Toxics Link
for a toxics-free world

Upscaling people's participation in urban solid waste management

Constraints and prospects

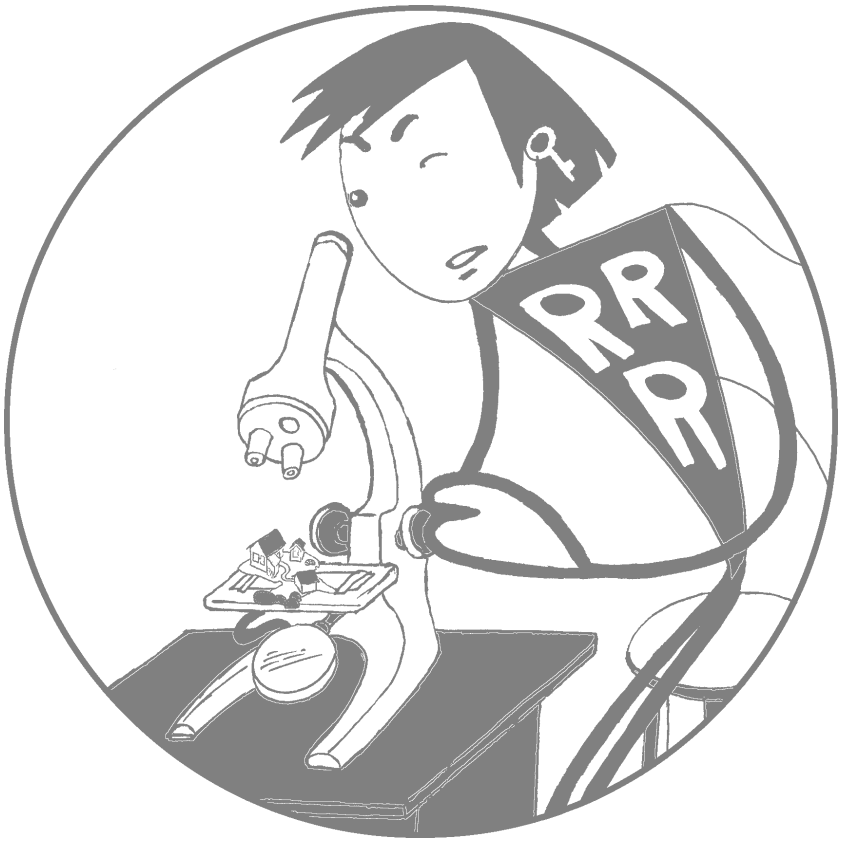
Decentralised solid waste management systems hold the promise of dealing with the increasingly worsening urban waste problem. This report examines successful community interventions in India to understand what makes them work.

About Toxics Link

Toxics Link is an environmental NGO, dedicated to bringing toxics related information into the public domain, both relating to struggles and problems at the grassroots as well as global information to the local levels. We work with other groups around the country as well as internationally in an understanding that this will help bring the experience of the ground to the fore, and lead to a more meaningful articulation of issues. Toxics Link also engages in on-the ground work especially in areas of municipal, hazardous and medical waste management and food safety among others. We are also involved in a wider range of environmental issues in Delhi and outside as part of a coalition of non-governmental organisations.

Upscaling people's participation in urban solid waste management

Constraints and prospects



Project team

Ravi Agarwal, Satish Sinha, Sanjay K Gupta (Programme Coordinator), Indrajeet Rai, Tanya Sengupta, Akanksha Mishra, N. Linthoingambi, K.S. Sudhakar, Kishan Chaudhary and Usha

CONTENTS

Acknowledgements 4

Section 1: Urban waste management in India 5
Urbanisation in India
Burgeoning waste in India
Future scenario
Composition and changing pattern of waste
Urban local governments and waste management

Section 2: MSW policies, informal sector and community projects 13
Environmental and judicial activism
Policy responses
Municipal response
Community projects
Informal sector and waste management
Urban waste and poverty
Conflicts and challenges
Range of future interventions

Section 3: Analysing CBSWMSs in India 23
Guidelines for documenting the projects
Research methodology
Community projects
Sustainability of community interventions
Key challenges in upscaling and sustainability of community interventions
Waste collectors
Composting

Colour plates: Successful community interventions 49
Center for Development Communication, *Jaipur*
Center for Environment Education, *Bangalore*
Exnora Green Cross, *Vellore*
Friends of the Urban Poor, *Kerala*
Jana Chaithanya Exnora, *Vishakapatnam*
Jan Sewa Ashram, *Solan*
Kagad Kach Patra Kashtakari Panchayat, *Pune*
Muskan Jyoti Samiti, *Lucknow*
Nav Bharat Jagriti Kendra, *Ranchi*
Naya Savera, *New Delhi*
Pramukh, *Dehradun*
Stree Mukti Sanghatana, *Mumbai*
Sukuki Exnora, *Hyderabad*
Vatavaran, *New Delhi*
Vikash, *Bhubaneswar*
ITC, *Bhadrachalam*
People's Movement for Civic Action, *Panjim*

Section 4: Municipality and SWM 65
Significant provisions of MSW Rules
Analysis of municipalities
Processing of waste
Municipal case studies

Section 5: Developing a model 77
Cost break-ups
Benefits of decentralised solid waste management systems
Creating a community-based SWM model in Delhi
Findings of the intervention

Section 6: Alliance for Waste Management (AWM) 91
Vision
The Mumbai workshop
Training workshops

Section 7: Recommendations 95

References 97

Abbreviations 98

Acknowledgements

This project required a collaborative effort and made us incumbent on seeking the co-operation of many organisations and individuals working with issues of solid waste management across the country. We are grateful for their assistance and hope to continue the relationship beyond this customary practice of thanks giving.

It has taken us 18 months to complete this work, though our involvement with the issues of waste management, recycling and the informal sector is nearly a decade old. Though the essence of the project involved the documentation of community-based organisations working with waste issues across the country, and understanding the constraints to upscale them, it included several other key interventions, such as building a collaborative platform (named Alliance for Waste Management) of expert organisations and individuals working in South Asia; and organising training workshops for field practitioners. At the grassroot level, we initiated the model of a Zero Waste colony in Delhi to show that such a system is possible.

An intervention of this magnitude necessitated a joint venture. To begin with, we thank Dr Virender Sharma, Dr Neena Gulabani and Dr Anjali Widge, members of the Advisory Committee, and former Programme Officer Mr Narayan Belbase of Ford Foundation, who helped in conceiving and formulating the main ideas.

During the documentation process, we had the opportunity to see the work of more than 70 organisations and about 40 municipalities. But, paucity of space does not permit us to mention the names of all individuals, organisations, municipal staff, the numerous waste collectors and other field workers who have all contributed in some way in the research.

Our special thanks to the participating members, particularly Dr Vivek Agrawal, Ms Jyoti Mhapsekar, Mr C. Srinivas and Mr Suresh Bhandari, who spared their precious time to interact with us. We also take this opportunity to express our gratitude to the Resident Welfare Associations of Sarita Vihar, the Area Councilor, Mr Hemchand Goyal, the Deputy Commissioner of Central Zone, MCD, and other field staff of government agencies working in Sarita Vihar.

Special thanks to Swedish International Development Agency (SIDA), which has been supporting the programme, and to Ford Foundation which supported this valuable project. Finally, we express our gratitude to the entire Toxics Link family, which has always been encouraging and supportive.

SECTION 1

Urban waste management in India

- Urbanisation in India
- Burgeoning waste in India
- Future scenario
- Composition and changing pattern of waste
- Urban local governments and waste management

Urban waste management in India

In the last few decades, there has been a significant increase in India's urban population. This is evident from the fact that in the last 50 years, while the country's population has grown two-and-a-half times, in urban areas, it has grown five times. In continuation with the trend, the percentage decadal growth of population in rural and urban areas during the period 1991-2001 has been 17.9 and 31.2 per cent, respectively. According to the 2001 Census, the percentage of urban population to the total population of the country stands at 27.8. In numerical terms, it is 285,354,954.

Urbanisation in India

At present, India's urban population is the second largest in the world, after China. More significantly, it is higher than the total urban population of all countries put together, barring China, USA and Russia. As per the 2001 Census, the number of metropolitan cities in India having a million-plus population is 35

What is so significant about this growth in urban population? First and foremost, it has changed the long-held popular belief that India lives in its villages. No longer. This trend is likely to continue and as a result, progressively larger proportions of India's population will be living in urban areas. At present, India's urban population is the second largest in the world, after China. More significantly, it is higher than the total urban population of all countries put together, barring China, the USA and Russia. As per the 2001 Census, the number of metropolitan cities in India having a million-plus population is 35.

Source: www.indiacore.com

Urban agglomerations/towns of India 2001 by class/category

Class	Population size	Number of UAs/towns
Class I	1,00,000 and above	393
Class II	50,000-99,999	401
Class III	20,000-49,999	1,151
Class IV	10,000-19,999	1,344
Class V	5,000-9,999	888
Class VI	Less than 5,000	191
Unclassified		10*
All classes		**4,378**

Data: Population Census, 2001

** Towns/cities in which the Census was not held.*

This urbanisation has given rise to problems of water, housing, electricity, transportation, health and sanitation and has raised serious concerns about municipal infrastructure. Huge investments are needed to meet these challenges. Some of the imperative forecasts regarding investment needs of urban areas are as follows:

- The India Infrastructure Report (1996) estimates the annual investment need for urban water supply, sanitation and roads at about Rs 28,035 crore (US $ 6.67 billion) for the next 10 years.
- Central Public Health Engineering (CPHEED) has estimated that by the year 2021, Rs 172,905 crore will be required to provide safe water and sanitation services to the urban population.
- In its draft policy paper, the Ministry of Urban Affairs and Poverty Alleviation (MUA&PA), has projected the financial requirement for solid waste management by 2025 as Rs 5,203 crore.

Source: MUA&PA website

How are these funds to be mobilised? Obviously, they cannot be located from within the budgetary resources of Central, State and local governments. What solutions have been considered by the government?

According to MUA&PA, two generations of urban reforms have been initiated to overcome these constraints and challenges. In the first generation of urban sector reforms, urban local bodies have been given constitutional status as per the 74th Constitutional Amendment Act of 1992. This Act empowers urban local bodies with financial resources through Central and State Finance Commissions. As per the Ministry, in the second generation of reforms, following steps are to be taken:

- The Central Government is in the process of preparing model legislation for facilitating private sector participation in urban infrastructure.
- The existing municipal accounting system is being reformed in collaboration with the USAID assisted Financial Institutions Reforms and Expansion (FIRE) Project.
- Programme rather than project approach is being advocated for external assistance.
- Large municipalities are being encouraged to

issue Tax Free Municipal Bonds to garner resources from the capital market. In fact, the attempt to change the financing patterns of urban local bodies has started from the Eighth Plan itself. The Plan envisaged building cost recovery into the municipal finance system. In the Ninth and Tenth Plans, most of the development projects are to be financed through institutional finance instead of from budgetary resources.

Despite these efforts, municipalities are facing a serious resource crunch in financing urban infrastructure projects. The 74th Amendment Act has transferred many responsibilities to municipalities without raising their economic base or their resource mobilisation capacities. In turn, municipalities have failed to provide satisfactory services in terms of quantity, quality and access.

Burgeoning waste in India

There is no comprehensive national level data available on generation, collection, storage, transportation and disposal of Municipal Solid Waste (MSW) in India. It is therefore difficult to quantify data on waste, though there have been few studies by NEERI, TERI and other organisations. According to the Manual on Municipal Solid Waste (Ministry of Urban Development, Government of India), about 100,000 metric tonnes of MSW is generated in India. According to the report of the Burman Committee, it is estimated that the total waste generated by the 217 million people living in urban areas is 23.86 million tonnes per year (1991) and may cross 39 million tonnes by 2001. Per capita waste generation in major cities ranges from 0.2 - 0.6 kg.

Waste generated per day in cities

City	Waste per day in tonnes
Ahmedabad	2,086.92
Bangalore	2,480.00
Chennai	3,873.76
Delhi	6,500.00
Hyderabad	1,941.84
Kolkata	4,578.08
Mumbai	6,640.20

Source: CPCB

According to a calculation by TERI, while the population of Mumbai grew from 8.2 million in 1981 to 12.3 million in 1991 registering a growth of about 49 per cent, MSW generated in the city increased from 3,200 tonnes per day to 5,355 tonnes per day, registering a growth of around 67 per cent in the same period. Thus, in this case, the growth in MSW has clearly outpaced the population growth, which is likely to happen in other places too

Role of GNP and expected generation of waste

Country	During the year 1995			During the year 2025		
	GNP per capita (US$)	Urban population (% of total)	Urban MSW generation	GNP per capita (US$)	Urban population (% of total)	Urban MSW generation
Low Income	490	27.8	.64	1,050	48.8	0.6-1.0
Nepal	200	13.7	.50	360	34.3	0.6
Bangladesh	240	18.3	.49	440	40.0	0.6
India	340	26.8	.46	620	45.2	0.7
China	620	30.3	0.79	1,500	54.5	0.9
Sri Lanka	700	22.4	0.89	1,300	42.6	1.0
Middle Income	1,410	37.6	0.73	3,390	61.1	0.8-1.5
Indonesia	980	35.4	0.76	2,400	60.7	1.0
Philippines	1,050	54.2	0.52	2,500	74.3	0.8
Thailand	2,740	20.0	1.10	6,650	39.1	1.5
Malaysia	3,890	53.7	0.81	9,400	72.7	1.4
High Income	30,990	79.5	1.64	41,140	88.2	1.1-4.5
Korea, Republic of	9,700	81.3	1.59	17,600	93.7	1.4
Hong Kong	22,990	95.0	5.07	31,000	97.3	4.5
Singapore	26,730	100	1.10	36,000	100.0	1.1
Japan	39,640	77.6	1.47	53,500	84.9	1.3

Source: 'What a Waste', Solid Waste Management in Asia, Urban Development Sector Unit, East Asia and Pacific Region, October 1998

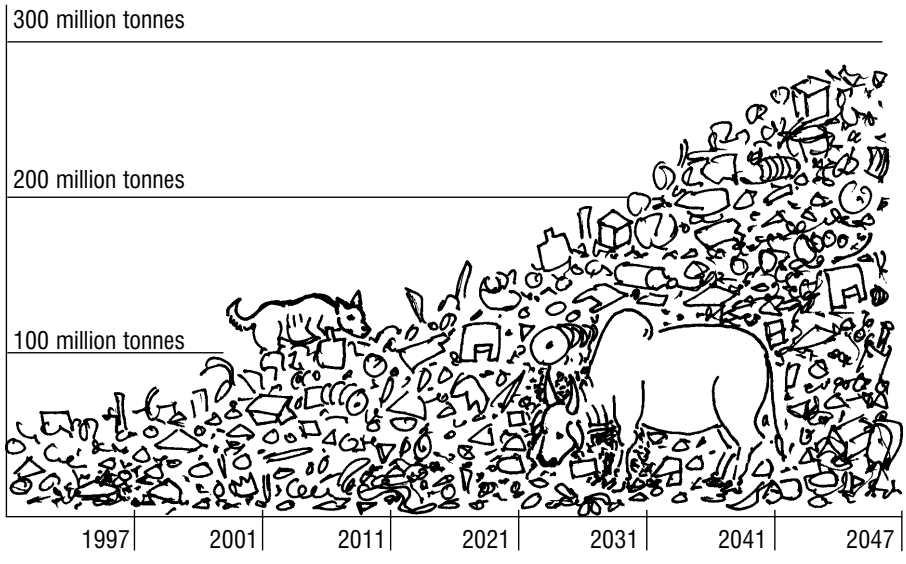
Future scenario

Historically, urbanisation has had a direct relationship with waste. As urban population increases, so does waste. Increasing urbanisation, coupled with rising GDP and income levels, has a multiplier effect on the amount of waste produced in the cities.

