in the project area. This was the first study in Luanda to focus exclusively on solid waste from low-income *musseques*. The waste sampling was carried out using the refuse from 60 households over an eight-day period. A local team was trained in the methodology.

The waste characterisation study showed a great potential for waste minimization at the source. About 78 percent of the waste stream was composed of organics and yard sweepings broken down as follows: organic/putrescible waste (24.3%) and stones, bricks, tiles < 75 mm (6.9%), and fines less than 10 mm (46.6 %, i.e., mixture of fine silt, sand). If waste reduction strategies were introduced, then the need for collection would only be in the range of 22 percent of the present waste generation rate of 0.56 kg/capita/day. Savings of as high as 78 percent in real collection costs (of hauling the waste out of the *musseque* and into the landfill) could potentially be realised. The reduction also makes it easier to manage the wastes.

The challenge then was to find uses for the organics and sweepings portion of the waste to improve the landscape within the *musseques*. The options considered for the reuse of waste and the corresponding advantages and disadvantages of each were as follows:

- 1) Producing compost or organic fertilizer the skills for doing this would need to be introduced in Luanda. The demand for organic fertilizer would likely not be high within the *musseques* nor the rest of Luanda for that matter because very little green space is available for urban gardening
- 2) Producing building bricks or blocks made up of a mixture of soil, cement and sand: brick making skills exist in Luanda and brick production is a thriving industry. This could provide income opportunities for the large number of unemployed. However, the quality of the fines mixture would have to be tested (overseas, as in-country facilities are limited), the appropriate mixes tested, and production units organised.
- 3) Using the stones and fines portion of the waste for improving roadways and road reconstruction: Development Workshop had previous experience in using rubbish (unseparated) as infill material to improve roads. Road improvement was a priority for the residents and could provide employment. Improved road access would make removal of waste easier. Methods of separating the stones and fines from the rest of the waste would have to be developed. Teams to work on road improvement would have to be organised.

The third option was determined as the most feasible. Thus waste reduction efforts were directed at eliminating stones and fines (hereafter referred to as sand/ rocks/ bricks) that comprised 54 percent of the waste generated

3.2.3 Waste separation at source

The social mobilisation set out to focus on the key message: sand/rocks/bricks are not wastes; these should be separated from other household rubbish. The community theatre group's performances focussed on this and follow up was done in household visits.

To chart the progress of the mobilisation, 20 families were selected in each of the five *quateraos*. The mobilisers visited the families several times over a period of 12 weeks and the number of families separating sand from solid waste was recorded. The waste was visually checked to confirm that separation was occurring. The majority of the families were separating sand from the other waste. For those cases where sand was not separated, the explanation given was that it was the children who must have allowed it to happen.

In addition, a control group of two sets of ten families living outside the project area were visited. The majority of the families in the control group did not separate sand from other waste. Those that did separate explained they did so because sand can be used within the yard and sand significantly increases the weight, which makes carrying

the waste to the dumpsite much more difficult. As well, if they burned the garbage, the sand made the burning more difficult.

3.3 Waste reuse and elimination of the dumpsite

The original project designed was premised on an agreement with ELISAL that a peri-urban waste transfer unit will be set up in the municipality of Cazenga with EU financing (hence this was one of the factors influencing the choice of the project area). Accumulated waste was to be removed from the dumpsites using heavy equipment provided by ELISAL and would then be hauled to the new transfer unit. But four months into the project's operation, the institutional context on which the project design had been based had unexpectedly changed.

In the initial months of the project, confusion about the ownership of the land for the new transfer unit's location delayed its start up. In August 1997, after the Provincial Government of Luanda contracted Urbana 2000 to run ELISAL, the plans for a transfer subunit in Cazenga were canceled altogether and the equipment allocated to it was subsequently returned to service the city core. EU funding for the peri-urban unit was suspended. Further negotiations on EU funding, which were contingent on an agreement between the Provincial Government of Luanda and the EU, were also delayed because all three Vice-Governors of Luanda were replaced in September

With these changes, the project was left without the means of waste removal and had no budget to hire a private contractor to take over ELISAL's role. It thus faced the challenge of removing waste out of the dumpsite on its own. Support from Urbana 2000, while clearly a possibility, would take some time to establish. To avoid delays, the project had to quickly find ways to eliminate the dumpsite. The task was to experiment with ways to reduce the volume of waste and to try to extract reusable portions. Recycling was one option but there was little industry still operating in Luanda and few possibilities for reprocessing recyclable items. No formal recycling programme exists and, in fact, little is known about the recycling done in the informal sector.

