

Solid Waste Management Initiatives in Small Towns

Lessons and Implications

In recent years, select examples have emerged of initiatives developed and launched by small urban local bodies in India that have transformed service levels and helped improve compliance with the Municipal Solid Waste Rules. A series of case studies has been compiled for three small towns in West Bengal, Goa, and Andhra Pradesh, focusing on decoding the institutional dynamics at work.





Cover: Cleaned street in Kanchrapara. Old community garbage bin converted into flower pot with the message, 'Do not use plastic'.

The information and analysis provided in the case studies are based on information provided by municipalities and field assessments undertaken in the period April-July 2005.

US\$1 = Rs 45; 1,000 million = 1 billion.

Estimates of waste generation in all three cases were provided by municipalities based on per capita waste generation norms (400-500 g) and not any empirical study.

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The focus of the programs was on primary collection and transportation ...[however] the disposal end has remained unaddressed, with open dumping being the norm.



Suryapet: Dumping on roadsides.

Since 1842, with the passing of the first Municipal Act, the responsibility for municipal solid waste (MSW) management in India has been with urban local bodies (ULBs). This was further reiterated under the 74th Constitutional Amendment of 1992. In 1995, a plague in Surat brought the criticality of this function back into focus and led to a series of reform measures in the sector since then. Subsequently, a legislative framework was provided by the Municipal Solid Waste (Management and Handling) Rules 2000 notification.

Given these developments, it was to be expected that the situation on the ground would improve. However, despite the clear identification of responsibility and pressures arising from growing public awareness, the status of MSW services in most Indian towns has remained far from satisfactory.

Yet, in recent years, select examples have emerged of initiatives developed and launched by small ULBs that have transformed service levels and helped improve compliance with the MSW Rules. It is a matter of interest to explore the reasons that led to the development of these initiatives, the factors that supported their implementation, and the lacunae that remain in these programs.

Focus of the Study

Accordingly, a series of case studies were undertaken in April-July 2005, focusing on decoding the institutional dynamics at work; in particular, the factors that supported or constrained the design and implementation of the initiatives. Some important lessons that may be drawn from these cases include the (a) need for developing a reform program that is firmly grounded in the

Box 1: Program Thrust

Kanchrapara → Community partnership
Panaji → Equipment innovation and financial incentives
Suryapet → Stakeholder engagement and advocacy

local context; (b) potential that exists for harnessing local resources and innovating through a bottom-up approach; (c) supportive role required to be played by state governments, which should guard against adopting a top-down prescriptive approach; and (d) need for more active intervention in waste treatment and disposal that has tended to get neglected due to constraints existing at the local level.

Case Studies

Three towns from three different states were selected for this study—Kanchrapara (West Bengal), Panaji (Goa), and Suryapet (Andhra Pradesh). The towns are similar in size, with populations of approximately 100,000, but with differing economic profiles and political orientations. The programs were similar in scope, but achieved the end outcomes using substantially different strategies (see Box 1). Accordingly, while being comparable, these cases represent a diverse set

of small town experiences. All the three programs were launched with the aim of 'improving the civic environment' (as against 'safeguarding public health').

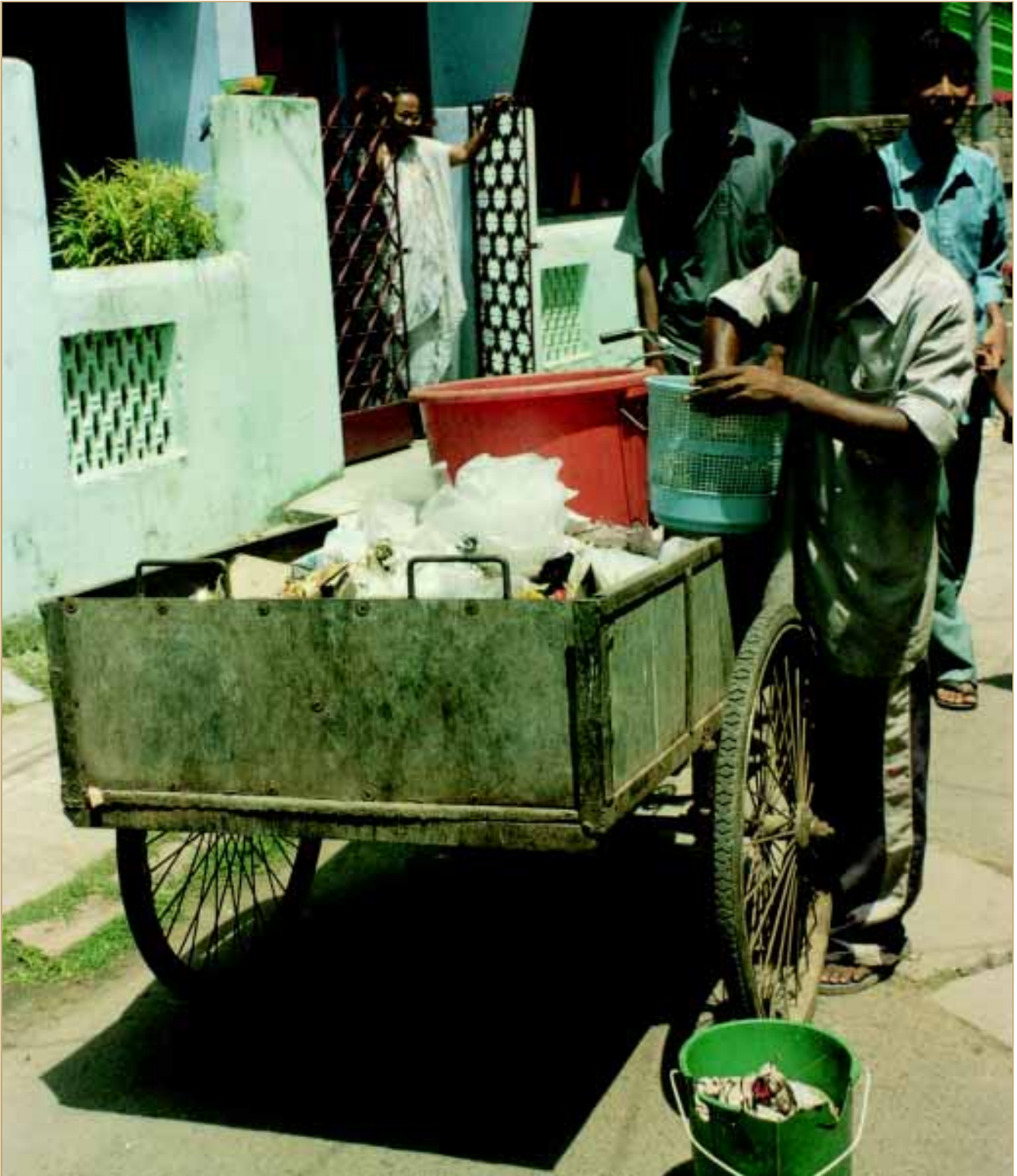
The focus of the programs thus was on primary collection and transportation, that is, increased frequency of collection, elimination of fixed community bins, and streamlining of transportation systems. In all the three cases there has also been an *attempt* at instituting segregation, composting, and recycling. To that extent, they indicate a fundamental shift in approach from basic cleaning services to integrated sustainable waste management. Despite this, the disposal end has remained unaddressed, with open dumping being the norm.

Funding for all three programs has been almost entirely from municipal finances, with some contributions from local stakeholders (for example, commercial establishments or business groups); little or no financial assistance was taken from higher levels of government.



Panaji: Dump site at Curca.

In Kanchrapara, the inadequacy of financial resources with the Municipality necessitated the development of a low cost service delivery model that could be implemented by the people themselves.



Kanchrapara: Door-to-door collection of segregated waste.

Case Study 1 Kanchrapara (West Bengal): Community- Based Service Delivery

Kanchrapara was originally built as a township by Indian Railways. Today it has expanded to include other economic activities as well, primarily small-scale trade and services. Given municipal status in 1917, the wards in the non-Railway areas are managed by the Kanchrapara Municipality (KM). The rapid growth of population in the non-Railway areas had resulted in sharp increase in municipal solid waste (MSW) generation in these areas. Secondary storage points for MSW (streetside vats) were cleared only two or three times a month, resulting in unhygienic conditions on the streets and in open spaces. The Municipality was unable to keep the town clean, given its inadequate MSW infrastructure and resources.