Though there is a direct relationship between population growth and waste generation, this relationship is not always in proportional terms. According to a calculation by TERI, while the population of Mumbai grew from 8.2 million in 1981 to 12.3 million in 1991, registering a growth of about 49 per cent, municipal solid waste (MSW) generated in the city increased from 3,200 tonnes per day to 5,355 tonnes per day, registering a growth of around 67 per cent in the same period. Thus, the growth in MSW has clearly outpaced population growth, which is likely to happen in other places too.

Rising income levels and changing lifestyles are the main reasons for this trend. The table on the previous page shows the relationship between GNP and expected generation of MSW, based on the study conducted by the United Nations in 1995.

Projected trends in the generation of municipal solid waste (million tonnes/year)



Source: Shaleen Singhal and Sunil Pandey; Solid Waste Management in India*, TERI paper*

However, this rise is not uniform across the income levels and cities. For the record, the urban poor, earning less than US $80 per month, still produce less than 200 gm of waste per person per day, while those with higher incomes of over US $200 per month generate more than 800 gm of waste per day. A study conducted by NEERI has shown that waste generation has a proportional relationship with the population of the town. These types of nuances, hitherto overlooked by city planners in India, are likely to further exacerbate the problems of waste management of the cities.

Waste generated per capita

Population range (in lakhs)	Average per capita waste generation (gm/capita/day)
1-5	210
5-10	250
10-20	270
20-50	350
50 lakh plus	500

Source: NEERI Strategy Paper on SWM in India, 1996

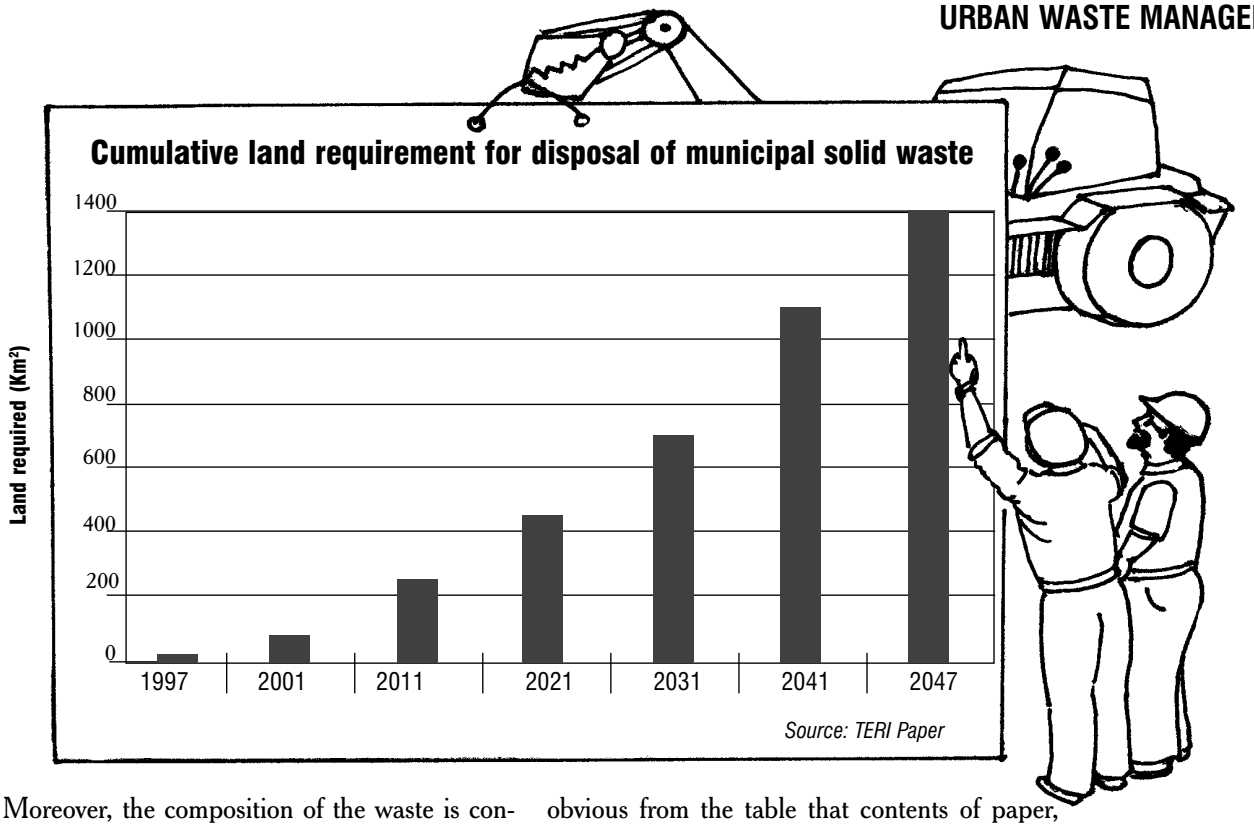
Predicting the quantum of waste increase is very difficult. However, by combining all the abovementioned factors, TERI has attempted to project the rising quantities of waste in urban India. According to its calculations, the figure on this page depicts the rising quantities of municipal solid waste from 1997 to 2047 under the Business As Usual (BAU) scenario assuming the daily per capita waste generation in 1995 as 0.456 kg (EPTRI, 1995) and the per capita increase in waste generation 1.33 per cent (Shekdar, 1999).

As per the same analysis, the cumulative requirement for the land for disposal of municipal solid waste would amount to around 1,400 square km by 2047. This is roughly the present area of Delhi.

Composition and changing pattern of waste

Urban waste is heterogeneous in nature. It is a complex mixture of domestic, commercial, institutional, construction and toxic elements derived from different types of activities.

Upscaling people's participation in urban solid waste management



Moreover, the composition of the waste is continuously changing. Again, it is very difficult to forecast the changing composition and patterns of the waste generated. According to the Manual on MSW, the factors promoting change in waste composition are more or less similar to factors producing changes in waste generation. An additional important factor is the change in density of the waste caused by different storage, transportation and disposal methods. Here, the relationship between waste density and income level is of inverse proportion – waste density is higher in low-income countries.

NEERI has done a study on characterisation of solid waste in India. A brief summary of physical characteristics of Indian solid waste as per NEERI studies is given in the table here. It is obvious from the table that contents of paper, metal and glass will generally increase with an increase in population. The study does not explicitly say anything about plastics, but its content is likely to increase as well with population growth and economic development.

Inert material shows an upward trend with an increase in the population. However, the total compostable matter does not show any definite trend and we will need a large pool of data to make a reliable conclusion.

Furthermore, with the rise in income level, new materials are being introduced in the waste stream. Many types of plastics, or multi-layered materials are not possible to recycle in the existing set-up, or are just not economical to collect

The arrangement made by municipalities for solid waste management is inadequate in most cities. The most fundamental weakness of the system is the way waste management is being perceived by the municipalities

Physical characteristics of Indian solid waste

Population range (in millions)	Cities surveyed	Paper	Rubber/ leather	Glass	Metals	Total compostable matter	Inert
0.1 to 0.5	12	2.91	0.78	0.56	0.33	44.57	43.59
0.5 to 1.0	15	2.95	0.73	0.35	0.32	40.04	48.38
1.0 to 2.0	9	4.71	0.71	0.46	0.49	38.95	44.73
2.0 to 5.0	3	3	3.18	0.48	0.59	56.67	49.07
> 5	4	6.43	0.28	0.94	0.80	30.84	53.90

All values are in per cent. Source: Manual on Solid Waste Management

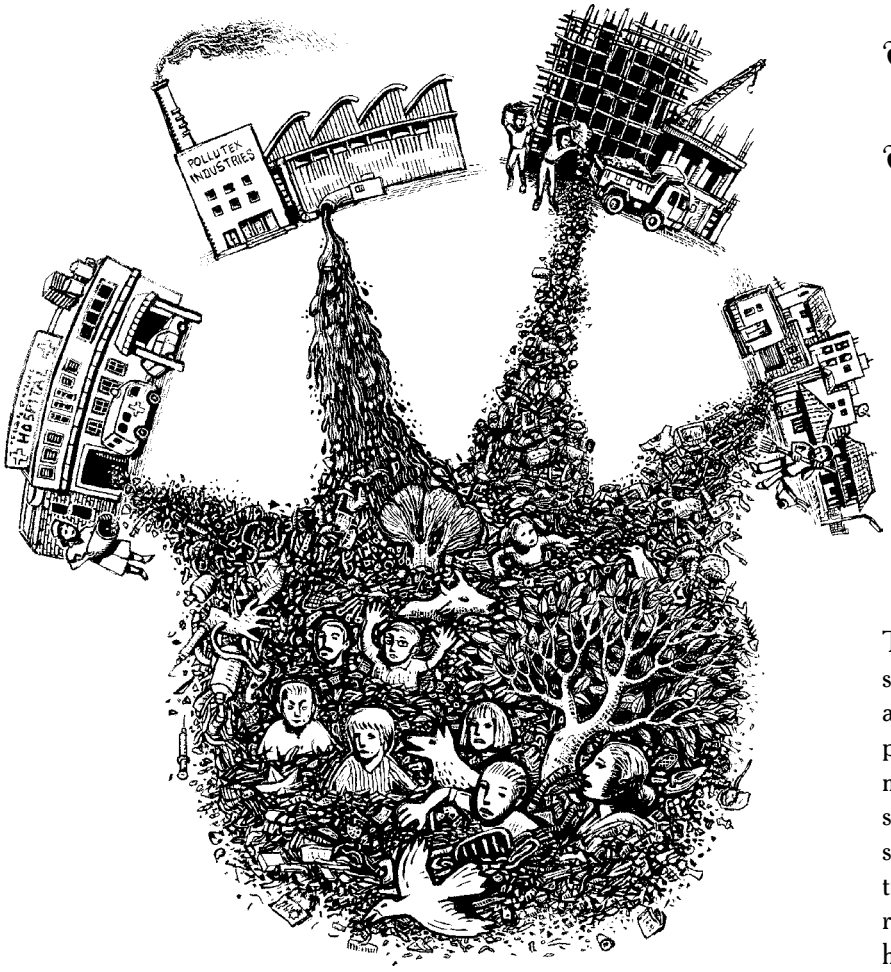
and recover. 'PET' is a classic example of this, which needs scales of investment not within reach of small units. Hence, though possible to recycle, there is no demand for it and it is therefore not collected by waste pickers everywhere. In many cases waste is 'pre-created' since it comes as packaging or as 'containers', ready to be disposed. This continuously changing composition of waste needs to be kept in mind while devising future solutions.

Urban local governments and waste management

Municipal laws and structures were designed for smaller and simpler cities and simpler lifestyles. Managing the waste of a modern city needs new skills, approaches and structures

In India, the management of solid waste has primarily been perceived as the responsibility of the local government, with other actors playing marginal roles.

Solid waste management is a State subject and it is obligatory on the part of the local bodies to make arrangements for its management. Thus, municipalities are ultimately responsible for making provisions for the solid waste management of the urban areas.