The waste characterisation study showed that a combination of sand and other inert (rocks, bricks) comprised 54 percent of the waste generated by families. The project investigated how this component could be extracted from the accumulated waste to reduce the volume and weight of waste requiring haulage. Should the separation be successful, the sand and inerts could then be used in road improvement.

3.3.1 Waste separation at the dumpsite

The project experimented with simple technology and manual labour to separate sand and inerts from the rest of the waste. The use of mechanised equipment for separation was ruled out as securing and maintaining such equipment is difficult in Angola (all spare parts need to be imported). The aim was to develop methods and processes that would be easily replicable given the local resources.

The work at the dumpsite proved that the volume of waste could be easily and significantly reduced in a very simple manner, contrary to the prevailing belief that heavy equipment and containers were the only means to do this. This showed the community and the government that the waste problem was not insurmountable but could be tackled with simple technology and labour, both resources readily available in Luanda and in the project area

Furthermore, the sand separation effort at the dumpsite could show that part of the waste can be reused, the project could avoid/reduce waste removal costs. This initiative also reinforces the message that sand is not a waste but rather a useful commodity that must be treated separately from the other household waste

Work at the dumpsite began in September 1997 and ended in February 1998. The start up period (September and October) saw limited production because of the newness of the work, the presence of unexploded ordnance, and the subsequent introduction of necessary changes in work practice.

ORGANISATION OF WORK The work was organised as a food-for-work initiative. The workers were selected from the community giving preference to displaced persons, demobilised soldiers, and the unemployed. Trials with separation began with a team of four workers receiving food in payment. This expanded to five teams of six persons each. The teams worked between four and five hours per day.



Figure 5 The waste separation process.

The workers were instructed to don the protective clothing provided: coveralls, work gloves, rubber boots and masks, but often would prefer not to use them because of the heat (particularly the masks). Many argued that the protective clothing makes little difference given that they have lived and breathed close to the garbage all these years.

TECHNOLOGY AND METHOD. Separation began using wire screens with openings of various dimensions (100mm, 50mm, and 10mm). The screen with an opening of 50mm offered the best results. Figure 5 illustrates the separation process. The bulk of the material passing was sand and gravel with some organics and small pieces of

broken glass and such. The larger pieces of plastic, paper, cloth, and branches were easily separated. The resulting pile of inerts appeared suitable for use as road infill.

In the end, the most effective separation process was as follows.

- 1) a backhoe loosened the waste,
- 2) hoes and shovels moved the waste onto the screen;
- 3) piles of sand under the mesh and waste in front of the screen were cleared away with shovels (see Figure 6);
- 4) sand and waste was loaded onto trailers either manually or with a backhoe and hauled away;
- 5) the resulting pile of garbage was put aside for removal.

Originally, the compacted waste was loosened manually using a pickaxe. But the first encounter with unexploded ordnance required a change work practice. For safety reasons, the pickaxe was eliminated and a backhoe became a necessity.

The volume of waste separated per day varied with its density (degree of compaction) With the backhoe, daily production by a team of six persons was about 3.5 m³ of sand and about 0.75 m³ of garbage. As the waste at the dumpsite was several years old, the organic components had already degraded, and smell was minimal. The main difficulty during separation was the presence of human excreta because the unauthorised dumpsites usually serve as public "latrines."

By February 1998, 450m³ of sand were produced. The volume of waste varied with the degree of compaction (density). In general about one quarter the volume of waste was produced for each volume of sand. About 600m³ of unprocessed waste was taken away by Urbana using heavy equipment.

As the dumpsite was being eliminated, several small studies were conducted to determine the weight of sand in comparison to the weight of waste. The results indicate that the material passed through the screen (mostly sand) comprised between 75 to 90 percent of the total weight. Removal of this portion of the waste resulted in a significant reduction of the dumpsite and produced a potentially useable material.

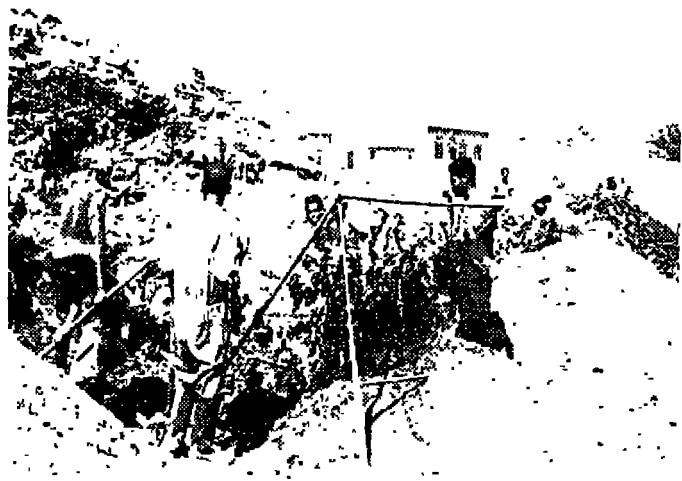


Figure 6 The results of the waste separation process piles of sand were collected behind the wire screen while solid waste remained in front

In January 1998, Urbana 2000 visited the project on two occasions. After its second visit, Urbana 2000 removed the 600 m³ of solid waste that remained after separation, thus opening the intersection to traffic for the first time in five years.