The idea of a participatory approach to solid waste management (SWM) emerged in mid-2002, in the course of discussions between the Vice Chairman, Kanchrapara Municipality, and the then Chief Environment Officer, Government of West Bengal. The inadequacy of financial resources with the Municipality necessitated the development of a low cost service delivery model that could be implemented by the people themselves.

After preliminary discussions and subsequent approval from Municipal Councilors, a provisional roadmap was developed, based on community

Box 2: Program Summary

Outputs: Frequency of garbage collection increased from once in 10 to 15 days to daily collection; fixed community bins eliminated. Attempt at treatment of biodegradable waste through composting; open dumping of the rest.

Period of implementation: 2003-2005

Coverage: Town-wide (achieved 80 percent coverage as of March 2005)

User fees: Yes

Segregation: Yes

Program champion: Municipal Councilor

Implementation phases:
Ward-wise

Program cost: Approximately US\$66,700 for 15 wards
(estimated US\$100,000 for full town)

Box 3: Profile of Kanchrapara

Location: Municipality town located about 48 km. from Kolkata in North 24 Parganas district of West Bengal

Area: 3.07 sq. km. (plus 6 sq. km. under the management of Indian Railways)

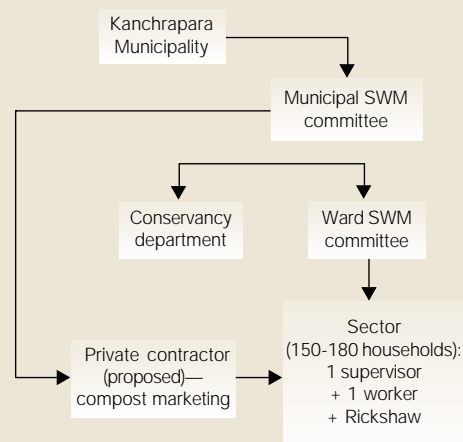
No. of wards: 19 (plus 5 under the management of Indian Railways)

Population (2001): 126,000 (of which approximately 84,000 is under the Kanchrapara Municipality)

BPL population: Approximately 20 percent

Quantity of solid waste generated: Approximately 40 MT per day

Figure 1: Institutional Arrangements



involvement, cost sharing, employment generation, gender sensitivity, and integrated waste management. The main elements of the SWM program were:

- Introduction of door-to-door collection (DTDC) of garbage against payment of a service charge.
- Constitution of SWM committees at the municipal and ward levels to oversee the SWM function.
- Substitution of community dustbins by mobile trailers.
- Introduction of segregation at source to enable effective treatment of waste.

Implementation Strategy

Launched in December 2002, the program was implemented on a ward-wise basis, with the ward of the Vice Chairman, Kanchrapara Municipality, serving as the pilot. Towards end-January 2003, the Municipal Board adopted the necessary guidelines to run SWM committees at the municipal and ward levels. By March 2005, 15 wards (out of 19) had adopted the program.¹

To overcome the initial *reluctance to pay service charges*, the new SWM system was operated free of charge for the first two months in each ward. No ‘willingness to pay’ study, however, was done to arrive at the *tariff structure*. Instead, a brief consultation exercise using ‘local wisdom’ led to the formulation of the differentiated rate structure. The program did not meet

¹The remaining four were undertaking groundwork (for example, surveys, awareness meetings) to adopt the program.

Table 1: Monthly Service Charges

Category	Charges (in US\$)
Residents	0.22
• Families below poverty line (BPL)	0.10
• Poorest 5 percent families of BPL population	Free
Commercial establishments	
• Shops	0.10
• Restaurants and hotels	1-2

Collated by WSP-SA from data provided by the Municipality.

with any *resistance from the Municipality staff*, since there were no retrenchments under the program.

The most important quality of the decisionmaking process was that both the Chairman and Vice Chairman were keen to improve the situation and willing to commit municipal funds for the purpose, with the latter acting as the program champion.

Public communication. For each ward, the initial awareness creation was done primarily through group meetings in the ward. Once the system was introduced in a particular ward, a campaign mode was adopted, using posters, school competitions, and even the singing of songs by schoolchildren.

Institutional Arrangements

Prior to the intervention, the SWM function was managed entirely by the conservancy department of KM. Under the program, SWM committees were constituted at the municipal and ward levels to oversee SWM service delivery for the town. These committees became the vehicle for the adoption of the participatory approach under the program.

The ward-level SWM committees work within the framework provided by the

municipal-level SWM committee. The latter in turn is required to provide full support to the ward-level committees to enable effective functioning of the SWM system.

The *municipal-level SWM committee*, consisting of municipal councilors and other select nominees, has the overall responsibility for all aspects of SWM. It defines the operating guidelines for the ward SWM committees, including structure of service charges, wage rates and employment terms for ward workers, price of compost and distribution of earnings from it, and also initiates awareness creation. Operational responsibility is, however, divided between the KM conservancy department and ward-level SWM committees.

The *conservancy department* is responsible for street sweeping, drain cleaning, transportation of garbage from trailers to the disposal site, composting operations, and managing the dump site.

The *ward-level SWM committee(s)* consists of 12 or 15 members drawn from the ward committee plus select nominees. It oversees all operational and maintenance aspects of the DTDC service, including hiring of workers,

collection of charges, and maintaining financial accounts.

Two market SWM committees have also been created to coordinate and oversee garbage collection from the two main markets in the town.

The funds generated through collection of service charges remain within the ward, and are used only for SWM-related expenses. The ward committee maintains financial accounts for these funds, which are internally audited once a year, and then disclosed to the ward residents in the annual general meeting. [Note: SWM charges are the only funds raised by the ward committees.]

As per the guidelines laid down, ward workers should be hired from their own area from the underprivileged sections, typically for a tenure of one year. The supervisors are required to be female, typically from the BPL category. There are no rewards or penalties linked to performance; nevertheless, motivation levels run high, driven largely by public goodwill and a sense of civic pride.

A comprehensive monitoring schedule has been developed by the

Kanchrapara Municipality, and adopted for tracking operational aspects of the SWM service delivery systems.

Operating System

- Each ward (average population: 4,500) is split into four or six sectors; each sector consists of 150-180 Waste Generating Units² (WGUs). Each sector is assigned one tricycle van accompanied by one waste collector and one supervisor.
- Every morning, segregated garbage is collected from households and dumped in the trailers stationed at

specified points in the ward. In the afternoon, a tractor tows away trailers (up to 10-12 trailers per tractor) to the dump site where the waste is unloaded (segregated biodegradable waste goes directly into the compost chambers).

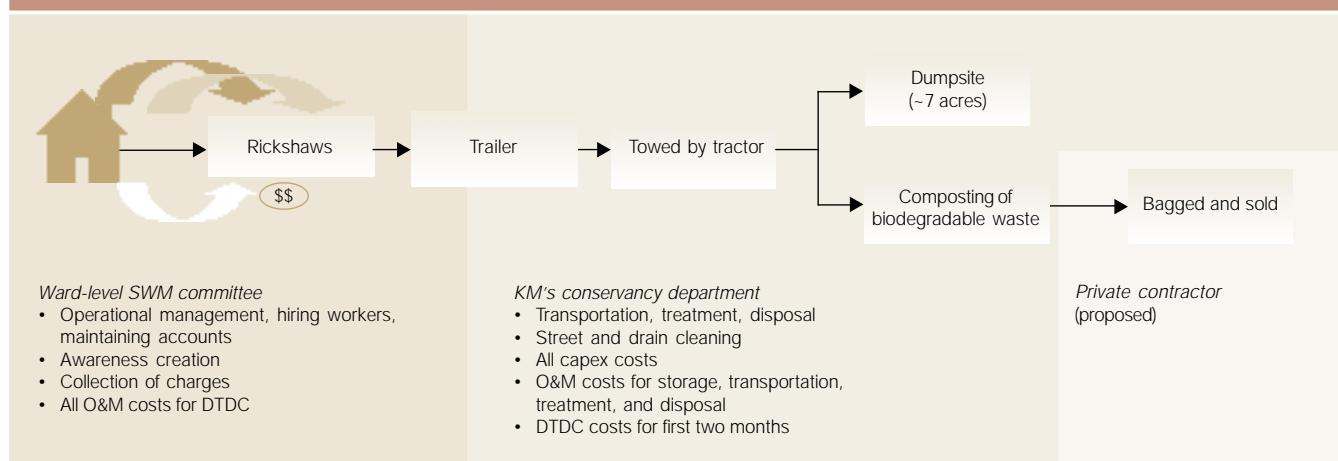
- The waste collector does the physical work of collection, while the supervisor is responsible for monitoring the work (that is, ensuring that all units under her charge are covered), collecting monthly charges, maintaining records, and encouraging segregation at source. This system is operational 365 days a year.
- Every family has been given two buckets—for storing biodegradable

²Mainly households, but also including shops, restaurants, and schools.