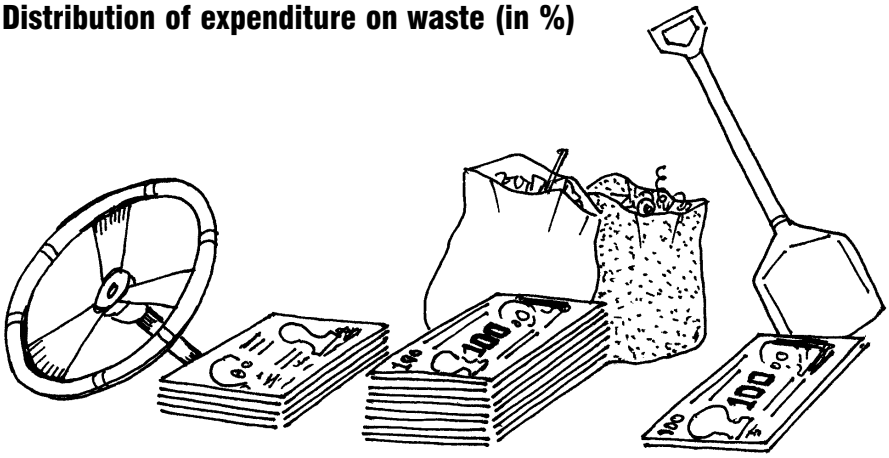


The arrangement made by municipalities for solid waste management is inadequate in most cities. The most fundamental weakness of the system is the way waste management is being perceived by the municipalities. They have come to regard waste management as being limited only to collection and disposal of waste. Though the nature of waste has changed, the ways of managing waste by municipalities have not. Some of the fundamental problems of the current waste management system of municipalities are as follows:

- There are only a few cases of primary collection (door-to-door collection) of the waste.
- Storage of waste at source is severely lacking. It is mostly littered on the roads and streets from where it is swept into municipal bins, which are generally open.
- Transportation of waste is still taking place in open vehicles, which are generally overloaded. This results in re-littering of the collected waste on streets.
- Most of the waste is either dumped or burnt openly, contaminating the soil, air and ground water.
- There is no scientifically designed landfill in the country. Waste is being dumped in low-lying areas of the cities, designated either as dumping grounds or landfills. Leachate from landfills contaminates the soil and water with toxins like lead, arsenic, mercury, etc. Moreover, in many cities, landfills are filled to the brim and no future sites have been identified. These dumping grounds disproportionately impact the poorest section of society as most of them are situated near poor communities. The urban poor, who live off waste, carry out recycling in extremely hazardous conditions.

There is no gainsaying the fact that municipal services are far from satisfactory. Municipal laws and structures were designed for smaller and simpler cities and simpler lifestyles. Managing a modern city needs new skills, approaches and structures. Some of the existing laws need revision as they may be a hindrance to municipalities. For example, municipalities in India are responsible for any waste lying outside private homes.

Distribution of expenditure on waste (in %)



Transportation 25% **Collection 70%** **Disposal 5%**

Managing waste, which is already a complex task, is likely to become more challenging with the growth of cities. The gap between demand and supply of municipal services has increased manifold and, in absence of substantial financial support from state and central governments, municipalities are finding it very difficult to manage the situation.

Municipal bodies are supposed to generate their own resources but due to a lack of will of the political executives to impose taxes, they are unable to muster enough financial resources to provide for continuously increasing demand for municipal services. As far as expenditure on waste is concerned, a large part of it is spent on salaries of the *safai karmacharies*, since sweeping is done manually. For example, about 26 per cent of the Municipal Corporation of Delhi's employees are *safai karmacharies*.[1]

References

[1] *Solid Waste Management in Delhi: An Exploratory Study on Local Government-Community Interface*, Institute of Social Sciences, New Delhi, 2000.

Upscaling people's participation in urban solid waste management

SECTION 2

MSW policies, informal sector and community projects

- Environmental and judicial activism
- Policy responses
- Municipal response
- Community projects
- Informal sector and waste management
- Urban waste and poverty
- Conflicts and challenges
- Range of future interventions

MSW policies, informal sector and community projects

Environmental and judicial activism

Environmental activism has created awareness about environmental issues among the general public. It has also, with some help from the judiciary, forced the government into taking positive action.

In one of the first public litigations on sanitation, namely in Ratlam Municipal Corporation vs Vardhichand (AIR 1980 SC 1622), the Supreme Court issued directions to municipal councils to abate environmental pollution

Initially, these public protests were centred on two issues: deforestation by the timber industry and locally polluting industries. During the 1980s, these movements were helped by the sympathetic attitude of the Supreme Court towards environmental security. This gave rise to a series of public interest litigations on environmental issues. However, sanitation emerged as a major concern only in the late eighties. In one of the first public litigations on sanitation, namely in Ratlam Municipal Corporation vs Vardhichand (AIR 1980 SC 1622), the Supreme Court issued directions to municipal council to abate environmental pollution. In Rampal vs State of Rajasthan (AIR 1981 Raj 121), the State High Court held that municipalities were primarily responsible for maintaining sanitation and for taking proper steps for creating and maintaining a healthy environment within the municipal area. In another judgement, L.K. Koolwal vs State of Rajasthan (AIR 1988 Raj 2), the Rajasthan High Court held that it was for municipalities to see how to perform their duties and the court was not concerned with the availability of funds or staff.

However, the two most important cases regarding municipal waste management of cities were filed in 1990s :

- B.L. Wadhera vs Union of India (Writ petition© no.286 of 1994)
- Almitra H. Patel vs Union of India and Others (Writ petition © no.888/1996)

In the Wadhera case, the Supreme Court delivered its judgement in 1996 and directed the CPCB and DPCC to ascertain that the collection, transportation and disposal of waste is carried out satisfactorily and to file affidavits every two months for a period of two years. In the second case regarding management of municipal solid waste in Class-1 cities, Ms Patel alleged that practices adopted by municipalities for the disposal of waste in urban areas was faulty and had direct negative affect on the health of the citizens. Acting on the petition, the Supreme Court directed to constitute a committee to look into all the aspects of solid waste management in Class-1 cities of India. A committee was constituted under the chairpersonship of Mr Asim Burman, Municipal Commissioner of Calcutta. The committee submitted its report in March 1999. It examined the practices and suggested hygienic processing and waste disposal practices and proven technologies on the basis of economic feasibility and safety which the corporation/government may directly or indirectly adopt/sponsor. More importantly it also suggested ways to improve and review municipal bye-laws and the powers of local bodies and regional planning authorities and suggested necessary modifications to ensure effective budgeting, financing, administration, monitoring and compliance.

On the basis of the report of the committee, the Municipal Solid Waste (Management and Handling) Draft Rules were framed and circulated to all state governments for their suggestions. Subsequently, the Municipal Solid Waste (Management and Handling) Rules, 2000, came into effect from September 9, 2000.

Policy responses

Analysing the policy initiatives and steps taken by the government, one can assess the municipality's responses on management of solid waste in cities and towns.

Due to the pressure from civil society – which is evident in the number of cases filed for improving the solid waste management scenario – and increasing demands for services from the communities, the government has responded through a number of documents, reports and policies on solid waste management in recent years. Some of the important ones are:

Manual on municipal solid waste management

This was prepared by an Expert Committee,

constituted by Ministry of Urban Development, Government of India, January 2000.

The committee, after a series of deliberations, included various aspects in the manual such as the quantity of solid waste, storage, primary collection, composting, energy recovery, emerging technologies, land filling, community participation, etc.

Solid waste management in Class-1 cities in India

Constituted by the Supreme Court of India under the chairpersonship of Asim Burman in March 1999, a committee made two kinds of recommendations: mandatory and obligatory, which apply to all stakeholders – citizens, municipalities and state governments. Furthermore, the committee has made recommendations for all stages of solid waste management services and has laid down the minimum level of services that the local bodies should provide, within a set timeframe. The committee has also given various technical options which municipalities can adopt as per their financial resources and local conditions.

Municipal Solid Waste (Management and Handling) Rules, 2000

These Rules were passed by the Ministry of Environment and Forests, Government of India, in September 2000. These rules have emerged as the basic framework under which urban solid waste is to be managed in India. The rules have categorically divided and fixed the responsibilities of municipalities, State governments and Pollution Control Boards. The Rules had given a timeframe of three years after which these rules were to be implemented in full.

Waste as an energy policy promoted by the Ministry of Non-Conventional Energy Sources (MNES), 1995

The policy has the objective of promoting waste solely as an energy source. It provides incentives like:

- Financial assistance up to 50 per cent of the capital costs of the project, limited up to Rs 3 crore per MW (Mega Watt) for demonstration projects.
- Urban local bodies receive financial incentives at Rs 15,00,000 per MW for providing garbage free of cost to the project site and land on long-term basis on nominal rent.
- Financial institutions also get financial incentives to promote non-conventional energy resources.
- State electricity boards receive financial incentives on cost of equipment and differential power tariff when the energy generated is fed to the grid.
- Apart from the MNES, the Indian Renewable Energy Development Agency, a government of India enterprise, provides about 70-80 per cent financial assistance to waste-to-energy projects.

These policy documents again reinforce a very peculiar trend which has emerged in India since Independence: even the most decentralised issues need the initiative and support of the Central Government to get them moving. It was the Central Government which had to pass the 73rd and 74th Constitutional Amendments making

The Municipal Solid Waste (Management and Handling) Rules, 2000, were passed by the Ministry of Environment and Forests, Government of India, in September 2000. The Rules have categorically divided and fixed the responsibilities of municipalities, State governments and Pollution Control Boards. The Rules had given a timeframe of three years after which these rules were to be implemented in full

it obligatory on the part of state governments to let allow local bodies to perform their originally conceived constitutional roles. Similarly, the Central Government again had to come up with a set of rules dealing with State subjects.

What is the flip side of this increasing centralisation trend? Decentralised issues by their very nature demand the involvement of communities, which is not possible for centrally made policies to conceive in their entirety. Hence, all policy documents as well as legislation dealing with urban solid waste only mention or acknowledge community involvement as one of the ways of diverting waste, but they do so in a piecemeal manner and and do not address the framework needed to make this happen.

Pollution control costs for incinerators have already exceeded over 50 per cent of their establishment cost. In Europe, an incinerator for 2,000 metric tonnes of waste per day costs over US $500 million

Incinerators emit dioxins, furans and polychlorinated bi-phenyls (PCBs), which are deadly toxins causing cancer and damage to the endocrine system.

Municipal response

New government polices combined with pressure from civil society organisations has forced municipalities to take this issue more seriously and respond in new and innovative ways. What are these new and innovative responses of the municipalities? Privatisation of services and technology driven treatment of waste are the two solutions being promoted by municipalities.

Privatisation

Some part of the collection and disposal of the waste has been privatised in cities like Chennai, Nanded, Nagpur and Surat. Many others are in the process of privatising these services.This is taking place without devising proper guidelines in the perspective of MSW Rules, 2000, for monitoring and evaluation of these operations. In some cases this privatisation process itself may be responsible for more waste creation. For example, the payment in Chennai is to be made on the basis of the quantity of waste collected from the city. This, in turn, may serve as an incentive for private operators to promote more waste creation habits in the citizens.

Waste treatment technologies: incinerators and waste-to-energy plants

New and expensive technologies are being pushed for the treatment of waste, ignoring their environmental and social implications. A case in point is the promotion of thermal treatment of waste using technologies such as gasification, incineration, pyrolysis or pelletisation. These technologies have to be subsidised to ensure their viability. Indian waste lacks the required calorific value (and is likely to do so in the near future also) to make these options economically viable. While one MW of coal based energy costs about five crore Rs, energy from waste can exceed eight crore per MW.

Such polluting technologies also put the community to health risks. Incinerators routinely emit dioxins, furans and polychlorinated bi-phenyls (PCBs), which are deadly toxins causing cancer and damage to the endocrine system. Other conventional toxins such as mercury and heavy

metals are also released during thermal processes. In fact, pollution control costs for incinerators have already exceeded over 50% of their establishment cost. In Europe, an incinerator for 2,000 metric tonnes of waste per day costs over US $500 million. Ironically, the better the air control works, the more pollutants are transferred to land and water through scrubbers and filters. Besides, the problem of safe landfill disposal of ash remains.

The incineration experience in urban India has been very poor. A Dutch funded incinerator in Delhi ran for just one week in 1984, since the calorific value of the fuel was less than half of what the incinerator needed.

Similarly, waste-to-energy schemes are not only economically unsustainable but are also silent on material recovery (recycling) options.

Community projects

Solid waste management is essentially an issue of decentralisation. Its success greatly depends on the level of awareness, and co-operation, of community members.

Community organisations play a central role in helping implement the 4 'R's of waste – Reduce, Reuse, Recycle and Responsibility. Fortunately, in India, NGOs and Community-based Organisations (CBOs) are doing outstanding work in this area. In fact, all the important actions of the government in this field have taken place only in response to the initiatives of civil society organisations. The earlier mentioned cases of B.L. Wadhera and Almitra Patel are classic examples of this fact. Organisations like Exnora (Chennai), Wastewise (Bangalore), Vatavaran(Delhi), SEWA (Ahmedabad), Srishti-Toxics Link(Delhi) are among those who have implemented successful community-based waste management systems.

Stree Mukti Sanghatana and Kagad Kach Patra Kashtakari Panchayat have been pushing for better recognition and working conditions for women waste pickers. However, all these organisations, despite demonstrating remarkable success over the past decade are finding it difficult to upscale their activities.

Waste pickers, for livelihood reasons, have been an integral part of any city's solid waste management system.

Informal sector and waste management

Lack of resources, inefficiency of municipal workforce, frequent change of both political as well as permanent executives have rendered the management of waste ineffective. This has given rise to a huge informal sector which is involved in the management of a city's waste. This informal sector is also the human face of waste and has got inextricably linked with issues of urban poverty in India.

As mentioned earlier, in India, urbanisation has happened rapidly and in an unplanned manner. Push rather than pull has been the predominant factor in this urbanisation process of the country. Millions of poor people have migrated to urban centres in search of livelihoods, which have been absent in rural areas due to lack of land reforms, and low infrastructural and industrial development. At the same time, urban areas have not been planned to absorb such a large population of migrants. This unpreparedness of urban areas to provide employment and shelter has forced poor people to find whatever employment they can.

Waste pickers provide an unacknowledged subsidy to the waste producer, packaging industry and the legal owner of waste – the municipal body

Waste and its associated sectors such as recycling have emerged as one of the most important sectors providing livelihood to the poorest of the poor.

Urban waste and poverty

The issue of urban poverty is inextricably linked to waste. In India, over one million people find livelihood opportunities by engaging in waste

A woman waste picker makes a point at a public hearing organised by SMS in Mumbai in May 2004.

collection, disposal and recycling through the informal system. Hence, it is important to understand waste in this context. There are waste pickers, waste sorters and various levels of waste dealers who earn their livelihood from waste.