Two months after the final truckload of rubbish was removed, the Kwanza market expanded into areas of the former dump. The *comuna* administration issued permits to vendors and trucks (which load goods before traveling to the provinces) using the vacated space. The income from the fees is used to maintain the area garbage free.

DEALING WITH EXPLOSIVES. Throughout the Angolan civil war, the city of Luanda itself had been relatively insulated from the proliferation of landmines and other explosives that plagued the rest of the country. Nonetheless, explosives were encountered at the dump on several occasions. Some were live; others were missing the firing pin. In total two grenades, seven 81mm mortars and one 60mm mortar were found and disposed of safely. Regardless of the state, each was treated with the utmost caution. When an explosive was encountered, field teams were dismissed and work ceased. The FAA (army) was called to remove the explosive. The project often was delayed by the time it took to arrange the removal.

After uncovering the first explosive Development Workshop consulted the National Institute for the Removal of Obstacles and Unexploded Ordnance (INAROE), the national demining organisation and Norwegian People's Aid, an NGO specialising in demining. The project requested an opinion on the risks involved with continuing the work at the dumpsite and recommendations on how to safely remove the waste. Both organisations indicated the risk was minimal but suggested eliminating the use of pickaxes used to de compact the waste. Each organisation also provided a training and awareness course on recognising explosives and how they function for the teams.

3.3.2 Road Improvement

Roads in the project area are mainly unsurfaced, dirt roads. There is neither base material nor sub-base material with traffic passing on the native soils. There is no surface water drainage along the roadways. Although the terrain is relatively flat, the roads contain many depressions.

The roads are passable for most of the year but in the four months of the rainy season, the depressions fill with water, which can remain for weeks. As the rains dry, the depressions often turn into mud holes. Both vehicular and pedestrian traffic is severely restricted, as shown in Figure 7.

With the success of the manual separation of sand from the waste, the project began the road in-filling phase. The community drew up the list and selected the priority roads for in filling of the depressions with the separated material.



Figure 7 The effects of the four-month rainy season on the roads in the project area

Over 100 locations were identified within the target area of 300-meter radius from the dumpsite. Each location varied in size and depth but the average depth was about 0.5 meters with overall dimensions of 100 square meters. A total of 16 sites were worked on with a total area of approximately 1800 m².



Figure 8 Road in-filling technique using water to increase the moisture content of the soil for better compaction

A tractor and trailer transported the separated sand to the infill location (Figure 8) The sand was dumped and manually spread in lifts of 10cm or less. Water was added, then the sand was compacted with either a plate tamper or a small vibrating cylinder. Water was necessary to increase the moisture content of the soil and attain to better compaction. Initially water was added sparingly because the project did not want to appear to be wasteful

since the city water supply did not reach the area and people bought water from private vendors.

The project experimented with various types of infilling techniques. At most locations only the separated sand was used. However, at the two largest and deepest locations, solid waste from the dumpsite was placed in alternating lifts with the sand. Each lift was compacted with the vibrating cylinder and covered with a final layer of sand. In one area, the project was requested to construct a section of roadway that had been completely washed away during the previous rains, a combination of 15 car frames (from abandoned cars), garbage, and of sand was used to construct about 165 m² of roadway. A total of 450 m³ of sand and 125 m³ of waste were reused in the road improvement effort.

At the end of the project, the infilled areas were in reasonable condition even after several heavy rains. All locations saw some settlement as a result of vehicle traffic with the majority happening after the first rain. Subsequent rains caused little or no additional settlement. The two locations where waste was used with the sand deteriorated rather quickly after its first rain. Both sites experienced large amounts of uneven settlement and parts turned to mud. Repairs and the addition of another lift of separated sand were all that were necessary to bring the locations to acceptable conditions.