Box 4: Operational Flow

- 9 to 11 am: DTDC in a segregated form.
- By 12 noon: SW deposited in trailers located at specified points in ward.
- 12 noon to 2 pm: Trailers towed by tractor to composting and disposal site. After unloading, trailers returned to original locations.
- Cleaning of main roads done in the morning by a team of sweepers.

Figure 2: Operating System





Kanchrapara: Tractor with trailers unloading waste at dump site.

and non-biodegradable waste—by the ward-level SWM committee. The tricycles have provision for transporting the waste in segregated form. Trailers are also either partitioned or two trailers are provided at a spot, to store the biodegradable waste separately. Mixed waste provided by some WGUs is sorted by the waste collector on the tricycle van itself.

- Roadside vats used for secondary storage under the earlier system have been done away with, and are being gradually beautified into big flowerpots.
- The Municipality plans to provide stands for workers, to facilitate the transfer of waste from tricycle vans into trailers.
- Waste generators are required to

inform the ward committee about construction debris, which then gets it collected for a charge.

- Cleaning of main roads and drains is managed by the KM conservancy department. Streets inside the wards, though cleaned by KM workers, are managed by ward committees.

Treatment and Disposal

The town has a treatment-cum-dump site located on the outer edge of the town. It covers an area of approximately seven acres, of which about half is allocated for composting operations (started in early 2004). A multi-chamber framed structure is provided for composting segregated biodegradable waste (approximately three-four tons per day) using an EM (Effective Micro-

organisms) solution.³ The composting method was initially developed and tested with the assistance of a research candidate from Jadavpur University (Kolkata).

Disposal is clearly the weak link in the chain. The existing site is just an open dumping ground with no provision for leachate control. Moreover, it is surrounded by habitation. To mitigate the situation, KM proposes to construct a boundary wall and plant trees around the site, which should also address the currently prevalent cattle menace.

At current rates of dumping, the site has a remaining life of about five to seven years. To address this challenge, a proposal has been mooted to set up a regional disposal facility in coordination with two neighboring municipalities.

Marketing of compost and recycling of waste (currently entirely informal) are some of the areas with remaining ambiguities, and require to be addressed for more effective operation. To this end, the Municipality has submitted a proposal to the state government for financing expansion of composting facilities, and extending the program to the remaining wards in the town.

Financial Resources

Costs associated with DTDC are shared between the Kanchrapara Municipality and ward-level SWM committees (see Box 5), while costs associated with transportation, treatment, and disposal are borne entirely by the Municipality.

³ A liquid concentrate containing more than 80 strains of naturally available micro-organisms, for example, lactic acid bacteria, photosynthetic bacteria, yeast.

Box 5: Door-to-Door Collection Costs

Kanchrapara Municipality	SWM ward committee
<i>One-time costs</i>	<i>Ongoing costs</i>
• Two bins per family	• Wages of workers and supervisors
• Tricycles, bins (large), shovels or spades	• Repairs and maintenance of tricycles
• O&M costs for first two months	• Replacement of tricycle bins
• Awareness creation	• Gloves, raincoats, umbrellas
	• Signages and beautification of vats
	• Admin. expenses for committee

Table 2: Resource Mobilization

Category	Amount (in US\$ approx.)
Allotment from SFC grants	44,444
Municipal fund	4,444
Grant from Department of Environment of state government	11,044
<i>Plus service charges collected</i>	

Collated by WSP-SA from data provided by the Municipality.

Most of the ward-level SWM operations are financially viable, with service charge collections covering all ongoing costs associated with DTDC. In a few cases where the ward does not have adequate resources, KM may provide funds for maintenance and replacement of equipment.

The overall cost of the town's SWM systems is approximately US\$7 per ton (excluding street cleaning). The low costs are partly due to the low cost equipment deployed and low wage rates for DTDC.⁴ SWM costs account for about 15-16 percent of KM's total revenue expenditure (US\$800,000 in 2004-05). Service charge collections for the town are roughly US\$22,200

per year (equivalent to 20 percent of KM's SWM costs).

Earnings from the compost plant are planned to be distributed equally between the wards.

Program Cost and Resource Mobilization

In the first two years of operation, the Kanchrapara SWM program has cost US\$66,700 and covered 15 of the 19 wards. The expenditure has been on providing free bins for households; O&M costs for first two months (for each ward); trailers, tricycles, large bins; composting plant; and awareness creation.

KM spends an average of US\$4,000 per ward for introducing the program, which includes two months of operating expenses associated with DTDC, initial awareness creation, plus all equipment

(that is, bins, tricycles, shovels, spades, and trailers).

Apart from a small grant from the Department of Environment for carrying out the program on a trial basis in two wards, there has been no additional funding for the Municipality. Going forward, however, it is expected that additional funds would be required to sustain the SWM effort.

Program Highlights

- High level of public participation and decentralization through ward-level SWM committees.
- Payment of charges by *all* households, due to transparency and accountability. Revenue collections remain *within* the ward and are spent only on SWM.
- Segregation at source—approximately 60 percent. Provision for segregated transportation.
- Cost recovery: Service charges cover the full cost of DTDC.
- Employment generation for 150 workers (50 percent women) from BPL population.
- Negligible increase in KM staff or vehicles.

Issues

- System is dependent on volunteers from the community, which can be a constraint at times.
- Limited engagement of ragpickers.
- No organized attempt at recycling.
- Weak disposal system.
- Lack of coordination with other government authorities, namely the Railways (which manages the other half of the town).

⁴US\$6.66 (Rs. 300) per month for the supervisor and US\$11.11 (Rs. 500) per month for the collection worker.

The rollout of the solid waste management program in Panaji was part of a multi-pronged campaign aimed at the revitalization of the city, called 'Together for Panjim'.



Panaji: Transfer of waste from trolley bins into trucks using a mechanized side loader.

Case Study 2 Panaji (Goa): Innovation and Incentives Work Wonders

Panaji, the capital of Goa, is a city with a strong cultural heritage. Apart from being a popular tourist destination, it is an administrative center and a commercial hub for the state. Till the early 1990s, the town's municipal solid waste (MSW) management was characterised by a weak system with poor infrastructure, resulting in unhygienic civic conditions. In 1995, with the assistance of the Government of India, United Nations Development Program (UNDP), and Water and Sanitation Program-South Asia (WSP-SA), the Panjim Municipal Council (PMC) undertook the Solid Waste and Resource Management (SWARM) project. However, despite detailed planning and infrastructure upgradation undertaken as part of the SWARM project, sanitary conditions remained unsatisfactory.

In December 2000, with the help of the local Garbage Management Committee⁵ and the NGO 'People's Movement for Civic Action', the PMC launched its 'house-to-house garbage collection scheme' in Dona Paula (no longer a part of Panaji). The PMC appointed a contractor for the door-to-door collection (DTDC) and also instituted a service charge of US\$0.67 per month for each household. Though initially implemented for only 70 households, the scheme gained

⁵ Constituted under the Goa Non-Biodegradable Garbage (Control) Act, 1996.

Box 6: Program Summary

Outputs: Frequency of garbage collection increased from once in 10 to 15 days to daily; fixed community bins eliminated. Incentivization of recycling. Attempt at treatment of biodegradable waste through composting; open dumping of the rest.

Period of implementation: 2003
(nine months)

Coverage: Town-wide

User fees: Yes (partial coverage)

Segregation: No

Champion: Municipal Commissioner

Implementation phases: Locality-wise

Program cost: Approximately US\$88,900

Box 7: Profile of Panaji

Location: Corporation town located in North Goa, it lies on the banks of the river Mandovi

Area: 7.56 sq. km.

Number of wards: 14

Population (2001): 86,000 (plus 25,000 floating population)

BPL population: Less than 1 percent

Quantity of SW generated: 50 MT per day

SWM Program: 'Bin Free in 2003'



popularity and in a little over a year's time spread to approximately 200 households. In early 2003, under the leadership of the Chief Officer⁶ of Panaji, a comprehensive city revitalization campaign was launched, which included MSW management as a critical element. As part of the MSW component, christened 'Bin Free in 2003', the DTDC

⁶ Equivalent to a Municipal Commissioner.

scheme piloted in Dona Paula was rolled out to the entire city of Panaji. The key elements of the MSW program were (a) DTDC for the entire city of Panaji along with the introduction of service charges; (b) substitution of community bins by trolley bins along with automated truck-loading systems; and (c) program for the recycling of plastic waste.