A survey conducted by Stree Mukti Sanghatana, in Mumbai, revealed that 80 per cent of waste pickers are women. In Bangalore, community waste management systems have employed more women than men. A survey carried out in Delhi by Srishti in 2001 found that 24 per cent of the waste pickers were females

In India almost all recycling of urban municipal waste is undertaken through informal sector mechanisms. Waste pickers collect recyclables from wherever they are thrown – on pavements, outside homes, in parks – and store them in their homes, which serve as small godowns.

Then these recyclables are sold to the distribution chain of waste dealers and recycling factories.

Waste pickers and waste management

Waste pickers, for livelihood reasons, have been an integral part of any city's solid waste management system, even though their services have not been recognised and acknowledged, except in some cases through NGO efforts. Metropolitan cities have provided them with a type of self-employment, which requires few or no formal skills, education or financial investment. By collecting and selling waste to waste dealers, they divert a sizable quantity of waste from landfills and conserve resources. They also provide an unnoticed service to the municipal bodies by collecting refuse, thus saving crores of rupees that would have been spent for its transportation and disposal. Simultaneously they feed recycling units with material resources to ensure their survival and reprocessing waste back into products.

Waste pickers, part of the lowest rung of the urban poor, live in sub-human conditions of filth, deprivation and social ostracism despite the fact that they work as service providers. They provide an *unacknowledged subsidy* to the waste producer, packaging industry and legal waste owner – the municipal body.

It is possible that if waste pickers could be organised in a decentralised manner, the quantum of waste recovery would be much larger and there would be more recyclable materials feeding the recycling industry. Besides waste pickers' efforts end up in the Delhi municipality saving around 20 per cent of its annual budget, which is true for other metropolitan cities as well. Instead of being recognised and rewarded, waste pickers are treated as outcasts, they are called 'scavengers', their way of living is despised, and their identities denied.

Gender, livelihood and urban waste

In some of the cities a substantial number of waste pickers, whether engaged privately or individually, are women. A survey conducted by Stree Mukti Sanghatana, in Mumbai, revealed that 80 per cent of waste pickers are women. In Bangalore, community waste management systems have employed more women than men. A survey carried out in Delhi by Srishti in 2001 found that 24 per cent of the waste pickers were females.

The subordinate status of women in India, which limits their access to economic resources results in them opting for this work as it is the lowest on the economic ladder. Besides, such work can easily be done in the neighbourhood, instead of looking for jobs by commuting to far off places where safety becomes a cause of concern. The men of course face no such dangers. Hence organised waste collection has provided more jobs to women in an otherwise male dominated employment scenario.

But even here, women earn less than their male

counterparts due to a lack of social-cum-business contacts. Moreover, the working conditions of female waste collectors are worse than their male counterparts. They face harassment from the police as well as the municipal staff, apart from the lewd comments from the public. They have to work early in the morning and then take care of household work and look after the children. Some communities allow their women and adolescent girls to go out for waste picking while others do not.

There have been a few remarkable initiatives from women groups which have ensured better and safer working conditions for women. Kagad Kach Patra Kashtakari Panchayat (Pune), SEWA(Ahmedabad), Stree Mukti Sanghatana (Mumbai) have been pushing for better working conditions for women waste pickers. They have been able to organise waste pickers and provide them with substitute livelihoods. Kagad Kach Patra Kashtakari Panchayat's interventions have secured medical insurance for 3,000-odd waste pickers of Pune from the municipality.

Conflicts and challenges

Time is indeed running out for many cities where a lack of landfill space has reached a flash point. Delhi, for example, has almost completely filled up its three landfills. Siting a new landfill is not easy. Moves to site one in an urban village in July 2000 met with severe community resistance. Efforts are on now to convert a notified forest area into a landfill site. This is being vehemently opposed by environmental groups, which are proposing increased recycling of both organic as well as inorganic waste as the sustainable solution to the waste problem.

The first response of the municipality has been to pass on the waste responsibility to a centralised private operator. This has been in the form of a subcontract, and the responsibility still remains with the municipality. However, there are insufficient attempts to involve other stakeholders in a meaningful way. Even though communities across cities have initiated door-to-door collection of waste, and in some cases even negotiated to obtain land for local composting, such initiatives have no legal status. In many cases successful initiatives have been wiped out when the municipality has chosen to bring in a private operator instead of incorporating the community intervention into the city system.

The dilemma of a modern society: as standards of living rise, so does the amount of waste.

Sustainability in waste management

A wide range of groups have a stake in finding sustainable solutions to the waste problem: producers of goods, consumers, communities, recyclers, disposal operators and policy makers in urban and rural areas.

Apart from employing the right infrastructure and technology, the solution is rooted in an understanding of the social and economic dimensions of the existing waste management practices. Urban planners, municipal agencies, environmental regulators, citizen groups and NGOs need to develop response mechanisms that suit local dynamics, rather than borrow non-contextual solutions from elsewhere.

The entire trail of waste – the conversion of natural resources into goods to their post-usage disposal – needs to be viewed holistically. Post consumer waste can be recycled, processed or dumped into landfills. Ideally waste should be minimised and recycled safely, rather than land filled. Landfills, even when engineered well, leak over a period of time (30 to 50 years) and require space which is increasingly hard to find.

Organised waste collection through community waste management systems leads to a higher rate

Organised waste collection through community waste management systems leads to a higher rate of recovery of natural resources as compared to burning of waste in landfills or burning it through environmentally unsafe technologies

Community initiatives are a possible alternative to centralised waste management systems.

of recovery of natural resources as compared to burning of waste in landfills or burning it through environmentally unsafe technologies. Community waste management systems spruce up recycling and result in material recovery and preservation of virgin natural resources.

Though the community projects are working well and fulfilling the greater objectives of environmental safety and natural resource conservation, they are doing under great economic and social stress

On the face of it, there is still a tradition of reusing bottles, clothes, tins and glass in developing countries. However, with the use of disposable packaging this trend is changing.

Over 50 per cent of the 3 million tonnes of plastic produced in India is used for packaging, which becomes waste immediately through discarded wrappers, bags, etc. Similarly, paper will constitute the largest recyclabe waste in the next 25 years. About 36 per cent of old newspapers, writing paper and paper wrappers are sold to roving *kabaris* and back to the paper mills, but this needs to increase. Not much thought has been given to increasing the recycling rates through creating or upgrading systems which are doing their bit in the present set up.

Range of future interventions

The issue of urban solid waste must be considered in a holistic manner. The current piecemeal division of waste into watertight sections is a part of the problem. There is a necessity for much greater co-ordination between different departments in municipalities, as well as various ministries of the government. Apart from improved tools, a revamped personnel management strategy is needed to increase worker productivity and dissolve the prevailing inefficient work culture.

Many kinds of taxation and fiscal instruments can be used to modify waste generation behaviour. These can range from a cess which increases with the volume of waste generated to incentives for backyard composting.

At another level, better control of the types of packaging is required. As consumerist lifestyle grows, so does the amount of non-biodegradable material in the waste stream such as plastics, paper, tin cans and tetrapacks. In many developed countries, such materials are either banned or have a recycling cost built into them. Denmark, for example, does not allow the use of aluminium cans for beverages. Similar initiatives are likely to work well within Delhi and its environs, as in the case of plastic carry bags. Producer responsibility for packaging needs a serious examination for a proactive approach to waste management.

The informal sector too needs technological upgradation in the areas of recycling and reprocessing, particularly of plastics. Informal recycling systems should be recognised for their role in waste management, and must be given infrastructural support. It is unlikely that any long-term change will emerge without doing so.

Ragpickers need to be formally incorporated in waste management systems, at local levels as well as in the larger urban framework. There should be an accent on training them and imparting skills such as composting so that they can alleviate waste problems, and improve their own socio-economic status. Such training will be more effective if it is backed by municipal assistance in the placement of these waste managers.

So far, NGO initiatives have not been able to adequately address the issue of city level waste management. This may be because the work is carried out on a community-to-community basis, or on a local level. There is a sore lack of education and awareness within communities, which needs to be remedied.

Promoting a community paradigm

Many initiatives that are already underway in the country have sought to achieve this through on the ground involvement of various stakeholders. Of course the failure of the rationally run municipalities to provide adequate services in this changing situation has led to an acute waste situation. But on the other hand, there is greater involvement of individuals, communities and NGOs who have taken initiatives locally to manage their waste and more importantly to turn it into useful resources. Such community initiatives have been identified as a possible alternative as decentralised sustainable waste management systems. But such community initiatives are not well known across the country to learn the practices and replicate them elsewhere.

Though the community projects are working well and fulfilling the greater objectives of environmental safety and natural resource conservation, they are doing under great economic and social stress. There is neither the recognition nor support for such work by the different institutions from various stakeholders. Hence there is a need to bring the work in the larger public space and review the rules and regulations both for enhancing and providing incentive to such community waste management systems.

Upscaling community projects

Such a system cannot hope to deal with the situation at a macro level without a sustained participation from both the community and the municipality. The possibilities of upscaling community-based projects to more mainstream levels, either as larger projects or through a proliferations of such involvements are immense, though unexplored. The present rules and regulations of the local governments (municipalities) are inadequate both in terms of assessing environmental impact of waste and economic and social implications. There are various reasons why there is a strong case for intervention in both upscaling the community projects and making suitable policy interventions to make such initiatives sustainable, both economically as well as environmentally;

- Any community project needs the support of its various stakeholders to operate and sustain it: the waste pickers, residents, the local municipal body, the community-based organisations (CBOs), volunteers, etc. However the terms of such interface or interaction have never been fully examined or even documented.
- The existing traditional systems of recycling based on waste pickers and other stakeholders is being mercilessly torn and displaced by corporatising waste with the international waste to energy industry seeking a foothold. Simultaneously municipalities too while on the surface appear to support community-based projects have been quietly signing off these efforts to corporate interests, as they receive incentives from the government for doing so.
- The present rules and regulations are inadequate both in terms of assessing environmental impact of waste and economic and social implications. For developing countries recycling of waste is the most economical and socially viable option available both in terms of employment generation for the urban poor with no skills and investment and also preserving the natural resources going down the

drains or burning of waste through incineration or gasification.

- The initiative and incentive for community waste management should ideally come through the government. Local space to carry out local composting and other basic infrastructure should be provided by the local government bodies. The urban planning process does not include such needs in its spatial city plans. In the present scenario there is no such initiative or incentive for the government.
- There is a need to develop a market for compost produced from urban waste. Private sector investment made in this area has been floundering owing to the inability to sell the compost in the heavily subsidised chemical fertiliser markets. While energy products are being subsidised, the greener compost products need urgent attention.
- Organised waste collection through community waste management systems should incorporate waste pickers for livelihood substitution. This will also lead to more and cleaner recovery of recyclables, fetching more income for the waste pickers.

There is clearly a need to respond with a new framework. In many senses the framework already exists from various decentralised initiatives carried out by numerous groups, in small local as well as larger colony and zonal level work. These understandings need to be negotiated into the system of urban planning, municipal partnerships as well as marketing links.

SECTION 3

Analysing CBSWMSs in India

- Guidelines for documenting the projects
- Research methodology
- Community projects
- Sustainability of community interventions
- Key challenges in upscaling and sustainability of community interventions
- Waste collectors
- Composting

Analysing community-based solid waste management systems in India

Guidelines for documenting the project and research techniques and methodologies

For documenting successful decentralised community interventions in solid waste management, there was a need for a predetermined set of questionnaires and other guidelines to gather relevant data. The preparation of a relevant and appropriate set of questionnaires depends on the objectives of the research work. Besides documenting and highlighting successful decentralised community-based solid waste interventions in the country, the present research work primarily aims to identify challenges involved in upscalability and sustainability of the SWM interventions. (The terms interventions, initiatives and systems have been used interchangeable in the context of the discussion).

Upscalability of community projects can be assessed in two forms: either in the form of their expansion to mainstream levels (in the form of numerical expansion), or through a proliferation of such projects (in the form of replication)

By their very nature, community projects are confined to a small geographical area serving a small population. In most cases these community-based interventions have failed to sustain themselves, especially after the withdrawal of the facilitating agencies or individuals for almost similar reasons and local context. Whereas upscalability is concerned, these interventions face a dilemma. Being decentralised in nature and confined to a particular locality, the upscaling of these community projects are mainly in the form of replication of their prototypes. Their upscalability in the form of indiscriminate increase of coverage population involves the risk of ending the very essence of these community projects – their decentralised nature. Hence, one must be careful and should not place too much emphasis on the numerical expansion of these projects. Thus, upscalability of these community projects can be assessed in two forms: either in the form of their expansion to more mainstream levels (in the form of numerical expansion) or through a proliferation of such projects (in the form of replication).

Defining sustainability of these community projects is a tedious but critical task. Multiple factors determine and govern the behaviour of different stakeholders involved in such projects. These need to be analysed in an order to define the sustainability of such projects. Over the years, there have been some attempts to define and to develop some indicators to determine the sustainability of community projects. Some of the important studies concerning sustainability and constraints involved in these kinds of projects are:

- Community Participation in Solid Waste Management: Factors Favouring the Sustainability of Community Participation (A Literature Review, UWEP Occasional Paper Series, June 2000.)
- Alliances in Urban Environment Management: A Process Analysis for Indicators and Contributions to Sustainable Development in Urban SWM (Working Document 14.)
- Lessons from Community-based Initiatives in Solid Waste (WELL Study, March 99.)

A literature review of the subject reveals that in the Integrated Sustainable Waste Management (ISWM), six sustainability aspects are distinguished:

- Environmental,
- Economic and financial,
- Technological,
- Social and cultural,
- Policy/political, and
- Institutional aspects.

(Source: Alliances, UWEP).

Here, in order to develop our research framework, a brief discussion of all these sustainability aspects is called for.

Environmental sustainability

Environmental sustainability demands that any solid waste management system should strive to meet the three 'R's – Reduce, Reuse and Recycle. In other words:

- Production of waste should be minimised.
- Reuse and recycling of waste should be maximised.
- Biodegradable waste should be treated separately and only inerts should be dumped in the landfills.

The optimisation of last two goals depends on the source segregation of the waste. Thus, source

segregation or primary segregation of waste is a very important condition for sustainability of any kind of solid waste management.