The geotechnical and chemical properties of the separated material still need to be evaluated. Several samples were sent to the engineering laboratory for testing and to South Africa for tests, which could not be done in country

Using the recovered sand to infill depressions is clearly an interim solution. In conventional road construction, the material would be deemed substandard; better levels of compaction would be necessary for optimal results. Furthermore, roads without drainage will always pose problems. The future costs of road replacement may increase should resources become available to build roads that meet conventional engineering standards, since substandard materials will need to be removed before laying a proper base. As well, potential health risks may be associated with using material from the dump and spreading it out over a greater, more accessible area (chemical testing of sand samples will yield more information).

Though far from perfect, this is the optimal solution given the present road conditions, the future prospects for improvement, and the presence of the many dumpsites. Overall, the results were favourable, both as a means of improving road conditions and of eliminating the dumpsites. Even after heavy rains when other areas were submerged or were well on their way to becoming impassable pools of mud, areas infilled by the project remained relatively dry and passable.

Most important, the community responded enthusiastically to the road improvement efforts. Once the initial results were seen, the community put forward numerous requests for other locations. Road improvement activity was limited only by the amount of material extracted from the dumpsite. Volunteers helped to remove abandoned car frames. Residents deposited sand that they separated at home to the infill areas near their homes. Several community meetings were held to discuss potential community contribution and participation in a longer-term initiative.

3.4 Creation of a new collection depot

Eliminating the unauthorised dumpsite serves little purpose if an alternative proper disposal site is not established. While the dumpsite was being cleared, the community leaders prohibited residents from using the dumpsite in an effort to facilitate the clearing work. Residents were instructed to burn and bury their waste. Visits and conversations with the community by project staff indicated people were willing to burn and bury but they saw this as a short-term measure, something else needed to be arranged. Others, with limited space in their yards were immediately anxious for a disposal alternative. But options for an alternative collection depot location were few, as little vacant space exists in the project area.

Several meetings took place with Development Workshop assisting the community in identifying possible locations for the collection depot. The community proposed three sites and Development Workshop prepared a summary of the advantages and

disadvantages of each site. In a subsequent meeting, the advantages and disadvantages of each site were reviewed and discussed.

The community was clearly most concerned with eliminating the dumpsite and ensuring that another one does not replace it. It also became apparent that the community doubted the authorities would provide continued support without the intervention of Development Workshop.

Although it had several shortcomings, a nearby site located in an open area adjacent to the Kwanza market was selected. This location (referred to by the project as INDAP) is about 200 meters from the former dumpsite location (Figure 2 in Appendix A). Although this extra 200 meters would potentially inconvenience those who already live 200 to 300 meters from the former dumpsite, the community accepted this. The potential difficulty of having to pass through the market en-route to the collection depot was viewed as a minor problem that could be overcome by mobilisation. The leaders and *comuna* authority assumed the responsibility of working together with the project staff to promote the use of the new depot.

Another disadvantage of the selected depot location at INDAP is that heavy traffic because of the market and poor road conditions make road access difficult. The leaders arranged for the local police detachment located beside the market to provide traffic control during the times when Urbana 2000 comes in to pick up the waste. For supervision of the collection depot, the leaders arranged with representatives of the market to oversee the use of the depot. Project staff worked with the market staff to train and assist them.

Shortly after the depot opened, visits to houses in the project area were conducted to assess the reaction of the people to the INDAP site. Some people visited reiterated the disadvantages discussed during the site selection meetings. For some, the new site is too far and passing through the market where traffic is heavy can be dangerous especially for children. Others indicated they preferred to carry on with burning and burying. More work is needed to address the concerns of those who were not inclined to use the deposit to prevent them from resorting to unauthorised dumping.

An attendant at the dump monitored the waste coming to the depot to check if residents were separating the waste before bringing it to the deposit. The attendant's reports indicated that the waste coming to the deposit did not have a significant percentage of sand. Six months after the completion of the project, the INDAP deposit continues to be used by the majority as a collection depot.

3.5 Cooperation and partnership development

A key element in Development Workshop's strategy to improve peri-urban *musseques* is the promotion of tripartite cooperation among communities, para-statal agencies or utilities providing services (e.g., water, sanitation company), and the local government.

authorities. Development Workshop initially acts as a facilitator or intermediary, bringing together and linking the different parties and promoting dialogue. As trust is built among parties involved, the three-way relationship progresses and cooperation moves from more informal, short-term or narrowly defined joint actions to a longer term, formal co-ordination around a specific effort or program, Development Workshop gradually withdraws and its responsibilities are assumed by the different parties.

For example, in its water programme, Development Workshop in 1993 brought together the three parties in a project advisory committee for a standpost construction project. Today, the standpost community management system runs independent of Development Workshop's input. The standard consumer contract of the provincial Water Company (EPAL) has been revised, allowing neighbourhood water committees to sign communal contracts with the utility. The user fees collected by the water committees are divided among the users committee (to pay for the water monitor and minor repair/maintenance), the provincial water company (to pay for the water and servicing the main lines); and the *comuna* administration (to cover security).