Implementation Strategy

The rollout of the SWM program in Panaji was part of a multi-pronged campaign aimed at the revitalization of the city, called 'Together for Panjim'. The campaign encompassed improving the civic infrastructure and conserving the city's heritage, thereby fostering civic pride among the citizens. It had the support of local as well as state-level political representatives.



Panaji: Door-to-door collection using trolley bin.

Improving the sanitary conditions of the city was an important element of this campaign, reflected in the launch of the Bin Free program. Based on the pilot in Dona Paula, the program was implemented locality-wise. The implementation was managed directly by the Corporation of the City of Panaji (CCP)⁷ without any NGO assistance.

As part of the pilot at Dona Paula, initially households kept the bins outside and a truck collected the waste directly. Later an intermediate stage of transfer was introduced in the form of the trolley bin, which refined the operational flow to its current form. The current trolley bin *design* was arrived at after much experimentation with bin models from

several countries including Australia, France, and Singapore. The trolley bin has proved to be more functional than a tricycle rickshaw, given the undulating terrain of Panaji. A similar process of iteration was adopted for arriving at the street litter bin design. The hydraulic arm of the garbage trucks was also locally modified⁸ to enable transfer of waste from the trolley bin into the truck without manual intervention. This *local innovation* in truck design resulted in substantial savings in cost, which might have been otherwise incurred had the Municipality purchased modified trucks from the manufacturer. Modifications were also made in the design of lids for the bins provided to households. These prevented spillage of garbage by stray animals while being operationally

efficient as well. Help was taken from the bin manufacturer to arrive at the final lid design.

A unique feature of the city revitalization campaign was the way in which it harnessed local talent, by seeking widespread involvement from the city's residents at various stages of the program. For instance, architects and urban planners assisted in the restoration of heritage buildings, competitions were held to develop street art, music festivals were held to generate civic pride, and so on. For the MSW program in particular, musicians helped develop jingles for communicating the bin-free message, design inputs were sought from local experts to arrive at the look of the campaign as well as the SWM infrastructure (that is, street bins, trucks), and engineers contributed their inputs to design truck modifications.

The additional function of DTDC was performed without any increase in *manpower*. Workers earlier responsible for only street cleaning, drain cleaning, and removal of waste from community bins were now given the job of DTDC as well. Their cooperation was obtained by paying them a cash incentive from the service charges collected (details in subsequent sections).

This arrangement also served to counter resistance to payment of charges, based on the argument that the money collected was *"not to make the Corporation richer, but as an incentive for the worker doing the DTDC"*.

To gain public goodwill and credibility, a quick response vehicle was also introduced with a 24-hour helpline number, to clear garbage left uncollected due to any reason.

⁷In 2002, Panaji's municipal status was upgraded from Municipal Council to Corporation and the civic agency, Panaji Municipal Council, was re-christened Corporation of the City of Panaji.

⁸These were originally designed for picking up the SWARM bins of the earlier system.

The program was started in early 2003 and completed within nine months, by November 2003.

Public Communication Strategies

SWM by itself had little potential for engaging public interest. The subject, however, drew a lot more attention and cooperation when publicized in the context of overall civic revival under the 'Together for Panjim' campaign. As part of the campaign, cultural programs such as music festivals, fairs, and carnivals were held in which the message of civic hygiene was reiterated.

For locality-level communication, the Chief Officer of CCP and the Waste Management Officer visited houses, along with women volunteers, to convey the details of the scheme and garner the cooperation of residents.

Institutional Arrangements

Within the CCP, the solid waste function is managed by the solid waste

Figure 3: Institutional Arrangements

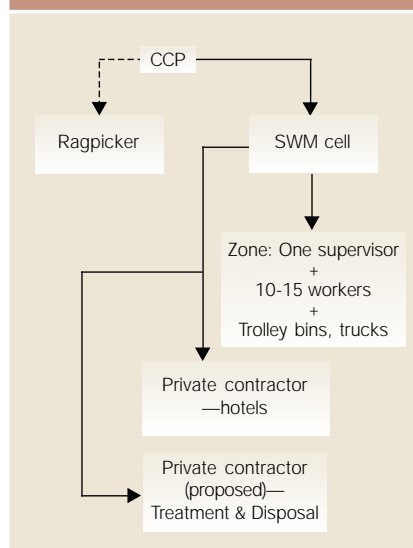


Table 3: Monthly Service Charges

Category	Charges (in US\$)
Residents, shops	0.67
Hotels or restaurants (depending on size of establishment)	3-13

Collated by WSP-SA from data provided by the Municipality.

Box 8: Operational Flow

Morning shift: Street sweeping

- Sweepers clean roads and leave waste in trolley bins by the roadside.
- Vehicles load waste and then transport it to the dump site.

Afternoon shift: DTDC

- 2 to 5 pm: DTDC done using trolley bins. On getting filled, these are left by the roadside.
- 3 pm onwards: Vehicles start moving along fixed routes, collecting garbage from trolley bins left by the roadside. On completing their route these vehicles transport the waste to the dump site.

Night shift (by contractors): Collection from hotels and restaurants.

management cell. It is headed by the Accounts/Taxation Officer, who also has the dual charge of the Waste Management Officer (in the absence of any alternate official with the requisite expertise). This officer represents the continuity factor of Panaji's SWM services, having handled this charge for over a decade. Given this, as well as the limited community involvement, the system appears to be excessively dependent on this one individual.

Field services are headed by a Municipal Inspector and a Sanitary Inspector, under whose charge are 15 supervisors, to oversee the collection and transportation work for each zone.

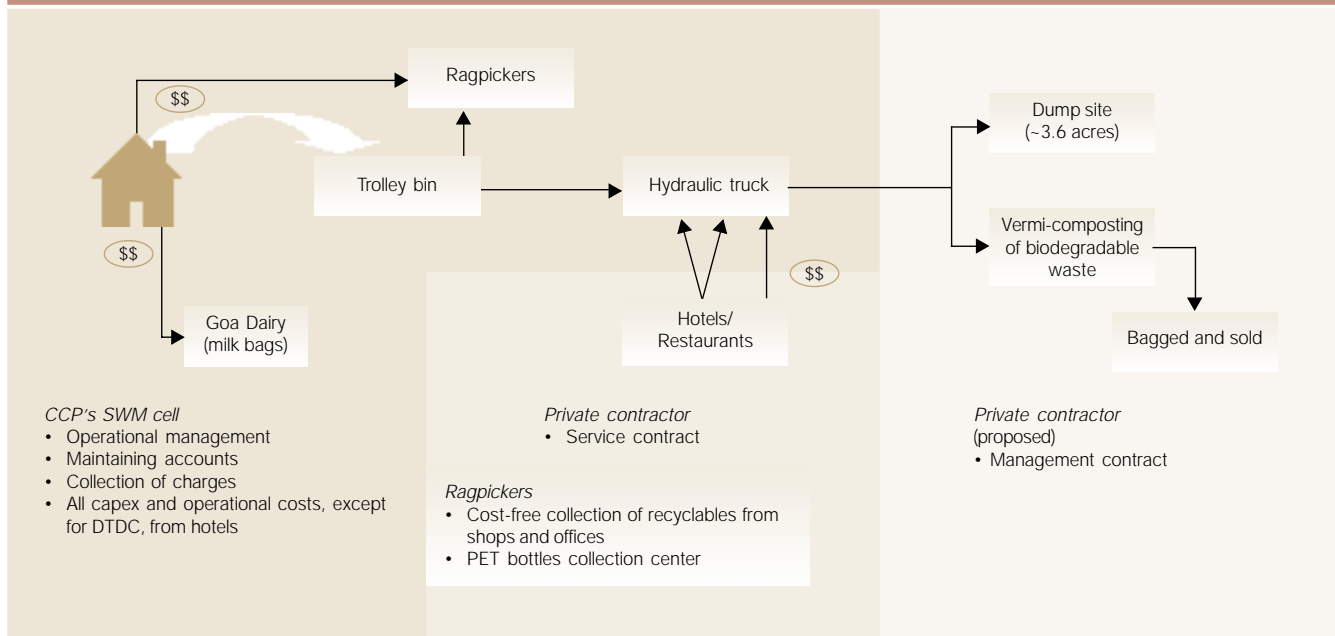
Service charges are collected by supervisors, who also deal with customer complaints, and manage

workers accordingly. Out of the collections made, the supervisors pay cash incentives (Table 5) to the collection and transportation workers, maintain accounts for these funds, and deposit the surplus amount with the CCP. The cash incentives serve as an informal contractual arrangement between the workers and users, enhancing worker accountability for proper service delivery.