Financial sustainability

In order to be sustainable the community intervention should be financially viable by itself. Usually, these interventions are initiated either with some kind of external help or with the seed capital of the catalysing organisation. Very few projects start from the contribution from service recipients. In order to be financially viable, it is necessary that the community should be willing to pay for the services. Thus, issues like affordability of user fees and willingness of the community to pay for the services should always be kept in mind while discussing sustainability of these projects. Moreover, extra sources of revenues like proceeds from selling of recyclables and compost should also be explored to make the venture profitable.

Social sustainability

This aspect mainly deals with the role and participation of the community in these projects. A community project can not sustain itself unless it inspires the community's whole-hearted participation. By showing its willingness to pay for the services and by playing an important role in monitoring the project, the community becomes the most important stakeholder. In fact, in order to become sustainable, a community project has to ultimately be owned by the community.

Moreover, such projects should provide safe and healthy employment to waste collectors because they are a key to its success. This can be done by offering formal contracts; providing basic training on waste segregation, collection and disposal methods; by providing uniforms and medical insurance; training in composting and rights over recyclables, etc.

Technical sustainability

Every community project has its unique geographical location and this demands technical innovations from project planners. Issues like ways of waste collection and transportation, kinds of vehicles used to access the service areas, treatment of biodegradable waste by adopting suitable composting methods, etc, play an important role in a project's sustainability.

Involvement of various stakeholders is crucial to the success of a community initiative.

Policy/political sustainability

Political/policy issues pertain to relevant legislations and incentives or barriers created for the smooth running of these projects. For example, is there any legislation that makes primary segregation compulsory? Are there special incentives being provided to promote recycling and composting? Is there a clear-cut division of roles and responsibilities among different layers of governance? These kinds of issues have an important bearing on the sustainability of these community projects.

The main stakeholders in any solid waste management system are: producers, consumers, waste pickers, traders of recyclable materials, recycling enterprises, waste dealers, local government, NGOs and CBOs

Institutional arrangements

It is imperative that relationships among various stakeholders are formally institutionalised. There are several factors which determine the degree of coordination: the degree of public participation, the prevailing political structure, the extent of privatisation of municipal services all have a bearing on the success of the project.

These are the most basic aspects concerned with the sustainability of community interventions. Now, the important question is how to capture all these aspects of sustainability while documenting the community projects in India. For this documentation process, it has been decided to

adopt stakeholders' approach to solid waste management systems. Who are the stakeholders in a community project? The answer to this question depends on the external context in which a community project functions. The basic environment in which community projects have to function in India has already been detailed in the introductory chapter and need not be repeated here. The main stakeholders in any solid waste management system are: producers, consumers, waste pickers, traders of recyclable materials, recycling enterprises, waste dealers, local government, NGOs and CBOs.

Key stakeholders

In India, solid waste management in urban areas is an obligatory function of municipalities. The Central Government has passed the Municipal Solid Waste (Management and Handling) Rules, 2000, making it compulsory for municipalities to start primary collection and segregation of waste from January 1, 2004. Municipalities function under the overall guidance of urban local bodies, which have been provided a constitutional status by the 74th Constitutional Amendment Act. Basically, the governance structure is like this: The Central Government–the State Government–the urban local body–the municipality. But, it is the municipalities which are directly involved in day-to-day management of urban solid waste and are accountable to the local government. Thus, in our case, it is the municipal body that is one of the main stakeholders. Since, the focus of our study is community projects, our main *stakeholders* are:

- **Municipality:** legally responsible for the overall management of the city waste.
- **Community:** both producer of waste and consumer of waste management services.
- **Waste collectors:** involved in collection and disposal of waste.
- **NGO/CBO:** generally who have initiated and sustained the project.

Here, it needs to be reiterated that besides these four stakeholders there are other actors involved in solid waste management of a city. For example, local elected leaders such as councillors, MLAs, or traders of recyclables their enterprises, etc, all have stakes in solid waste management systems.

Having defined the stakeholders, one needs to develop workable definitions for the terms upscalability and sustainability. Though, there are many NGOs/CBOs working with waste and related issues, information about them is sketchy. Moreover, some of these interventions are new, having started mainly in mid-1990s. Hence, a need was felt to be flexible in the criteria regarding selection of these interventions. After consideration, it was decided upon the following three criteria:

- There must be door-to-door collection.
- The intervention must be serving at least 2,000 households; whatever may have been the initial number of households.
- The intervention must be at least two years old in order to prove its sustainability.

During the documentation process, the criterion about number of households being served was relaxed in order to accommodate the maximum number of interventions

However, during the documentation process the criterion about number of households being served was relaxed in order to accommodate the maximum number of community-based interventions. We did stick to the criterion of the intervention being at least two year old to study the financial sustainability. As the documentation progressed, we came across some municipalities also undertaking door-to-door collection of waste. We documented the work of these municipalities as well to understand what works better and how they are different from community projects.

Research methodology

During the research a combination of different types of data collection methods was used to gather relevant information. Basically, data was collected at three levels:

- Primary data was collected from field through questionnaires and interviews.
- Secondary data was collected through a literature survey.
- Through personal observations of ongoing processes.

First, through a survey of literature a theoretical framework was defined. The process of defining the terms like 'upscalability' and 'sustainability', based on the prevalent literature, has already been defined.

The questionnaires were prepared for four main stakeholders:

- Community or service recipients,
- Municipality,
- Waste collectors,
- NGO/CBO.

Special attention was paid to incorporate all the defining parameters of upscalability and sustainability. Thus, the questionnaire for NGOs/CBOs had five main sections: background information, financial sustainability, infrastructural availability, motivation /leadership, community participation and external/enabling environment. Similarly, the questionnaire for service recipients covers financial sustainability, willingness and level of participation, evaluation aspects of NGO/CBOs work. The municipality questionnaire looked into the implementation status of the MSW Rules, 2000, incentives for NGOs/CBOs, plans to accommodate waste pickers in the mainstream and ways and means to enhance community participation, etc. Finally, the questionnaire on waste collectors covered financial earnings, health and infrastructure availability, the level of community and municipality's co-operation as its main sections. There were deliberate jumbling-up of some questions and overlapping of some questions across different questionnaires to cross verify the responses.

Testing the questionnaires

In order to arrive at the requisite number of respondents and to test the reasonableness of questionnaires, a pilot survey of the Vatavaran and Naya Savera interventions was conducted in Delhi. Based on the responses and experiences of the pilot survey, some changes were made to the questionnaires. It was decided to administer questionnaires to a random selection of 50 respondents from the target community and 10 respondents from the waste collectors. During the pilot survey, it was found that these numbers were sufficient, since after that the responses were getting repetitive. Of course, the urge to cover maximum number of interventions and time limitations were other two important factors limiting the number of respondents. However, during the survey process, an attempt was made to meet those community members who were actively involved in the running of the projects.

Limitations: Any field data collection effort suffers from several limitations and ours was no exception. Some of the important limitations of data collection were:

- Language was a barrier. India being a multilingual society, at several places we had to use interpreters. There could be possible distortions occurring due to misinterpretation of questionnaires as well as translating the questions to the respondents.
- Most of the organisations are not in habit of keeping well-maintained records and some of their responses were, at best, guesstimates.
- Municipalities have a very poor and archaic system of record keeping. Moreover, at many places no effort seemed to have ever been made to collect data about solid waste management system of the city; especially in the format we were seeking.
- At many municipalities, there was a natural suspicion about the motives of an NGO's research. The very mention of the fact that we were from an environmental NGO raised suspicions about our intentions. Hence, responses of the officials were very restricted and measured. Though, this was not the case everywhere. At some places, municipalities provided information readily.

At many municipalities, there was a natural suspicion about the motives of an NGO's research. The very mention of the fact that we were from an environmental NGO raised suspicions about our intentions. Hence, responses of the officials were very restricted and measured

Community-based initiatives

NGO/CBO	City
Center for Development Communication	Jaipur
Center for Environment and Education	Bangalore
Exnora Green Cross	Vellore
Friends of Urban Poor	Thiruvananthapuram
Jana Chaithanya	Vishakapatnam
Jan Sewa Ashram	Solan
Kagad Kach Patara Kashtakari Panchayat	Pune
Muskan Jyoti Samiti	Lucknow
Nav Bharat Jagriti Kendra	Ranchi
Naya Savera	New Delhi
Pramukh	Dehradun
Stree Mukti Sanghatana	Mumbai
Sukuki Exnora	Hyderabad
Swabhimana	Bangalore
Vatavaran	New Delhi
Vikas	Bhubaneswar

Municipal initiatives

City	State
Suryapet	Andhra Pradesh
Panjim	Goa
Nanded	Maharashtra
Nasik	Maharashtra
Bhadreshwar	West Bengal
Kalyani	West Bengal
Kanchrapara	West Bengal

Defining decentralised community-based interventions

Even if we take the two largest interventions, namely MJS at Lucknow and CDC at Jaipur, they deal with only 3.6 and 2.5 per cent of the city waste, respectively. But they are making a significant contribution in the form of providing employment to waste collectors and providing door-to-door collection services

In general, decentralisation is the process of devolution of resources and decision-making powers to local bodies. In India, it has come to be associated with the 73rd and 74th Constitutional Amendments that recognise the powers, roles and structures of local bodies. Basically, the idea is that there are certain functions which can be performed more efficiently if they are planned and managed by local bodies. In India, solid waste management and its related functions fall under this category. Thus, municipalities have been entrusted with the management of urban solid wastes in the country.

Based on the same logic, the research team has attempted to define decentralised community-based interventions in solid waste management. Thus, here decentralisation means that:

- The intervention has been planned and is being managed at the local level.
- The intervention has been defined by its geographical boundaries, which is limited in its expansion. Though, it is very difficult to define this limit as it varies from places to places.

Now, coming to the definition of community-based interventions, it is very difficult to provide a single definition which can encompass all the ground interventions. Hence, it will be prudent to define these interventions with the help of certain inherent characteristics of these interventions. Drawing heavily from the *Well Study: Lessons from Community-based Initiatives in Solid Waste*, the present research work has decided to document following types of interventions as community-based initiatives:

- An activist or group of households collectively recruits waste collectors for primary collection, agreeing a minimum fee and paying it individually to waste collectors.
- An NGO/ CBO actively manages the system, arranging the collection of fees and payments to the waste collectors.
- A small contractor/ NGO starts the collection service as a business and takes on various risks, including responsibility for necessary investments.

Twenty five decentralised solid waste management systems (DSWMS) across India have been documented in this report. Of these, 16 are community-based initiatives, either run by the NGOs or by CBOs/ RWAs. One community intervention, initiated by Jan Seva Ashram (JSA) at Solan has failed. The JSA intervention at Solan has been documented in spite of its unsustainability because even a failed project can give out some useful insights about sustainability of these kinds of interventions. Seven projects are primarily being run either by municipalities themselves or in arrangements with some NGO/ private agencies. Two projects, one at ITC Complex, Bhadrachalam and the other at BHEL, Ramachandrapuram (both in Andhra Pradesh) have been documented from an institutional area.

It needs to be mentioned that during the documentation process 70 sites and 32 cities were visited, of which only the above 25 interventions fitted into our criteria. Though flexible in our approach we have tried to study as many initiatives as possible during the survey period.

Models in operation

Five types of waste management models were found to be involved in DSWMS in particular relation to door-to-door collection. They are:

- **Partnership between NGOs and municipality**: NGOs/CBOs managing community interventions with some help of or in alliance with municipalities. For example, organisations like Exnora Green Cross (Vellore), Jana Chaithanya at Vishakapatnam have been sustaining their intervention with the help of the municipality.
- **NGOs/CBOs on their own**: The Muskan Jyoti Samiti (MJS)intervention in Lucknow

is a good example of this approach. MJS has been given support by State Urban Development Agency (SUDA), Lucknow District Collector and other government agencies, but never by Lucknow Nagar Nigam, which is constitutionally obliged to provide these services.

- **Municipalities on their own:** Municipalities like Suryapet, Kalyani, Panjim, Bhadreshwar, etc are engaged in DTDC of urban solid wastes purely on their own.
- **Outsourced to private operators**: In some places, municipalities have contracted out their solid waste management functions to private operators. For example, municipalites like Chennai, Nasik, Surat, etc have privatised their solid waste management services and are operational.
- **Institutions/industrial complexes on their own**: Some institutions/industrial complexes have started managing their solid waste with the help and expertise of local NGOs. Indian Institute of Technology and Jawaharlal Nehru University in New Delhi and Indian Tobacco Corporation in Bhadrachalam are examples of such an initiative.

Community-based initiatives

The following discussion pertains to those DSWMS which have been initiated by the NGOs/CBOs and are being run with some sort of support from municipalities or government agencies. Basically, these are interventions which are/were being run primarily with the help of user fee collected from communities. They are getting various kinds of support like provision of land for segregation/composting and issue of identity kits to waste collectors, etc from concerned municipalities.

Except the JSA project at Solan, all community interventions have upscaled and are sustaining themselves. However, the upscalability and sustainability of these community interventions, being the main objective of the present research work, will be discussed in detail in the next section. Before that, one needs to discuss some significant findings and observations about these projects based on the data collected during the documented process. Some of the important findings about these interventions are given here.

Community projects

A marginal but important presence: In the context of the city, all these community interventions have a very marginal presence. Even if we take the two largest interventions, namely MJS at Lucknow and CDC at Jaipur, they deal with only 3.6 and 2.5 per cent of the city waste respectively. But they are making a significant contribution in the form of providing employment to waste collectors and providing DTDC services. Organisations like MJS, CDC and KKPKP are providing employment to 900, 600 and 300 waste collectors respectively. Moreover, they are helping in keeping the city's environment clean and healthy and helping municipalities move towards organised waste collection. This has substantially reduced the burden of the municipality.

Service groups: One of the most significant findings is that all the community organisations have been mostly concentrating on carrying out their activities in middle-income localities.