Promoting a similar tripartite cooperation in the solid waste sector is more difficult and complex compared to water as the means to remove waste out of the neighbourhoods are beyond the range of community action. Without proper off-site facilities and the means of eventually removing waste from communities into the landfill, community action will at best be a stop gap measure. Chronic under funding and management problems left ELISAL with an operating capacity enough to service only 20 percent of Luanda's population. Both local authorities and *musseque* residents seriously doubt that the situation will improve dramatically.

Development Workshop's evolving partnership with ELISAL suffered setbacks as plans for ELISAL's peri-urban waste collection transfer unit were canceled. A period of uncertainty followed after the government decision to contract out the management of ELISAL to Urbana 2000, a private company in August 1997. Then partnership building started anew with Urbana 2000. Currently, Urbana 2000 has no capacity to coordinate at the community level and undertake social mobilisation, both of which Development Workshop can do, hence the partnership is mutually beneficial.

Starting in 1998, Urbana 2000 provided waste removal support to the project. Thus far, Urbana 2000, has shown a will to improve conditions in the *musseques*, helping to dispel the lack of confidence in the state's removal capacity and the notion that the *musseques* are overlooked.

4 PROJECT IMPACT

The project is the first attempt ever in Luanda to develop a community based solid waste management programme. Overall, the project's immediate impacts have been positive. Its single most important and visible impact is the improvement in environmental conditions. By challenging the widely held notion that trucks and containers are the only way to get rid of garbage and to keep the *musseques* clean, the project demonstrated other possible options for dealing with waste management in the *musseques*. Less tangible but equally important, are the project's impacts on institutions and people involved. By helping to build dialogue and a climate of trust among the different stakeholders the project promoted community participation in planning and implementation and strengthened the capacities of local authorities. Finally, the project demonstrated new modalities for programming and execution of projects involving the community, local authorities, NGOs, and the private sector (Urbana 2000).

4.1 Physical impact

- 1) Improved environmental sanitation conditions for an estimated 3,000 people through the elimination of the largest dumpsite within the community, the provision of continuous waste removal services at the new collection depot, and the repair of road depressions that become breeding places for disease carrying organisms in the rainy season.
- 2) Improved road access especially in the rainy season. The project improved 16 sections of roadway with a total area of 1800m². Almost 600m³ of material taken from the former dumpsite was reused in road improvement.

4.2 Socio-economic impact

- 1) Behavioural change in household waste management practices as households adopted the practice of separating sand from other household waste.
- 2) The project provided direct employment for 30 people working in waste separation and road improvement.
- 3) Increased income and employment opportunities were generated with the physical expansion of the Kwanza market into the area cleared of the dumpsite.
- 4) The expansion of the Kwanza market provided an opportunity for local resource mobilisation. The local administration (*comuna*) started issuing permits for vendors and trucks using the space created by the removal of the dumpsite. The money collected from these permits will go towards maintaining the area free of garbage

4.3 Impact on community participation and local governance

- 1) Social mobilisation secured community cooperation and at the same time helped create a pressure for more accountable local authorities. The focus on community problem solving and action planning built a climate of dialogue, trust and commitment to change among stakeholders. The demoralisation and skepticism about acting on the solid waste problem among both the residents and local authorities has turned into a motivation and willingness to cooperate and pursue other initiatives.
- 2) The project increased the confidence and improved the management capacity of local authorities and community leaders who have been involved in the project since its inception. Leaders have assumed responsibility for promoting the use of the new collection depot, arranged for police to control traffic in area, and have negotiated with the Kwanza market staff to supervise use of the depot. Six months after the completion of the project, the municipal authorities have an active dialogue with Urbana 2000 and ELISAL and have managed to extend the area of coverage of waste removal without any assistance from Development Workshop.
- 3) The community's involvement has allowed the development of some 'democratic space' at the local level and the feeling of a growing number of people in the *musseques* that they have a right to have more control over different aspects of their lives. This contributes to strengthening Angolan civil society, which has been weak and ineffective in challenging abuses of power

4.4 Impact on supporting organisations

Outside of the project area, the project also had an impact on government officials, ELISAL, Urbana 2000, other NGOs, donors and institutions with an interest in solid waste management and peri-urban area improvement.