Use of Financial Incentives for Recycling

- A collection center for PET bottles has been established (with support from Pepsi Co.). Raggpickers deposit plastic bottles there, for which they are paid US\$0.55 per 100 bottles. Bottles are transported to a crushing unit near Vasco (set up by Coca-Cola), from where the crushed plastic is sold to recyclers.

Figure 4: Operating System



- People can return washed empty *plastic milk bags* of Goa Dairy at the booths, for which they are paid at the rate of US\$0.17 per 100 bags (approximately 250 gram).

Privatization

The SWM function is managed entirely by the CCP, with the exception of a few service areas that have been, or are being, outsourced to private contractors, namely (a) collection of waste from the 250-odd hotels and restaurants; and (b) management of the treatment-cum-disposal facility in Curca. In both cases, the CCP has retained ownership of the underlying assets, having outsourced only the operational aspects (Box 9).

Operating System

The city is divided into zones⁹ for operational purposes, with each zone

managed by a supervisor. The supervisor manages the collection as well as transportation for his zone, using 10-15 workers consisting of a mix of permanent and temporary staff. The same workers do street sweeping in the morning and DTDC in the afternoon.

- Each collection worker covers approximately 250 households. The worker takes garbage from household bins (capacity: 20 liters) and transfers it into the trolley bin (capacity: 240 liters). Later, the garbage trucks travel along a fixed route and transfer garbage from the trolley bins left by the roadside into the closed truck. After completing their DTDC beat, workers place empty trolley bins back inside fixed enclosures.
- Waste from *slum-like areas* is received through common storage bins.

- After being swept, street waste is collected in the trolley bins, from which it is transferred into garbage trucks, as in the case of DTDC.
- This system is operational 365 days a year.

Transportation of waste is done using trucks (capacity: approximately seven tons) that are fully closed, some of which have provision for hydraulic loading (thus eliminating manual handling of waste). Each vehicle makes two trips—once in the morning for street waste and the other in the evening for DTDC waste.

Market waste is received directly in a truck parked at the location from where it is cleared more frequently in the course of the day, thus minimizing any accumulation of waste. With the elimination of community bins, *street litter bins* have been installed all across the city. The CCP has not yet instituted any fines for street littering.

⁹Not necessarily based on ward boundaries.

Box 9: Contractual Arrangements

Hotel or restaurant waste

Scope: Collection of segregated waste from hotels or restaurants, between 7 pm and 1 am, for a service charge (fixed by CCP).

Resources: CCP provides vehicle. Contractor hires CCP staff and pays them as per norms defined by CCP.

Payment: Contractor pays CCP US\$200 per month for vehicle. Retains surplus revenue.

Treatment-cum-disposal facility (proposed)

Scope: (a) treatment of mixed waste with effective micro-organism technology, followed by aerobic composting; assistance to CCP in marketing the compost and recyclables; (b) reclamation of old waste dumped on site; (c) improvement of site through tree plantation, roads, and drainage.

Resources: CCP to provide machinery and equipment.

Tenure: Five years.

Payment: CCP pays fixed fees of US\$1,222 per month and 7.5 percent of actual cost of civil and mechanical work.

Construction waste is being used as landfill cover. Residents are encouraged to phone in to get construction debris collected, for which separate charges are levied.

While *segregation* is being done at most commercial establishments such as hotels or restaurants (biodegradable waste) and offices (recyclables), not much headway has been made on segregation at the household level. Segregated biodegradable waste is treated at the composting facility, while recyclables are re-processed with the involvement of *ragpickers*. Apart from the incentive schemes for PET bottles and milk bags (described earlier), the CCP has informally organized ragpickers to collect recyclable waste directly from offices and shops—a service it provides free of charge. For the residential areas, it sometimes coordinates with the DTDC workers and extract recyclables directly from the waste in the trolley bin.

Treatment and Disposal

The town's treatment-cum-dump site at Curca is located nine km. from Panaji

(outside municipal limits), in what used to be a stone quarry. Started in 1994, it covers an area of 3.61 acres, and incorporates a vermi-composting facility. The site still lacks basic amenities such as a proper boundary wall (resulting in cattle menace), electricity or a water connection.

Apart from the obvious inadequacies of the facility, matters were further compounded by a nearby Municipality, Mapusa, directing its waste to Curca. The extra dumping continued for almost two years, till as late as March 2005, when it stopped after aggressive protests by Panaji representatives.



Panaji: Transfer of waste from trolley bins into trucks using a mechanized side loader.



Table 4: Service Charge Collections from SWM Scheme¹⁰

Year	Amount (in US\$)
2002-03	2,918
2003-04	19,360
2004-05 (estimate)	26,700
2005-06 (budget)	33,333

Collated by WSP-SA from data provided by the Municipality.

This overloading has brought the facility close to saturation levels, and also disrupted the vermi-composting operations. The vermi-composting facility (set up in November 2001) consists of 14 vermi-beds and is used for composting primarily hotel and market waste. When operational, the vermi-compost generated is used mainly for the city's horticulture requirements. The CCP now proposes to upgrade the facility, using a private contractor, who will also subsequently manage disposal-cum-treatment operations at the site (Box 9).

Attempts have also been made at decentralized vermi-composting in select residential complexes, in partnership with local NGOs. These have, however, remained isolated initiatives.

Financial Resources

Panaji's SWM model offers the following revenue-generating opportunities:

- Service charges from waste generating units (WGUs).
- Fixed payment from contractors for collection of hotel or restaurant waste.

- Sale of compost (currently negligible).

These do not offset SWM costs to any significant extent.

The operating cost (estimated) of the town's SWM systems is US\$31 per ton.¹¹ This accounts for about 35-40 percent of the CCP's total revenue expenditure. Service charge collections for the town are roughly US\$26,700 per year (equivalent to just about three percent of the CCP's SWM costs).

Currently the share of WGUs paying service charges is relatively small (about 20 percent). The CCP has refrained from aggressively pushing for increased collections, since its primary objective at this stage is to ensure participation of WGUs in the SWM system and not cost recovery. Nevertheless, collections have been steadily rising on a yearly basis since the start of the scheme (see Table 4), from US\$2,918 in 2002-03 to a budgeted US\$33,333 for 2005-06.

Not all service charge collections translate into revenue for the CCP since a share of these service charges is paid as cash incentives to the workers. While these incentives are defined by the CCP, their disbursement is managed at the supervisory level; the remaining surplus is deposited with the CCP.

To further increase willingness to pay, the CCP has started a scheme for annual payment of SWM service charges along with the property tax at a discounted rate of US\$6.67 instead of US\$8.11.



Panaji: Garbage truck parked at the vegetable market.

¹⁰ Net of cash incentives paid to workers, and also excluding collections from hotels or restaurants.

¹¹ Breakup (per ton): Collection cost: US\$19; transportation cost: US\$11.50; disposal cost: US\$0.50.

The CCP has spent roughly US\$88,900 on the program, which includes the acquisition of trolley bins, large bins, street litter bins, modification of hydraulic trucks,¹² augmenting of facilities at treatment-cum-disposal site, and awareness creation (a substantial part of this activity was covered under the larger civic revival campaign, well supported by local stakeholders such as corporates, NGOs, and clubs). The CCP's expenditure on the solid waste program has been funded entirely from its own sources, with no external funding for the Municipality.

Program Highlights

- Rapid implementation (nine months).
- Dovetailing with multi-pronged campaign resulting in effective outreach.
- Levy of service charges, resulting in part cost sharing for DTDC.
- Payment of cash incentives to workers (~ 30 percent) from collections. Results in (a) worker accountability; and (b) increased productivity without additional expenditure by the CCP.
- Improved recycling efficiency through market creation for PET bottles and plastic milk bags.
- Equipment choice and adaptation to suit local conditions.
- Minimal manual handling of waste.
- No increase in vehicles or manpower.

Issues

- No segregation at source in households.
- Low level of user-fee collection.



Panaji: Vermi-composting facility in a residential apartment complex.

Table 5: Sample Monthly Accounts for a Supervisor

Staff	Incentive per worker (fixed) (in US\$)	No. of workers	Total amount (in US\$)
Supervisor	11.11	1	11.11
Sweepers	3.33	8	26.67
Daily workers	3.33	7	23.33
Driver	8.90	2	17.78
Operators	4.44	6	26.67
Total cash incentives paid			105.56
Service charge collections			333.33
Net surplus deposited with CCP			227.77

Collated by WSP-SA from data provided by the Municipality.