One of the most significant findings is that all the community organisations have been mostly concentrating on carrying out their activities in middle-income localities

Organisations like Naya Savera, Vatavaran in Delhi, CEE in Bangalore, KKPKP in Pune, SMS in Mumbai, Vikas in Bhubaneshwar and FUP in Thiruvananthapuram are providing services in the middle and higher income areas only. Others like EGC in Vellore, MJS in Lucknow, NBJK in Ranchi, CDC in Jaipur, SE in Hyderabad and JC in Vishakhapatnam are serving all income groups. But, even their interventions are mostly concentrated in middle income areas. For example, MJS is serving only one lower income group in Lucknnow. During our discussion with these organisations and with community people, it was found that it is the law of supply and demand which is working in favour of middle income colonies. Municipal services in higher income areas are generally satisfactory. In fact, during the discussion with community people in Datta Phadake Colony, Mumbai, we found that some higher income areas are over serviced. Moreover, these people have the influence and power to receive municipal services. For lower income groups other issues of livelihoods are much more important.

Kinds of services: Most of these organisations are mainly concerned with door-to-door

collection, segregation and composting of biodegradable waste. Thus, NGOs like Naya Savera, CEE, Sukuki Exnora, Friends of Urban Poor, Vikas are concerned with DTDC and other waste disposal services. Some NGOs like Vatavaran and SMS are also involved in cleaning of staircases, pruning of trees, etc. However, some organisations like NBJK, EGC also undertake cleaning of drains and sweeping of roads, though only sporadically.

Composting: Out of 15 places, composting is being done at 11 places. Only MJS at Lucknow, NBJK at Ranchi and KKPKP in Pune, Swabhimana at Bangalore and Pramukh at Dehradun are not involved in composting. However, it needs to be mentioned that MJS used to carry out composting of organic waste but had to stop due to marketing problem. NBJK has a plan to start composting once it is able to get land from the municipality. As far as the issue of land for segregation/composting of waste is concerned, it has been provided by different agencies at different places. A tabular presentation of the land made available for segregation/composting of the waste to these organisations is given below left side.

Here, it is clear that the municipality is the main agency to approach for permission of land for composting. This is quite logical, since it is the main agency responsible for solid waste management of a city. In some flatted and society apartments, for example Basera Colony in Mumbai, RWAs have also provided land for local composting. In the case of Naya Savera and Vatavaran, educational institutions like IIT and JNU have provided the land for the composting.

Who provided land for segregation/composting?

	Number	Per cent
Municipality	7	50.0
Resident associations	2	14.3
Own place	3	21.4
Other sources	2	14.3
Total	**14**	**100.0**

Source of initial funding: It seems that various kinds of funding sources are available but there is a need to explore these sources. Organisations like JSA, CEE, NBJK, SMS and Vikas have been able to get initial seed funding from external donor agencies like NORAD and IECF, etc while organisations like EGC and FUP have started their present interventions with the help from concerned municipalities. Vatavaran started its interventions at Vasant Kunj with financial help from the local RWA. By exploring a totally new source of funding, Naya Savera initiated its solid waste management services at IIT Delhi with the help of the institution itself. However, what is more significant is that even if there is no financial help available from any quarter some organisations like MJS at Lucknow and Pramukh at Dehradun have started interventions from their own seed money – with the contributions from the found-

Source of seed money

ing individuals of these organisations. It needs to be mentioned that all these organisations are now running their services with contributions from the community; they are no longer dependent on external funding.

User fee: Expectedly and appropriately, there are different user fees for different income groups. Starting from Rs 10 to 15 for lower income areas, the user fee varies from Rs 30 to 50 for middle and higher income areas. At one place in Ranchi, NBJK charges Rs 100 as user fee.

It is clear from the table that in the majority of cases, it is the service organisation that is collecting the user fee. At Thiruvananthapuram, it is the municipality that is collecting the user fee in lieu of solid waste services.

Who collects the user fee?

		Number	Per cent
Valid	Organisation itself	9	64
	Municipality	1	7
	RWA and organisation	4	29
Total		**14**	**100**

Regular revenue generation is critical to sustain both the services and the organisation. Since the basic idea behind all these community interventions is to keep them sustainable even after the withdrawal of the facilitating organisations (in case of NGOs), the issues of financial contribution and ownership-cum-participation from community become very critical. For this, issues like the comfort level of communities in paying user fee, the sense of being reasonably charged in lieu of the services and readiness to pay more, which provides a sort of cushion to service organisations, need to be ascertained. The assuring fact is that the majority of the service recipients are ready to buy these services, which is evident from the analysis of our field data on service recipients.

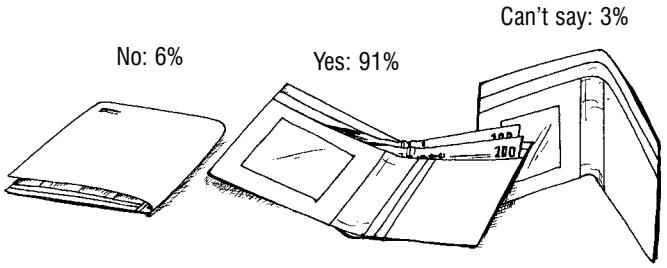
The responses as depicted in the figures here clearly demonstrate that there is every possibility of financial sustainability of these interventions. But, there is a caveat here. These figures are from successful community projects where the community is getting a reasonable quality of service and has a sense of participation and belonging to the project. However, if services are not satisfactory, the community may stop paying for the services and the intervention might fail. Indeed, the same has happened in Solan.

The story of Solan (see box on opposite page) clearly demonstrates that the ability of a community to pay and participate in a solid waste intervention will fail to hold in case of non-performance of these projects.

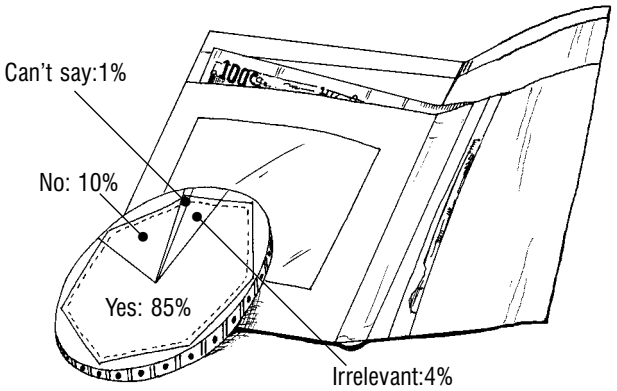
Community participation

Apart from a community's willingness to pay for services there are other important issues that impact an intervention. For instance, is the community undertaking primary waste segregation? Is there any difference in people's participation as per their income category? This section discusses such issues based on the responses of community and NGOs.

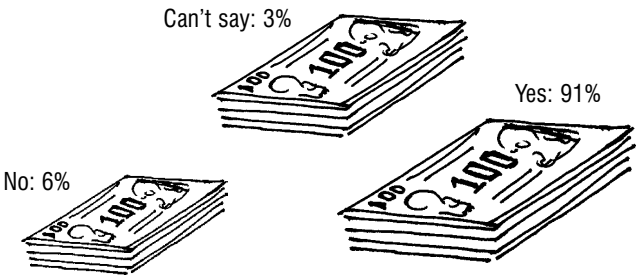
Comfortable in paying user fee



Reasonably charged

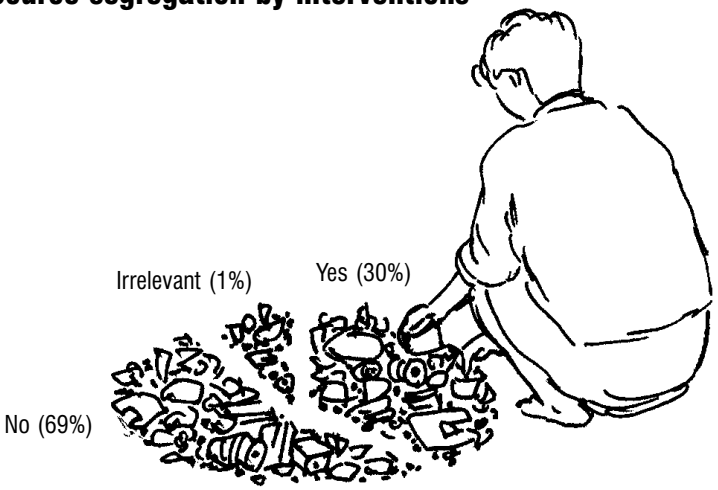


Willing to pay more



Source segregation: From the analysis, it can be inferred that getting people to do source segregation of waste is a long-term process that needs constant efforts from the intervening organisation. Despite their best and consistent efforts, majority of people are still not segregating waste at source. Here, it needs to be emphasised that there are differences in the degree of source segregation among the projects. This data represents the overall responses of communities across India. It was also found that whenever decen-

Source segregation by interventions



tralised composting was taking place, the rate of segregation was better than when composting was not done.

If no segregation, then why?: The noteworthy point is that 26 per cent of respondents were not aware about source segregation and 19 per cent responded that they were not asked to do source segregation. This means that some community projects need to undertake more awareness generation campaigns to convince people about the benefits of source segregation. It is also true that some organisations themselves are not prepared to handle segregated waste and hence have not asked people to start source segregation. The remaining 25 per cent are not segregating waste at source either due to lack of time or because it is inconvenient. Though, the importance of source segregation for solid waste systems can never be overemphasised, what is evident is that source segregation might not be a necessary pre-condition for sustainability of the kinds of interventions, at least in the initial years.

Heterogeneous communities: Do communities behave in a uniform way across different segregated denominators? For example, is the level of people's participation the same across different income groups? Is there any difference in people's participation as per their gender?

Why the Solan intervention failed

Solan is a hilly town and a tourist destination in Himachal Pradesh. Jan Sewa Ashram, an NGO, started decentralised solid waste management services, at Solan, in 1997. Initially, it got financial help from NORAD and the municipality provided the land for the compost plant. The people were to pay Rs 10-20 per month as user fee for door-to-door collection services in accordance with their income category. An awareness campaign was undertaken and the dustbins were placed at various places. Waste collectors started collecting the city waste. Moreover, a committee of 15 eminent people was formed to supervise and monitor the implementation. Initially, everything went as per plan, but after some time people started defaulting on their payments and the collection of waste was finally stopped.

After discussing the issues with JSA, the municipality and the residents, the following reasons can be attributed for the failure of the project:

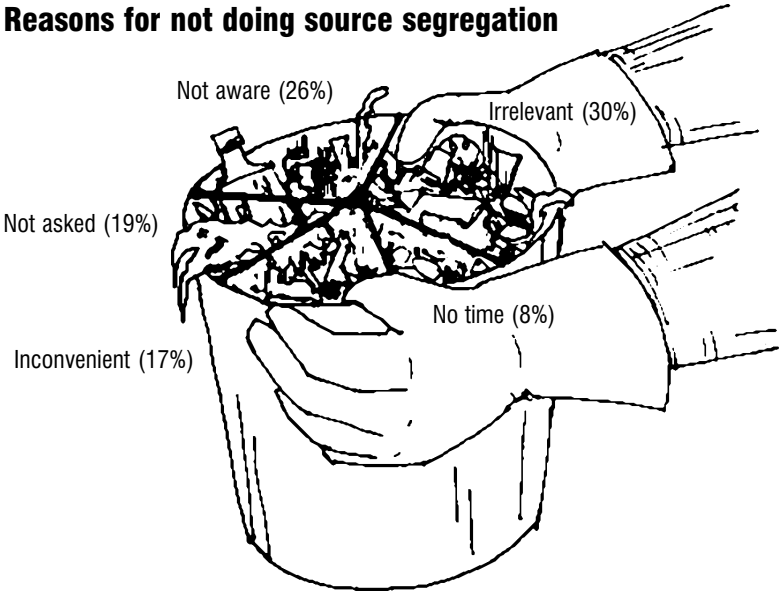
- The services were not completely integrated and the municipality failed to fulfill its part satisfactorily. For example, road sweeping and drain cleaning were municipality's responsibilities and these services were not performed regularly. Thus, overall visibility of the areas remained more or less the same. This de -motivated the community.
- The waste collectors used to dump the segregated household wastes in same old municipal bins. From these bins, municipality vehicles used to carry mix waste to the compost plant. This made people further reluctant to participate and pay for the services.
- Solan, being a tourist place, has sizeable market complexes where packaged goods are sold throughout the day; the result is too much littering which impacts the looks of the city. With the municipality unable to stop the littering, the project failed to make visible changes in the overall appearance of the town.
- Moreover, the shopkeepers' union was reluctant to pay the user fee arguing that waste management was the responsibility of the municipality and they should manage it from their own resources. With business community constituting a significant percentage of the population, their reluctance to participate in SWM intervention made its sustainability more difficult.

These are critical questions and can provide significant insights for future mobilisation of people in such projects. Here, without being critical one can say that none of the documented organisations has given too much thought over these issues. This was reflected in their responses during the interview process. They were not sure about their answers or had not thought about such questions. But with a caveat some useful insights about community participation have emerged from their responses.

To begin with, most organisations had begun with an awareness campaign to involve the community in source segregation. The campaign consisted of meetings, workshops, distribution of awareness material, street plays, etc. Typically, a combination of these mediums were used to raise awareness among the community. However, once a reasonable degree of awareness had been created and the project had taken off, attending complaints of the community became the most frequent means of sustaining people's participation in the project. This is reflected in the table below.

Where the differential rates of people's participation across different income groups and gender are concerned, experiences of the organisations were mixed. Organisations like MJS, CDC, EGC, KKPKP and Vikas were of the opinion that there were differences in the degree of people's participation based on their income categories. On the other hand, organisations like SMS and Friends of Urban Poor did not find any difference in people's participation across income variables. Organisations like Vatavaran, NBJK, Sukuki Exnora were undecided over the issue. Of the five organisations which found differences in people's participation as per income variables, three were of the opinion that middle income persons participated more in the interventions. Over the gender issue, four organisations – NBJK, Vatavara, SE and CDC – were of the opinion that women participate more than the men. Others were either undecided or did not respond to the question.