- 1) Research conducted during the project contributed to a better understanding of the properties of waste, waste generation, and waste management practices at the household and community levels in peri-urban areas. The waste characterisation study was the first in Luanda to focus on waste generation in peri-urban areas.
- 2) The project showed that, contrary to popular belief, the waste problem is not insurmountable but can be tackled with simple technology and labour, resources that are both readily available in the project area and in Luanda
- 3) Waste reduction (in the range of 75 to 90 percent by weight was achieved by separating sand from waste in existing dumpsites) significantly reduces the cost of waste removal from the *musseques* to the landfill. This cost reduction allows for increasing the area coverage of removal services, waste reduction also makes it easier to handle the waste. The experiments in separation of sand at the dumpsite

yielded valuable information and the methodology can be replicated at other dumpsites

- 4) The project introduced the concept of waste reuse by extracting sand and other inerts from piles of accumulated garbage at the dump and by using this as infill material to improve roadways within the community.
- 5) The Food for Work teams demonstrated how food aid could be used in public works programmes to improve living conditions in the *musseques*
- 6) The project has demonstrated how cooperation between the community, local authorities, government, NGOs and the private sector (Urbana 2000) can effect changes in the solid waste situation.
- 7) The partnership between Development Workshop and Urbana 2000 can potentially develop into a model for private sector-NGO cooperation in solid waste management and the provision of other urban basic services. The private sector can provide the services while the NGO does the necessary social mobilisation and coordination at the community level and with local authorities.
- 8) The project has helped create a greater awareness of the solid waste problem in the *musseques* and increasing acceptance among decision-makers of the alternative measures to deal with the solid waste problem. The Provincial Government of Luanda has recently undertaken a publicity and education campaign on awareness of the hazards of poorly managed solid waste. At one of the meetings with the Vice Governor of the Provincial Government of Luanda, the pilot project was cited as a successful initiative brought together by Development Workshop with the support of the community and local leaders. Both the Administrator of Cazenga and the General Director of Urbana 2000 made reference to the project. The Vice-Governor has offered a counterpart to the project who will act on the provincial government's behalf.

5 PROJECT STRENGTHS, CONSTRAINTS AND LESSONS LEARNED

The project has identified innovative strategies for managing solid waste in Luanda's *musseques* within the context of the resources and constraints in peri-urban Luanda. It set in motion an initiative that has taken hold in the community and the local leadership has acted to maintain the improvements that have been made. Its success to date has renewed the confidence and willingness of both *musseques* residents and the government to address what has been viewed as an almost insurmountable problem. But at the same time, the project had to confront deep-rooted views on the "proper" methods of waste removal in the *musseques*, reluctance of the residents to take actions, and skepticism about the government's ability and interest to sustain the improvements. Changes in the institutional context as the project got underway, the weak capacity at the local level and in ELISAL, and financing and cost-recovery for

waste removal services posed added challenges. The project offers valuable lessons for replicating the effort in other *musseques* and for scaling up the activities into a citywide programme.

5.1 Strengths

- 1) The project has identified innovative strategies for managing solid waste in Luanda's *musseques* within the context of the resources and constraints in peri-urban Luanda.
- 2) The project used mainly simple technologies and labour-intensive methods that are easily replicable.

Sand separated on at the dumpsite used hand tools – shovels, hoes, pickaxes and screens on wooden frames. The methods developed used what is perhaps the most abundant resource in the community – labour

At the household level, reducing waste at source by separating the sand was simple, easily understood, and did not require substantial modification of current practice in handling of waste. The idea made sense to the residents. Some households were already separating sand from other household waste to reduce the weight of rubbish being carried to the disposal site

- 3) The project secured involvement of the local authorities and the community from the outset.

The project worked within the existing local government structure in the municipality and *comuna* and with the leadership structure within the sectors and *quateraos* of the community. Participatory research techniques were used to gain an understanding of current waste management practices and the community's views on feasible and desired improvements. Social mobilisation was then undertaken to secure and facilitate public participation in the project. Community problem solving and action planning allowed stakeholders to dialogue and work together – a rare occurrence in civil society-state relations in Angola

- 4) The project invested front-end effort in social mobilisation and used popular communication methods (theatre) supported by home visits.

A national NGO (ADRA) which had been active in health and sanitation efforts in the area had been selected as a partner. Social mobilisation preceded full implementation of project. Full-time mobilisers were assigned to the project to facilitate community meetings and conduct home visits. A theatre group augmented their efforts. In parallel, the project's objectives and activities were promoted among key actors and

organisations beyond the immediate project area to disseminate the project's experience and to gain their support.

5.2 Constraints

- 1) The project had to overcome people's preconceptions about the "proper" methods of waste collection and removal in the *musseques*

Many envisioned a system of containers distributed in the *musseque* and trucks coming in to empty the containers even if it were clear that Urbana 2000 and its forerunner ELISAL had neither the containers nor enough trucks to service the peri-urban areas. The complexities of solid waste removal were not well understood and little was known about waste generation and handling in the *musseques*.