- Poor downward allocation of operational responsibility.
- Low public engagement in operations and monitoring.
- Inadequate cost information to decide pricing under contractual arrangements.
- Weak disposal system (inter-municipal 'conflict') due to strong NIMBY ('Not In My Back Yard') sentiment in region.

¹² No additional vehicles were acquired under the program.

Though the Suryapet initiative was spearheaded by the Municipal Commissioner, it received strong backing from the political decisionmakers, namely the elected councilors.



Suryapet: Cleaned streets in a residential area.

Case Study 3 Suryapet (Andhra Pradesh): Engaging Stakeholders to Achieve Service Delivery Outcomes

Suryapet was assigned municipal status in 1952. Its population has since grown by over 10 times. Its main economic activities are agriculture and business. The town also has an industrial estate that includes industries such as PVC, HDPE pipes, rice mills, pharmaceuticals, and stone polishing.

Prior to 2003, the town suffered from poor sanitary standards. The frequency of garbage collection was low, resulting in waste spillage around bins. Incidence of disease in the town's populace was high. In an effort to clean up the city, the Municipal Commissioner launched a 'Zero-Based Solid Waste Management' initiative¹³ in early 2003, which was implemented on a phased basis. The key elements of the initiative were:

- Introduction of door-to-door (DTDC) collection of garbage.
- Eradication of community dustbins.
- Introduction of segregation at source.
- Installation of treatment and recycling facilities to minimize waste disposal requirements.

¹³ A similar initiative had been attempted by the Municipal Commissioner in his previous assignment as Municipal Commissioner of Mandapeta (Andhra Pradesh). He drew from his previous experience for the design and implementation of the Suryapet SWM program.

Box 10: Program Summary

Outputs: Focus on primary collection and transportation; frequency of garbage collection increased from once in 10 to 15 days to daily collection; fixed community bins eliminated. Treatment of biodegradable waste through composting, recycling of dry waste, and open dumping of the rest.

Period of implementation: 2003

Coverage: Town-wide

User fees: No

Segregation: Yes

Program champion: Municipal Commissioner

Implementation phases: Operationally phased. Phase I: Bin-free with daily clearance; Phase II: Segregation at source

Program cost: US\$275,500 (from municipal finances and contributions from local stakeholders)

Box 11: Profile of Suryapet

Location: Municipality town located about 137 km. from Hyderabad in Nalgonda district of Andhra Pradesh.

Area: 34.54 sq. km.

No. of wards: 28

Population (2001): 103,000 (plus 30,000 floating population)

Slums: 44 slum areas

Quantity of MSW generated: Approximately 32 MT per day

Implementation Strategy

The project was launched in two phases, both of which were implemented for the entire town:

- In January 2003, the municipal council started DTDC, and eliminated community dustbins (approximately 360 bins). This resulted in significant improvement of the town's civic environment.
- From May 2003, a two-bin system was introduced. Nearly 52,000 green and red plastic bins were distributed free of cost to all residential houses to enable segregation at source.

The first phase had won the goodwill of the citizens by displaying the Municipality's commitment to improving living conditions. This facilitated the involvement of households in the implementation of the second phase, that is, in doing segregation at source. Both these phases were accompanied by an aggressive public outreach program (further details below) for creating awareness among the citizens and ensuring their cooperation.

Though the initiative was spearheaded by the Municipal Commissioner, it received strong backing from the political decisionmakers, namely the elected councilors. This allowed the program to be implemented without

any political hindrances. Considerable effort was devoted to engaging all the stakeholders—chairperson, councilors, staff, union leaders, and specific user groups (for example, trade associations, industry groups, schools, and colleges). Senior citizens were also involved for collecting suggestions. Moreover, an integrated approach was adopted for implementation. To this end, the involvement of decisionmakers from the Engineering, Town Planning, and Revenue sections was made mandatory for the purposes of project monitoring and implementation.

Training was imparted to the local government staff and public health workers under the leadership of the Municipal Commissioner. The Municipality even arranged for meditation sessions and yoga programs to correct behavioral attitudes to hygiene and improve worker interaction with citizens. Special efforts were made to recognize and reward workers for their hard work. No involvement was sought from any private or non-governmental entity in the change process. The entire exercise

was designed and implemented solely by the Municipality.

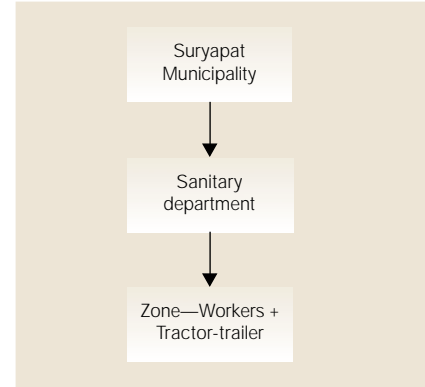
Public Communication Strategies

The Municipal Council undertook aggressive efforts to generate public awareness and engage the community. The nature of communication differed for each phase of the project.

In the first phase, the message was a part of overall civic awareness. Street meetings were conducted to create awareness on personal hygiene, along with other elements of civic well-being, for example, family planning, literacy, developmental schemes, and reasons for the spread of communicable diseases. The aim was to sensitize people to the importance of maintaining hygiene, and thereby create a favorable mindset for their participation. Households were persuaded to store the garbage in their homes (as against dumping on roadsides) and hand it over to the collection staff.

In the second phase, the campaign focused on segregation. Various

Figure 5: Institutional Arrangements



communication channels—distribution of leaflets, publicity in print and electronic media, street plays, pasting of stickers on the doors of houses, house visits by women volunteers (since the target audience was the female members of households)—were deployed.

As part of the community engagement effort, the Municipality also held meetings with trade bodies, and organized campaigns in schools and colleges.

Institutional Arrangements

The entire SWM program and its operations are managed by the Municipal Commissioner. The engineering and sanitary departments function under him, and together provide the SWM services for the town.

The smooth functioning of the system appears to depend heavily on the initiative of the Municipal Commissioner himself. It is unclear how well the system will continue to function once he is no longer with the Suryapat Municipality.

The change process was self-initiated, without any diktat from central or state government agencies. This possibly accounts for the commitment and



Suryapat: Segregated dry waste stored at recycling facility.

innovativeness displayed by the Municipality in implementing the change process.

The public goodwill generated as a result of the SWM initiative has had a spin-off benefit in the form of improved tax collections by the Municipality.

The success with segregation has created improved opportunities for recycling, which has in turn facilitated the development of micro enterprises and other income generation opportunities for the informal recycling sector.

Half of the area dedicated to composting and recycling operations is inhabited by low-income groups and slums. The improved solid waste operations have provided poor people the twin benefits of (a) improved hygiene resulting in improved health and productivity (in turn reflected in raised levels of savings); and (b) increased self and wage employment opportunities for them.

Operating System

The town has been divided into seven zones (of approximately 4,000-5,000 households), with one tractor and 30-35 sanitary personnel assigned to each zone for DTDC. Collection is done directly by tractor-trailers; no tricycles are used. There is, therefore, minimal manual handling of wastes.

Community dustbins (approximately 360) have been entirely eliminated. To prevent street littering, pole bins have been installed along footpaths.

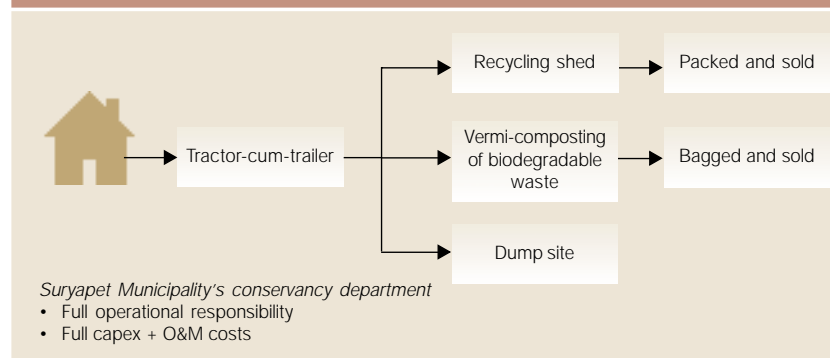
Treatment and Disposal

The treatment and disposal site has composting sheds, beds, and a bore well pump. A shed has also been constructed for further segregation of dry waste.