Reasons for not doing source segregation



Structuring policy environment: The broader policy environment in which these interventions function has already been detailed. But to recall in brief, local political leadership and municipality govern the policy environment of these interventions and, hence, the issue of relationship among these stakeholders is of utmost importance.

Without saying it in as many words, most organisations perceived the local political leadership as potential troublemakers. They were of

During field surveys, it was found that there was a lack of awareness among the community regarding source segregation and other waste related issues. In some cases, at Lucknow, it was found that though people were participating in the services, they did not know the name of the service provider

Any difference in people's participation across different income groups?

	Number	Per cent
Yes	5	31.3
No	3	18.8
Cannot say	5	31.3
Irrelevant	3	18.6
Total	**16**	**100.0**

Means utilised to sustain people's partcipation

	Number	Per cent
Regular meetings	2	12.5
Through articles (media)	1	6.2
Attending complaints	7	43.8
All of the above	4	25.0
Irrelevant	2	12.5
Total	**16**	**100.0**

Without saying it in as many words, most organisations perceived the local political leadership as potential troublemakers. They were of the opinion that local leadership should be involved in the project from the very beginning just to avoid any future conflict

Should political leadership be involved in the intervention?

the opinion that local leadership should be involved in the project from the very beginning just to avoid any future conflict. MJS revealed that the local councillor wanted a cut from the collection fee and hence was creating trouble for the project. Exnora Green Cross was of the opinion that politicians should not be involved in the project at all. Vikas wanted to involve the local leadership during the implementation stage of the project. Others, for the reason stated above, said that local leadership should be involved from the beginning of the project. Hence it can be inferred that a strong political will can make a difference to such projects, atleast in their initial stages.

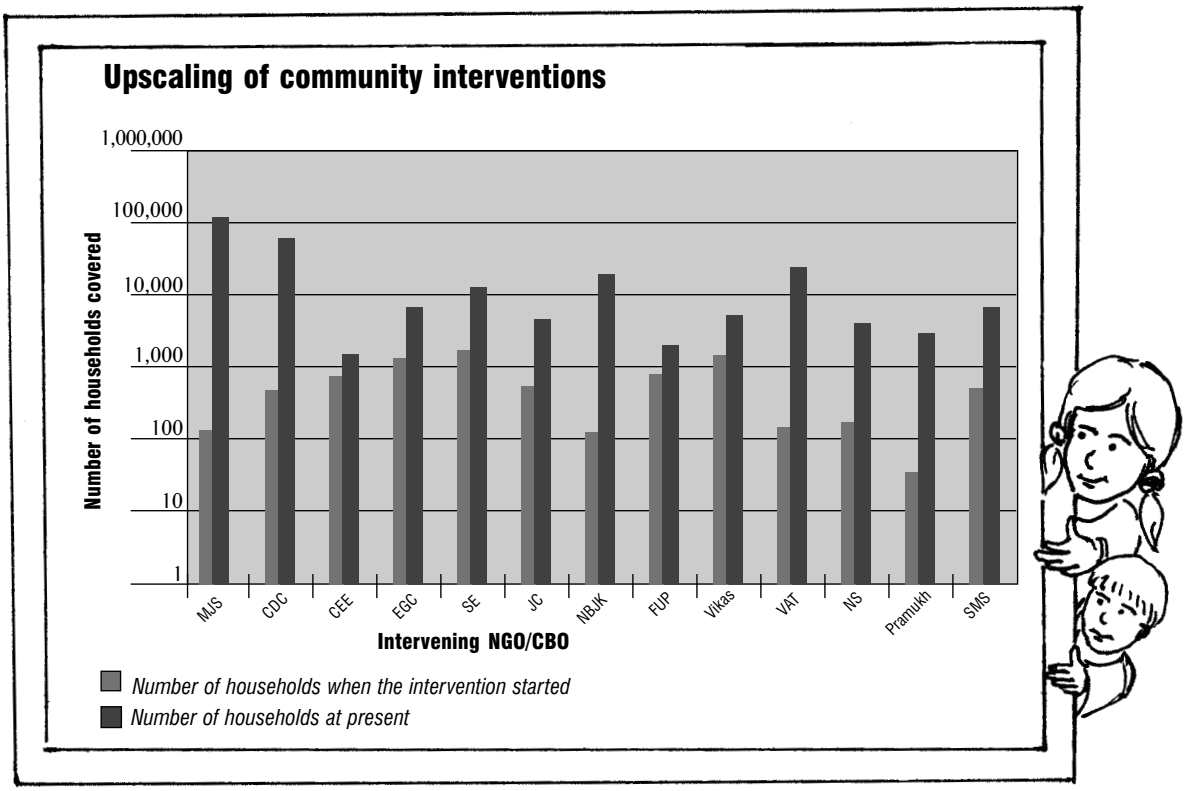
Almost every organisation was of the opinion that the relationship among the NGO/CBO, municipality and local leadership should be institutionalised through formal agreements.

Upscaling of community interventions: We found that all the ongoing interventions have upscaled, though to varying degrees. The upscaling has occurred at different levels:

- Upscaling in terms of increase in the coverage population: All the documented organisations have succeeded in increasing their coverage population; again with varying degrees and with different reasons, which has been explained later. Basically, this kind of upscaling has happened in terms of 'replication' of the 'pro-types' at different residential colonies in the same city. This has been the most frequent type of upscaling and all the interventions have succeeded in doing so, except the JSA intervention at Solan.
- Upscaling in terms of different kinds of interventions: Some organisations have been very innovative in their approach and, have not only upscaled but have also started different kinds of interventions altogether. Exnora Green Cross is a good example of this. It has started its interventions in many diverse settings. For example, it has its interventions in Vellore Institute of Technology, fish market, temples, cow sheds, etc.
- Upscaling in terms of 'replication' in many cities: In this case, CDC has been the only organisation which has been able to replicate its interventions in many cities. It has interventions in Jaipur, Nanded, Nagpur, Surat, etc. The nature of CDC interventions, however, is different at different places. At Nanded and Surat, it is participating as a private operator: it has got contracts in open competitive biddings as per the terms and conditions of privatisation process.

A multiple bar-diagram depicting the degree of upscaling of these organisations is presented here. It is clear from the diagram that the two of the most upscaled organisations are MJS and CDC. Some of the main reasons for their upscaling are:

- **Service provider's mode:** Both these organisations are working in the service provider mode. By service provider's mode, we mean that they are primarily managing waste in collection and disposal mode. There is a demand for these services owing to municipalities' inability to provide satisfactory services. Though, both MJS and CDC have tried to promote source segregation and composting of biodegradable waste, they have not got their operations restricted by these constraints. Thus, they have started doing on-rickshaw segregation of waste, instead of getting stuck in convincing community to do primary segregation. Similarly, they started with the composting of waste but have almost discontinued the practice. Though, CDC claims that it is still composting organic waste, there



is an apparent gap in the amount of waste collected and composted. On the other hand, MJS has stopped composting organic waste completely, citing the lack of marketing opportunities. Composting of organic waste is a tedious and time consuming process since it has many inherent difficulties like finding the land, situating the compost plant, which at times evokes the NIMBY (Not In My Back Yard) syndrome, technical capacity to produce compost and marketing of the product.

Moreover, during the field survey, it was found that there was a lack of awareness among communities regarding source segregation and other waste-related issues. In some cases, at Lucknow, it was found that though people were participating in the services, they did not know the name of the service provider. In other words, it means that there is no continuous on going mechanism to promote source segregation and waste management.

- **Minimum spin-offs for waste collectors**: Those organisations have found it easier to upscale, which have not made significant efforts to provide maximum spin-offs to their waste collectors. For instance, MJS does not provide any salary to its waste collectors but has given them rights over recyclables. The proceeds from the sale of recyclables are the only remuneration which MJS waste collectors get in return of their services. At Jaipur, CDC provides a regular salary to its waste collectors and has also given them the rights over the recyclables. But, not all the interventions offer minimum spin-offs to waste collectors in comparison to similar other organisations. For instance, EGC and SMS have formed self-help groups of their waste collectors and provide them several other kinds of training. SMS trains its waste collectors in composting and other entrepreneurial activities and has helped them in forming their own independent co-operatives. It also organises regular literacy classes and health checkups for its waste collectors. At Pune, KKPKP has succeeded in getting the municipality to provide medical insurance to its waste collectors. Again, all these activities require lot of efforts and are time consuming affairs. These kinds of spin-offs are absent in the case of above-mentioned two most upscaled organisations.
- **Innovative and diversified approach**:

With 91 per cent consumers feeling comfortable in paying the user fee and 85 per cent feeling that they are being reasonably charged, it can safely be assumed that there is willingness among communities to pay for the services

EGC, by means of adopting innovative and locally adoptable approaches, has been able to replicate as well as upscale its interventions at several places. As has been mentioned earlier, it has ongoing interventions in educational institutions, temples, the fish market and other places. In its temple intervention, EGC has inspired devotees to use small wooden baskets for their offerings in place of packaged sweet boxes and other plastic materials. It has opened cattle sheds where street cows and calves are being looked after and the cow dung from these cattle sheds are being utilised for composting processes. It would be appropriate to mention here that EGC sprinkles cow dung regularly over organic waste to augment the composting process. Thus, by being innovative in its approach, it has been able to replicate its interventions in diverse social and natural settings.

In order to make the interventions sustainable, the two most important stakeholders that need to be involved are the local political leadership and the concerned municipality

Sustainability of community interventions

Based on the data gathered during our documentation process, this section seeks to identify some basic indicators that determine the sustainability and upscalability of decentralised community interventions in solid waste management. The multiple factors governing the sustainability of community-based interventions in solid waste management have served as benchmarks in developing these basic indicators.

The time scale, perhaps, is the most flexible variable defining the sustainability of these interventions. There is no standard time period to define an intervention as sustainable. We have assumed that if an intervention is two years old, it can be classified as sustainable. Thus, time-scale is necessary but not a sufficient condition to define sustainability. In other words this means that:

- The quality of services being provided by municipalities is so low that the community is ready to pay organisations that are doing just primary collection, without promoting source segregation and composting of biodegradable.
- There is either enough margin in running these operations or there is significant reduction in establishment costs if the intervening organisation does not undertake composting of biodegradable waste.

Ecological sustainability

As per the theoretical framework, in order to be ecologically sustainable a community intervention should strive for the following:

- Production of waste should be minimised.
- Reuse and recycling of waste should be maximised.
- Biodegradable waste should be treated separately and only inerts should be dumped into landfills.

To fulfill the last two conditions optimally, waste should be segregated at source. However, all these conditions are not being fulfilled by all the documented interventions.

Where the issue of waste minimisation is concerned, we are not in a position to say anything categorically, for, no organisation has records to show that it has achieved some degree of waste minimisation since the intervention started. Same is the case with the condition of reuse and maximum recycling of waste. The fulfillment of these two conditions requires behavioural changes and is a long term process.

However, source segregation of the waste is the minimal condition to treat biodegradable waste separately, though ideally only, and to maximize recycling recovery. Even that is not being met at every place. It needs to be recalled that all these interventions have, together, achieved only 30 per cent of primary segregation. Two of the most upscaled interventions – MJS and CDC interventions at Lucknow and CDC at Jaipur – have been managing their interventions without primary segregation of waste: though they are doing on-ricksaw segregation since 1994 and 1996 respectively. They have reasonable years of experience and hence can be sited as examples.

As far as separate treatment of biodegradable waste is concerned, out of the 16 interventions, composting is only being done in 11. Thus, this is also not a necessary condition though it provides an extra source of income and increases the financial sustainability of the project besides saving transportation cost and landfill space for municipalities. Thus, both primary segregation of waste and composting or separate treatment of biodegradable waste are neither necessary nor

sufficient conditions for sustainability of community interventions in solid waste management. However, there is no denying the importance of these conditions for long-term ecological sustainability.

Financial sustainability

This is, perhaps, the most important aspect of sustainability. It must be recalled that we are discussing only those projects, which are sustaining due to contribution from the community. This contribution is in the form of a user fee in lieu of services provided by these organisations. Our field data vindicates the assumption that if satisfactory services are provided, the community will pay for it. With 91 per cent consumers feeling comfortable in paying the user fee and 85 per cent feeling that they are being reasonably charged, it can safely be assumed that there is willingness among the community to pay for services. Some of the important issues which should be considered for attaining financial sustainability are:

- Organisations should be pragmatic in their approach over the issue of the user fee. There should be different user fee for different income categories.
- A significant section of the community (39 per cent), was either undecided or unwilling to pay more for the services. Hence, organisations should proceed cautiously and should approach the community with sufficient reasons, if there is a need to increase the user fee.
- Moreover, extra sources of revenues from the sale of compost and recyclables should also be considered. Here, the trend is mix. Some organisations have rights over recyclables and treat it as a source of revenue. Thus, NGOs like Naya Savera and Sukuki Exnora earn Rs 15,000 to 20,000 per month from the sale of recyclables and use it to pay the salary of waste collectors. On the other hand, organisations like CDC exercise no right over recyclables and waste collectors are allowed to keep the proceeds from their sale as an extra source of revenue. Similarly, Exnora Green Cross and Vikas earn about Rs 16,000 and 8,000 per month from the sale of compost. But, at other places, the income from compost sale is not that substantial. Moreover, not all organisations are able to compost biodegradable waste and hence, income from composting cannot be relied upon as a substantial means of revenue. This must be factored in while making calculations for financial sustainability of such products. The challenges associated with composting processes are many and will be dealt within a separate section.

Most consumers are willing to pay a user fee when provided with high quality services.