- 2) Local governments and communities have limited resources and skills to improve conditions in their areas.

To help ensure replicability and sustainability of the models developed, the project was designed to work within the existing local government structure in municipality and *comuna* and with the leadership structure within the sectors and *quarteras* of the community. While this is among the project's strengths it is paradoxically also a constraint. The combined effects of a centralised government structure, prolonged civil war, a limited resource mobilisation capacity at the local level, and a relatively recent history of democratic institutions have resulted in a weak capacity at the local level. The lowest levels of government barely function and lack the confidence to dialogue and negotiate with other levels of government and with service providers.

For the community, survival is the primary concern as living conditions in the *musseques* are difficult. There is little experience in making claims and making the state authorities accountable.

- 3) The financing and cost recovery for waste removal services still needs to be addressed.

Local government financing available for waste removal services in the *musseques* is very limited. In the longer run, the ongoing costs of solid waste collection, removal, road improvement and community supervision must be recovered if sustainability is to be ensured (see further discussion of this issue in section 5.4 Sustainability and future prospects).

- 4) Changing conditions in the project's institutional context resulted in unanticipated changes in the project design and slowed the project's progress towards establishing the links among the community, the local leaders, and the authorities responsible for waste removal.

From the outset changes in the institutional context impacted on the project. The original project plan required changes when funding of the larger Infrastructure and Rehabilitation Project of the Government (within which the pilot was a component) was suspended. Development Workshop independently sought alternative funds but had to proceed on a reduced scale. The original plan of linking solid waste with improvements in water so that user fees collected for water could be used to offset costs of waste collection could not be done.

Later on, the cancellation of the planned peri-urban subunit of ELISAL (around which the project had originally been designed) left the project without the means to remove the waste out of the dumpsite and an alternative strategy had to be devised. Another period of uncertainty followed after Urbana 2000 was contracted in August 1997 to manage ELISAL. It was not immediately clear how Urbana 2000 was going to be involved in waste removal in the *musseques* since the contract covered only the city core. Development Workshop itself had to develop a relationship with Urbana 2000 before it could facilitate links between the community and Urbana 2000. Finally, involvement of Urbana 2000 in the project did not materialise until January 1998, just three months before the end of the project funding cycle.

Given these unanticipated changes, the planned withdrawal of Development Workshop and the gradual transfer of its responsibilities to the local authorities and community leaders proceeded more slowly.

5.3 Lessons

- 1) It is more difficult to mobilise community action around the issue of solid waste compared to, for example, water. Rubbish removal ranks lower in priority for *musseque* residents (usually coming second to water or employment). Although they recognise accumulated solid waste as a serious threat to public health, they are wary of investing in rubbish removal services. There are limits to what can be done at the community level. Rubbish has to be hauled out to disposal sites outside the community but residents doubt the capacity of the government to maintain such services in the long term.
- 2) Combining applied research with ongoing project implementation as an effective means of developing strategies that are appropriate to the conditions in the peri-urban context.
- 3) Social mobilisation is important in securing community participation. Social mobilisation of *musseque* residents around issues of improving basic services is a relatively recent concept in Angola.
- 4) It is important to generate awareness about the project and to enlist the support of key actors and institutions outside of the immediate project area. This increases

the possibility that new modalities and strategies, for programming and project execution will gain wider acceptance

- 5) Local government, when provided with resources and training, appears to be the appropriate level of administration to deal with providing basic services in the *musseques*. Training and accompaniment, in this case provided by the NGO (Development Workshop), are integral elements of a community based solid waste management programme. The capacity at the local level needs to be strengthened to enable the local authorities and community leaders to manage the programme. Withdrawal and transfer of NGO responsibilities would have to be phased as the capacity and confidence of local partners develop.
- 6) The partnership between Development Workshop and Urbana 2000 is a potential model for private sector-NGO cooperation in solid waste management and the provision of other urban basic services. The private sector can provide the services while the NGO does the necessary social mobilisation, training, and coordination at the community level
- 7) The management contract of Urbana 2000 with ELISAL indicates the potential for private sector participation in providing basic services. It needs to be monitored to assess its applicability in a community based solid waste management programme. Within the *musseques*, a continuous waste removal system can be linked to a private service provider. Residents deposit household waste at designated collection depots managed and monitored by the community, the private company picks up and hauls waste out to the landfill.
- 8) The issue of cost recovery and community contribution to waste removal services still needs to be addressed. In the longer run, the ongoing costs of solid waste collection, removal, road improvement and community supervision must be recovered if sustainability is to be ensured.
- 9) Waste reduction and waste reuse are viable strategies for improving solid waste management services in the peri-urban *musseques* of Luanda.
- 10) Sand recovered from waste can be used as suitable material for infilling of low spots and depressions as an interim measure to improve road conditions in the *musseques*.
- 11) Food aid can be used in food-for-work programmes to improve environmental conditions in the *musseque* and provide employment for the large numbers of unemployed in these areas
- 12) People's preconceptions about "proper" methods of waste collection and removal in the *musseques* are slow to change