Box 12: Operational Flow

- By 10 am: DTDC using tractors with trailers. On entering each lane at a pre-set time, the tractor driver blows a whistle to inform the residents to hand over their dustbins to the municipal staff.
- 10 am to 12 noon: Collection of waste from shops, business establishments, and hospitals.
- 2 pm to 5 pm: Lifting of drainage silt and collection of waste from meat shops.
- Waste is transported by tractors to a recycling and treatment facility.
- Sweeping of main roads is done at night.

Figure 6: Operating System



The disposal site has an electrical connection for lighting purposes. During treatment and disposal (a) dry waste is further segregated at a recycling shed, and recyclables are packed and weighed. These are sold to paper and other industries located in the vicinity; (b) organic waste is vermi-composted and sold to farmers or used for horticulture purposes; and (c) rejects, debris, and other final waste is used for leveling purposes. Due to the success with segregation, landfill diversion rates are very high. Performance levels achieved till now reflect this—60 percent of organic waste is composted,¹⁴

¹⁴ The Municipality is unable to do more due to inadequate composting infrastructure at present.

and 90 percent recyclable waste is sold or reused. Nevertheless, despite the high diversion rates some amount of waste remains untreated or unused, and this is then dumped on roadsides or other low-lying areas.

No user charges are being levied for collection and disposal of waste; the service is currently free of cost for the people.

However, the Municipal Council has passed a resolution authorizing a US\$2.20 fine on defaulters. The fine, along with regular monitoring for defaulters and on-the-spot action, has ensured a high level of compliance among the public.



Table 6: Operational Infrastructure

Category	Before program	After program
No. of workers for DTDC	217	226*
Workers for road cleaning	n.a.	12
Tractors	9	10
Community bins	360	Nil

*Male: 98; Female: 128; n.a.: not available.
 Collated by WSP-SA from data provided by the Municipality.

Financial Resources

The Suryapet Municipality spent about US\$275,555 on cleaning up the town. The money was spent primarily on equipping the residents with two separate dustbins, constructing the vermi-compost and recycling sheds, and implementing training and awareness programs. There was negligible increase in, and hence minimal expenditure on, operational infrastructure.

Apart from its own finances, the Municipality raised money from different

sources such as the Lions Club, industrial houses, and trade associations. The Municipality implemented the program without any support from the central or state government. It has, however, submitted a proposal for funds to augment the transportation and composting and recycling infrastructure for the town. Operating cost is roughly US\$5.80 per ton. On the other hand, the SWM system is currently generating income through the sale of recyclables for the production of paper and pulp, and also through selling compost to farmers.

In 2003, the Municipality earned US\$575 by selling recyclables. Currently, the Municipality earns approximately US\$1,770 per month through the sale of recyclables and compost (which it sells at the rate of US\$0.06 per kg).

Program Highlights

- Achieved high levels of segregation at source.
- Accomplished high landfill diversion rates (60 percent biodegradable waste; 90 percent recyclables).
- Led to income generation from sale of recyclables and compost ~ US\$1,770 per month.
- Generated financial support from local trade and civic groups.
- Resulted in increased tax collections due to public goodwill generated by program.
- Achieved engagement of all stakeholder groups, thereby ensuring smooth implementation.
- Resulted in income generation and improved living conditions for slum population.
- Led to minimal increase in vehicles and manpower.

Issues

- No user fees or worker incentives resulting in an absence of contractual arrangement with user.
- Inadequate decentralization of operational responsibility.
- Low public engagement in operations and monitoring.
- No provision for proper disposal of remaining waste stream.



Suryapet: SWM department workers near a tractor-trailer.

Summary of Program Outputs

	Kanchrapara (West Bengal)	Panaji (Goa)	Suryapet (Andhra Pradesh)
DTDC scope	100%	100%	100%
Covered storage	Approximately 30%	100%	No storage
Daily clearance	Yes	Yes	Yes
Collection from bulk generators	Yes	Yes	Yes
Covered transportation	Approximately 30-40%	100%	Partial
Treatment (percent of biodegradable waste)	Centralized composting (less than 30%)	Centralized and decentralized vermi-composting (minimal)	Centralized composting (approximately 60%)
Recycling (percent of non-biodegradable waste)	Ragpickers scavenging from trailers or dump sites (approximately 10-30%)	Ragpickers coordinated with DTDC. Organized scheme for plastic bottles (approximately 40%)	Centralized recycling center (approximately 90%)
Disposal	Open dumping	Open dumping	Open dumping
Emancipation of informal sector	Employment generation for DTDC	Reduced health hazards for ragpickers; financial incentives	Employment generation for treatment and recycling; reduced health hazards
Community participation	Very high (through ward committees) <ul style="list-style-type: none"> • Compliance • Segregation at source • User charges • Operational control 	Average <ul style="list-style-type: none"> • Compliance • User charges 	Average <ul style="list-style-type: none"> • Compliance • Segregation at source
Financial summary (Figures not fully comparable due to differing accounting practices)			
Operating expenditure on SWM (percent of total revenue expenditure)	2003-04: US\$113,333 (16%) 2004-05: US\$117,778 (15%)	2003-04: US\$688,890 (34%) 2004-05: US\$800,000 (40%)	2003-04: US\$348,890 (14%) 2004-05: US\$175,556 (10%)
Operating cost (per ton)	Approximately US\$8-10	Approximately US\$40	Approximately US\$15
Revenue generation (percent of cost recovery)	Approximately US\$22,200 p.a. (100% of DTDC costs; 20% of total SWM costs)	Approximately US\$26,700 p.a. and rising (3-4% of total SWM costs)	Approximately US\$22,200 p.a. (sale of compost and recyclables) (13% of total SWM costs)
Program cost	Approximately US\$66,700 for 15 wards (estimate for full town US\$100,000)	Approximately US\$88,900	Approximately US\$275,500

Note: DTDC: Door-to-door collection; p.a.: per annum.
Collated by WSP-SA from data provided by the Municipality.

Lessons and Challenges

Program Outcomes

- **Significant improvement in civic environment, though final health outcomes has not been achieved due to absence of systems for safe and sanitary disposal.**
- Reduced incidence of health hazards associated with ragpicking (especially in Suryapet and Panaji).
- Increased compliance with Municipal Solid Waste (MSW) Rules 2000 (except disposal norms, which have not been met).
- Improved system productivity as indicated by the negligible increase in staff or vehicles despite improved service levels.
- Income-generating opportunities for population living below the poverty line and ragpickers.
- Improved citizen confidence in city administration, in some cases resulting in improved tax collections.

Lessons

Why did the programs get initiated in these towns?

None of these programs were driven by external pressures, such as a diktat from the state government or the State Pollution Control Boards (SPCBs); their genesis lay in local drivers. In each of the three towns, one of the key decisionmakers in the Municipality recognized the need for reform in the MSW management services, and perceived public discontent with the prevailing state of affairs. In all three, these decisionmakers had been



Kanchrapara: Door-to-door collection of segregated waste.

exposed to alternative strategies for SWM services—at Kanchrapara through a workshop as well as interaction with a sector expert; at Panaji through a pilot undertaken in a specific locality by a local NGO; and at Suryapet through a similar initiative attempted in a previous work assignment.

This enabled the concerned decisionmakers to proceed with their programs with a greater degree of confidence. They further leveraged their already favorable relationship with political stakeholders in the town to gain assurance of political support for their programs. They were thus able to effectively translate public discontent into public cooperation for the program.

Success Factors

Program design has to be firmly grounded in the local context. All the programs drew heavily from local knowledge of town layout, community behavior, functionality of equipment,

labor profile, and technical infrastructure for maintenance of equipment; and by doing so, designed programs that were locally appropriate. This, however, did not prevent them from drawing on external expertise where necessary, as in the case of (a) Kanchrapara where a researcher from a nearby leading university assisted them in designing their composting process; or (b) in Panaji where assistance was obtained from the product supplier for re-designing the household bins.

Extent of community engagement varies depending on the local context. A community-based approach should be encouraged since it facilitates greater public participation in the MSW management process. However, the extent of community involvement needs to be evaluated against the prevailing local context, that is, community structures, past history of cooperation, and growth patterns. For instance, broad-based community engagement

was effected in Kanchrapara in the form of a community-based service delivery system; largely facilitated by its extant system of ward committees. In Panaji, however, efforts at engaging the community for the SWM program have been less successful, possibly due to the absence of local platforms for community engagement, or the poor past track record of civic partnerships with the Municipality.

Whatever the extent of community involvement, it needs to be well synchronized with Municipality operations since the primary responsibility for MSW management remains with the latter.