13) Emergency interventions can be designed to enhance local capacities while at the same time meeting immediate needs. Careful attention to this at the project design stage can help develop capacities for longer-term reconstruction and development efforts that are required in conflict prone societies such as Angola.

5.4 Sustainability and future prospects

The main dumpsite (*lixeira principal*) is gone. Already the momentum of life in the *musseque* has taken over. Where previously there was a mountain of garbage, there are now market vendors setting up huts to sell their wares. The local authorities have issued permits to vendors. Revenue raised from permit fees is being used to keep the area free of garbage. The Kwanza market association is willing to contribute to improvements and the market supervisors are undergoing training to oversee the collection depot.

The pilot initiative has identified waste reduction and waste reuse as viable strategies for dealing with solid waste in the *musseques* and has set up a continuous removal system. Further work is required to investigate and to ensure that key factors affecting the sustainability of operations and maintenance of a community based solid waste management programme are in place. These factors include the financing of solid waste services, the continued support by the local leaders and by the community, and the availability of removal services from Urbana 2000.

The financing issue could not be addressed within the timeframe and resources of the pilot initiative but this is a priority for follow up. The ongoing costs of maintaining the collection depot, removal, road improvement, and community supervision must be recovered if the programme is to be sustainable. The local government has a very limited resource base to finance the cost of solid waste services. Part of the costs will therefore need to be covered from user fees.

However, the effective demand for waste removal services is lower relative to the more pressing need for water. Development Workshop's experience in its water and sanitation programme indicates that residents are more likely willing to contribute labour and resources on an ongoing basis to water projects (i.e. public standposts) than to efforts to remove rubbish from their neighbourhoods. Therefore one way to address the issue of financing waste removal services is to link it to cost recovery for the provision of water. The concept of covering the cost of rubbish collection within the fees paid for other services such as water, is widely practised in many countries.

Under the Development Workshop-EPAL Peri-urban Water and Sanitation Programme, each standpost serves about 100 families. It is managed by an elected water committee that collects user fees which pays for maintenance and repair costs. Development Workshop is yet to practically test the principle of income from water fees being invested in waste removal. But its water programme has been able to show that a surplus can be produced through water fees. Moreover, there exist a number of

issues to address under this approach. Catchment or service areas differ for Standposts and rubbish collection systems. Further, they fall under the administrative jurisdiction of two different para estatal agencies (EPAL and ELISAL)

The local leaders have accompanied the project since its inception, their continued vigilance and supervision will be needed to ensure compliance to proper waste disposal. Six months after the project, the municipal authorities have an active dialogue with Urbana 2000/ELISAL and have managed to extend the coverage of waste removal without any NGO assistance. Accompaniment and training of local leaders needs careful attention in future similar initiatives. Social mobilisation efforts will need to continue to ensure that residents who have not begun to use the collection depot at INDAP do so or dispose their waste in a responsible manner. The local leaders must address the concerns raised by some residents about the distance to the deposit and the hazards of passing through the market.

Urbana 2000, thus far has an interest to improve conditions in the *musseques* and a willingness to work with the local government and with NGOs like Development Workshop on pilot projects. For years, there has been little faith in state companies and the sentiment that the *musseques* were marginalised was widespread. Urbana 2000's continued presence dispels the negative perceptions about the state's removal capability.

Given the involvement of the Provincial Government and the improvements brought about by Urbana 2000, the outlook for the solid waste sector appears more positive than it has ever been in recent times. Informal dumpsites are disappearing and the volume of waste that goes uncollected has been drastically reduced. The Provincial Government's recent increased interest in the solid waste sector (as evident in publicity campaign to promote awareness of better solid waste management) may keep solid waste on the agenda of the government, which can ensure continued financial support.

With Urbana 2000 doing rotating weekend service in the peri-urban areas, removal now reaches all areas of the city. Reducing the volume of waste at source (at the household) will facilitate waste removal and increase the area covered by Urbana 2000. This pilot project has shown that through community participation waste reduction of at least 50 percent is feasible. The potential for further reduction through recycling has yet to be evaluated.

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