This has been done effectively in the case of Kanchrapara where a clear framework of mutual cooperation has been put in place between the ward committees and the Municipality for ensuring smooth ongoing operations. Functional and financial responsibilities are clearly delineated, guidelines for community-based operations are articulated to ensure consistency across the town, and a system of information sharing has been instituted to enable effective planning and monitoring at the Municipality level.

Any program needs a program champion, preferably a local entity. The program champion would be someone who takes responsibility for carrying the program forward. In each of the three cases, success depended on the initiative taken by a single champion who conceived the program and propelled the required activities.

Moreover, ownership for the programs was enhanced by the fact that in all three cases the program was initiated by a local functionary.



Suryapet: Vermi-composting facility.

It is necessary to ensure the buy-in of all the key stakeholders, especially political representatives.

In all the programs, considerable effort was made to ensure involvement of all stakeholder groups, namely, political representatives, workers, department officials, commercial establishments, schools, and so on. This helped minimize the incidence of unexpected disruptions by any particular interest group. In particular, political support and goodwill was crucial to the ultimate success of the programs.

Public cooperation follows from program credibility. In order to elicit public cooperation for segregation at source, or payment of a service charge, it is necessary to first demonstrate credibility of intent. To do this, different strategies were adopted in the three cases, such as phased implementation to demonstrate the efficacy of the program, free service for initial few months or distribution of free bins. In the end, however, it is visible and

sustained improvements in service quality that ensured continued public cooperation for the program.

Program outreach needs to be part of a larger message, and conveyed by an appropriate 'messenger'. To draw the attention of the citizens, the program communication in all cases was made part of a larger message such as health, child welfare, upliftment of women or civic pride. The *target audience*, especially in the door-to-door visits, was the *female members of households* (the prime users of MSW management services). To facilitate this interaction, female volunteers were deployed to participate in the door-to-door visits.

Reform programs for collection and transportation can be implemented and largely sustained using local finances. All the programs were financed by locally generated resources. These cases illustrate that, at least for the collection and transportation

stages, service upgradation does not necessarily entail a huge financial commitment (roughly US\$1.11-2.22 per head in the three cases), and to that extent need not depend on handouts by the state government. Moreover, *operational viability* may be achieved to quite an extent by *levying user charges*, which in turn would ensure long-term sustainability of the program. As illustrated by Kanchrapara, it is possible to levy charges even on low-income households. Willingness to pay can be increased by enhancing transparency and accountability in the way the user charge collections are deployed.

Private sector participation (PSP) is not the only way to improve service delivery. The decision on whether or not to use PSP, or the extent to which it would be utilized, needs to be taken after evaluating the local circumstances, exploring alternatives available for improving service delivery and efficiency levels. For instance, productivity of existing workers can be increased even without PSP, as in Panaji, by establishing a contractual arrangement

between the user and service provider in the form of user charge collection, a part of which is used to pay financial incentives to the workers.

Engagement of the informal sector is necessary for long-term sustainability of the program. The informal sector is integral to any MSW management system, and all the three programs internalized this basic premise in the program design. The form of engagement of the informal sector varied in the three cases, but nevertheless ensured that improved service levels were accompanied by better working conditions for these workers. For instance, in Panaji and Suryapet, streamlined processing of recyclables reduced the need for scavenging from open dumps and thereby reduced associated health risks for ragpickers, ensuring greater security of earnings. In Kanchrapara, workers for the door-to-door collection were drawn from the population living below the poverty line, often former ragpickers. By thus synergizing the interests of the informal sector with the

program objectives, the livelihoods of this vulnerable section of society were safeguarded and the long-term sustainability of the program enhanced.

Challenges and Interventions Required

Despite the success of these programs, they suffer from some drawbacks that may hamper their long-term sustainability and efficacy. Interventions are required (at the state and national level) to address these and develop an enabling environment that encourages reform of the MSW sector.

Downward delegation and clear allocation of responsibilities needed for institutional continuity. Going forward, one of the important challenges facing all these programs is ensuring continuity. While a program may be launched and implemented successfully, service quality often tends to deteriorate once the program champion moves away. This risk may be mitigated if efforts are made to institutionalize the program into routine municipal service operations. Institutional continuity in any system is maintained by operational personnel. To this end, it is vital that responsibility is delegated downwards as far as possible, thereby reducing dependence on any one individual. This needs to be accompanied by constant upgradation of skills through capacity-building efforts. Additionally, streamlining of institutional structures is required for appropriate responsibility allocation. Ad hoc structures, such as the one in Panaji where the Accounts Officer also manages the solid waste function, need to be avoided. Clarity in roles and responsibilities would lead to greater transparency and accountability, and facilitate service improvements in the sector.



Kanchrapara: Bagged products at a composting facility.

Strengthening of local decision-making processes required.

While local bodies are knowledgeable about the local operating environment, they lack information on solid waste technologies or equipment options available. This constrains them from making appropriate choices or else compels them to invest considerable time and resources on searching for relevant information (as in Panaji). To address this drawback, common information resources—which urban local bodies (ULBs) can access during their decisionmaking processes—need to be created.

Similarly, decisionmaking on pricing and contractual terms is often ad hoc. It is not supported by costing or performance data (as was evident from the Panaji experience with contracting). *Capacity building is required for information systems and accounting processes to enable more economically and operationally efficient decisionmaking.*

Local planning processes need to be improved. Currently, there are no systems to plan for future growth, and hence the MSW management requirements, of the town. This undermines the long-term sustainability of the system.

Measures required for fostering community engagement. Differing levels of community engagement displayed in the three cases reflect the differing socio-political environments prevailing in those towns. The three ULBs adapted their program design to suit the prevailing context. Nevertheless, levels of engagement can be improved by fostering *community organizations* such as ward committees or Resident Welfare Associations, which can then serve as a platform for public



Kanchrapara: Ragpickers on dump site.

participation in service delivery. Policy measures should be considered to support this process.

Introduction of service charges needs to be encouraged, with the aim of increasing accountability, as well as financial viability, of these services. State government support may be required to help overcome political reticence at the local level (as in the case of Suryapet).

Balance between locally initiated reforms versus a top-down state government-led approach. All three cases revealed a willingness and ability to address reforms in primary collection and transportation aspects of MSW management. However, critical gaps remained in treatment and disposal due to (a) a diluted focus on public health objectives of MSW management; and (b) resource constraints faced by ULBs in addressing the complexities of designing and implementing a viable and effective treatment and disposal system. State governments could consider incorporating a dual approach in their sector reform strategy.

- *For primary collection and transportation the reform should ideally be initiated and designed by the ULB itself.* To this end, the state government should *focus on service outcomes* by ULBs, and not on process specifications.

To motivate ULBs (or champions therein) to initiate reforms, triggers may be designed using strategies such as reward programs or state recognition.

- *For treatment and disposal systems, greater intervention is warranted from state and national agencies.* In particular, they could assist in developing regional models for integrated waste management facilities. While facilitating this process, however, caution should be exercised—the design and implementation of these facilities should be undertaken with the full involvement of ULBs. Their sense of ownership for these aspects of MSW management, which remain their firm responsibility, should not be diluted.

In all the programs, considerable effort was made to ensure involvement of all stakeholder groups—political representatives, workers, department officials, commercial establishments, schools, and social organizations.



Panaji: Waste stored in a household bin.





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Solid Waste Management Initiatives in Small Towns: Lessons and Implications

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4. Do you find the information contained in this study relevant to your work? Yes No

<p>If yes, how would you use this information in your work? <i>(Use extra sheets of paper if required)</i></p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>If no, give reasons why <i>(Use extra sheets of paper if required)</i></p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
<p>What impact, if any, does this information have on:</p> <p>•You:</p> <p>.....</p> <p>•Your organization:</p> <p>.....</p> <p>•Your colleagues:</p> <p>.....</p>	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
<p>What are the main lesson(s) you have learnt from the information contained in this study?</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
<p>Would you like to share any study/research similar to the information in this study?</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>

5. Give up to three subjects/issues in the Water Supply and Sanitation sector that interest you and you would like to know more about:

- i)
- ii)
- iii)

6. Do you know anyone else who might benefit from receiving our publications?
If yes, provide the following details (optional)

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7. Please provide your particulars:

Name:
Designation:
Organization:
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Phone Numbers:
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Area of work: Government / NGO / Private Sector / Academia / Consultant / Bilateral Agency / Dev Bank / any other

8. Indicate your area of interest:

- Water
- Sanitation
- Rural
- Urban

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