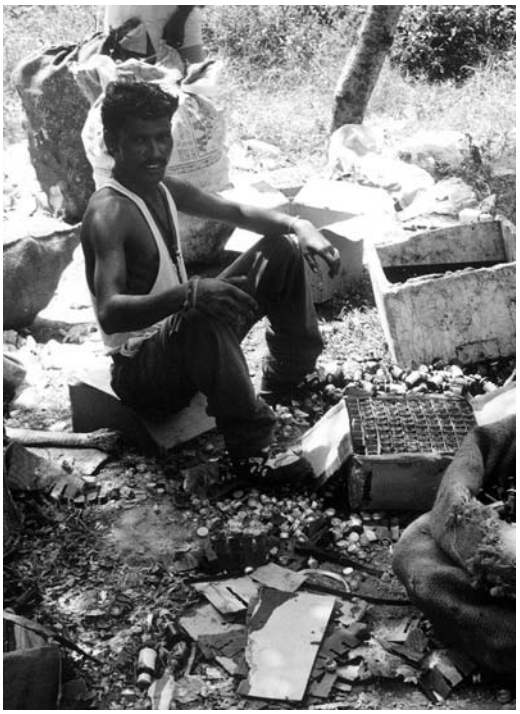
However, there is a need to explore the option of proceeds from the sale of recyclables. Mr Sarvinder Kohli of Naya Savera is of the opinion that he can recover the entire financial cost of the intervention, and can generate some profit, from the sale of recyclables. He feels that user fee will not be needed provided the community is ready to give him source segregated waste. At Lucknow, MJS does not pay any salary to its waste collectors but has given them the rights over the recyclables. According to Mr Mewa Lal of MJS, waste collectors are able to make enough money from the sale of recyclables.

The support of municipalities is crucial for various reasons: they can issue I-cards to community waste collectors which saves them from a lot of harassment; they can provide land for composting

To conclude, there is enough evidence to suggest that community interventions are financially sustainable; though the onus lies on the intervening agency to keep exploring all possible sources of revenue as per local conditions.

Income groups of service areas and kinds of services

Though not emphasised in the literature available on the subject, these two factors have emerged as key features of all these sustainable community projects.



Sale of recyclables is an important source of revenue for community-based initiatives.

Awareness generation among the community is a long-term and continuous process. The intervening agency has to be patient and innovative in its approach. Despite their best effort, community organisations have been able to achieve only 30 per cent primary segregation

On the issue of income group of service areas, middle income group habitat has come out as the common denominator in all these interventions. Of the ongoing 14 community interventions, seven are serving middle and higher income colonies. The remaining seven are serving all income areas, but they, too are primarily concentrated in middle income areas.

What are the main reasons behind this concentration of community interventions in middle income colonies? Though, we had not included this question in our questionnaires, a perusal of the field documents and responses throws some light on this issue. Higher income areas are generally well served by municipal authorities; in some cases even over served, as we have seen in the case of SMS. In case of low income areas, there are different basic needs on the priority list of people and hence, it is very difficult to motivate them to pay for the services. On the other hand, middle-income colonies are able to fulfill the criterion of the law of supply and demand. Here, there is a demand for these kinds of services but there is lack of requisite supply by the municipality. Hence, CBOs/ NGOs find it appropriate to run their operations in middle income colonies.

Here, it needs to be mentioned that it is not necessary that these interventions are likely to be sustainable only in middle income colonies. Many of these interventions are running in all kinds of income colonies. But, certainly, middle income colonies are the common denominator across all the interventions. Hence, definitely, chances of these interventions being sustainable in the middle income category do appear greater.

In the case of intervening organisations providing kinds of services, the study points out that, ideally, there should be an integration of all the services related with solid waste management. In other words, the intervention itself should be providing services like DTDC of waste, road sweeping, drainage cleaning, tree pruning, etc, or there should be perfect synchronisation among different service providers. This improves the public visibility of the serviced areas and keeps residents motivated to continue participating in the intervention. For example, in Mumbai, some ALMS like Diamond Garden have taken upon themselves to arrange for DTDC of waste, drainage cleaning, tree pruning, etc. This has improved the looks of the colony and residents appeared more convinced about the utility of the interventions. On the other hand, at CEE's intervention in Bangalore, RWA members responsible for management of the intervention explicitly highlighted the point that due to unsatisfactory performance of municipality in its other civic responsibilities like road sweeping and drainage cleaning, the intervention had failed to make optimum impact. Similarly, Mr Bisht of Pramukh said that they become helpless when there was a strike by municipal staff. They are therefore considering the purchase of a vehicle to transport the collected waste up to a landfill site. At present, the Pramukh waste collectors dump the collected household waste in municipal containers of the area from where it is transported to the landfill by municipal vehicles. Thus, a perfect synchronisation and an integration of all the solid waste services should be emphasised upon, in order to make the intervention sustainable.

Institutional linkages

Any community intervention involves various stake holders. It is therefore necessary to have

some sort of formal or informal arrangement which brings them together in order to allocate responsibilities and make them aware about each other's responsibilities and difficulties involved in their performance. But, in order to make these interventions sustainable, the study finds that the two most important stakeholders that need to be involved are the local political leadership and the concerned municipality.

The political structure

The local political structure is very crucial for the sustainability of these community interventions; though, there is no consensus among community leaders about the local leadership being involved in these interventions. However, field experiences clearly point out that the support of local political leadership is very critical. A community intervention at Vellore had to be abandoned because the local council withdrew the land given to the intervention. Similarly, at Lucknow, MJS had to face a lot of opposition from the local political leadership. The majority of MJS waste collectors are Bangladeshi immigrants and the local political leadership considered them as potential threat to national security. At Chennai, it is said that the present government has deliberately contracted its municipal services to Onyx (a private operator) in areas where Exnora was already working, because Exnora was considered close to one political party. This has been a setback because Exnora had succeeded in making people do source segregation. But, with Onyx working in collection and disposal mode, people have again relapsed to their old habits. These field evidences show that local political leadership has a lot of potential to create trouble for these kinds of community interventions. Whether their active support is needed to run these interventions may be a subject of discussion, but their opposition is definitely troublesome for these interventions. Hence, in order to make any community intervention sustainable, it is necessary that local political leadership should be kept in good faith as per the prevailing political realities.

The municipal linkage

Last but not the least, is the issue of linkage with the municipality of the area. The support of municipalities is crucial for various reasons: they can issue identity cards to community waste collectors which saves them from a lot of harassments; they can provide land for composting; they can help by performing their services like regular road sweeping, drainage cleaning and cleaning local dhalaos (containers) regularly. The repercussions of unsatisfactory performance of these services for sustainability of a community intervention have been discussed in the preceding section. However, there are many other ways by which municipality can affect the sustainability of these interventions. For example, at Bangalore, the BMC has started DTDC of waste free of cost. They plan to levy solid waste cess in the coming months. But, this has started affecting the community intervention in HRBR locality, being run with the help of CEE. Residents were increasingly becoming reluctant to pay for the services citing the example of BMC which was providing these services free of cost. The community was unaware of BMC's plans to levy a cess in the near future. Had there been an institutional relationship between BMC and CEE, this problem could have been avoided.

Thus, sustainability of community intervention demands that there should be some sort of forward-backward linkages among the CBO/NGO, municipality and local political leadership.

Creating linkages with local political leaders and members of the community can be critical to the success of a community initiative.

The unsatisfactory performance of municipal staff has the potential to create challenges even for institutionally linked community interventions

Key challenges in upscaling and sustainability of community interventions

As community interventions in solid waste management involve many stakeholders, any initiative to upscale and make these interventions sustainable will have to grapple with numerous challenges and at different levels. Moreover, there are different kinds of challenges involved in upscaling and sustaining these interventions, though, they are not completely de-linked. Furthermore, these interventions, essentially being decentralised in nature, involve different kinds of challenges at different places. Still, there are some common challenges that can be identified in the up scaling and sustainability of these interventions. Situation specific responses are needed to overcome these challenges.

Sustainability of these interventions precedes their upscaling as it becomes a contributing factor in their upscaling. A sustainable intervention becomes a demonstrable model for replication at different places. Hence, let us first discuss the challenges involved in the sustainability of these interventions.

The present study has already discussed the necessary conditions needed to make these interventions sustainable. But, these recommendations are based on a minimalist approach and have identified only basic conditions needed for the sustainability of such kinds of projects. But, there are many other problems that pose challenges to the sustainability of these interventions, howsoever indirect they may be. In fact, in some cases, they might not appear as a challenge for the sustainability of these interventions, but they have the potential to affect their sustainability: for example, the problem of non-participating households in an ongoing intervention. It is true that some of these interventions are able to sustain just on the basis of user fee collected from the participating households and may not be feeling directly affected by non-participating households. These non-participating households place several constraints on these interventions. For instance, these households have their own servants or housemaids who dump the garbage as per their own convenience. This affects the visibility of the area, which has the potential to act as a de-motivator for participating households. The non-participating individuals might produce a demonstrator effect and motivate a dissatisfied but participating household to opt out of the intervention. This, in turn, might trigger a larger demonstration effect which can affect the sustainability of such interventions. Thus, there are many challenges, direct as well as indirect, which have a bearing on the sustainability of these interventions. The present research work has attempted to identify these challenges as per the stakeholders approach.

Community ownership

The sustainability of community interventions not only involves community participation but community ownership as well. In other words, a community intervention has to be owned by the community itself in order to be sustainable. An NGO or CBO can be a facilitating agency at best. Ultimately, the project has to be owned and run by the community itself; though there might be a need for occasional external intervention. What are the challenges involved in the community participation? As per the findings of the documentation process, some of the main challenges involved in community participation are :

Awareness generation

The study has found that awareness generation among the community is a long term and continuous process. The intervening agency has to be patient and innovative in its approach. This is evident from the field study. Despite their best effort, community organisations have been able to achieve only 30 per cent primary segregation (this data is based on the combined analysis of all the interventions and there are variations across them).

RWAs – more questions than answers

The issue of ownership of these community interventions remain ambiguous. Any organisation, from within the community has to assume ownership if it is not contracted out to a service providing agency. In India, these organisations have come to be known by different names like

An intervention cannot be sustainable unless it involves and ensures the participation of the community.

RWAs, ALMs, etc. But, what is the locus standi of these community organisations? Despite their being instrumental in facilitating community participation and serving as the prime nodal agency for the community's interface with the outside world, their status is undefined. In fact, these organisations do not have much legal sanctity. Thus, they cannot take action against non-participating members. Yet, RWAs are being promoted as a legitimate interface agency between the community and the outside world by several governments. For example, all Bhagidari programmes in Delhi acknowledge RWAs as legitimate stakeholders. Moreover, there is a trend to allocate more roles to these RWAs.

Apart from the ambiguity over the status of RWAs/CBOs even the smooth functioning of RWAs pose many challenges for community interventions. RWAs hold elections for their office bearers and many times different individuals return as office bearers. Besides creating a problem of continuity this poses several other challenges. If new members are elected, they have to briefed and sensitised about the ongoing intervention. New members might have different ideas and solutions about some of the problems and this may break the continuity of the intervention. Also, the election process can create a sense of bitterness among defeated candidates who can create problems in the functioning of the newly elected RWAs. This could affect the continuity of the ongoing intervention.

Municipality – a passive and reluctant partner

The centrality of the municipality in any solid waste intervention, whether community-based or otherwise, can hardly be over-emphasised. And, hence, its roles and their performances have inherent potential to pose various challenges for the sustainability and upscalability of community interventions.

Municipalities' policy of benign neglect towards decentralised community interventions in itself is a critical kind of challenge for the upscalability and sustainability of these interventions. The basic means being adopted by the municipalities is to privatise solid waste services and to opt for centralised and mechanised compost plants, especially by the larger municipalities. For instance, Excel Industries has signed contracts with 54 municipalities across the country to help them establish centralised and mechanised compost plants. The co-operation of NGOs/CBOs is being used to create awareness among community regarding waste management and related issues only and that too by few municipalities

only. At many places, like Ranchi and Dehradun, NBJK and Pramukh have the permission to dump the collected household waste in nearby municipal bins. From there, these waste are transported in municipal vehicles up to the designated municipal landfill/dumping sites. Moreover, at these two places, municipalities undertake road sweeping and cleaning of drains. The decision by Dehradun Nagar Nigam staff to go on strike posed a new kind of challenge to Pramukh. At Ranchi, NBJK workers used to supervise the works of Ranchi Nagar Nigam's sweepers and drainage cleaners. To protest against this external supervision, RNN staff went on a strike and consequently, RNN asked NBJK to stop on-site supervision of its staff. Thus, the unsatisfactory performance of municipal staff has the potential to create challenges even for institutionally linked community interventions.

There is no such thing as replicability of such interventions. Every new intervention has to start afresh. Geographical locations, community composition and the income category may all be different

Besides these challenges, community interventions have to deal with many other issues that affect their smooth functioning and might have a bearing on their sustainability. At some places, community members expressed their concerns over the frequent turnover of waste collectors. According to them, it disrupts the continuity and the waste collectors have to be instructed and trained afresh regarding the residents' preferences. Some women residents said that the frequent turnover of waste collectors creates a sense of insecurity.

The Toxics Link initiative at Sarita Vihar has involved the local RWA and the MCD, New Delhi.

Challenges in upscalability

Challenges involved in upscaling of such initiatives are different from those needed to make a single initiative sustainable. However, the initiation of a sustainable prototype does help in upscaling and replication of such interventions, since these prototypes can be used to demonstrate the practicality of such kinds of interventions. Indeed, this has happened in the case of Toxics Link's intervention at Sarita Vihar, New Delhi. Toxics Link's previous experience in creating successful community interventions at Govindpuri and Sultanpuri was used time and again to demonstrate the feasibility of such projects to residents of Sarita Vihar. Hence, having established a successful model does help in replicating/sustainability of interventions. Now, some of the basic challenges involved in upscaling/ replicability of community interventions are:

- In fact, there is no such thing as replicability of such interventions. Every new intervention has to start afresh. Geographical locations, community composition and the income category may be different: though, the previous experience will definitely prove a road map to proceed farther and faster.
- A change in the intervention area within the same municipality might create different kinds of challenges. The new municipal authorities may not be receptive to such interventions. As has been pointed out, even the policy of benign neglect on the part of municipal authorities may pose different challenges.
- Different kinds of habitats require different kinds of approaches. For instance, private residential colonies, government staff quarters, educational institutions and offices have different rules and regulations governing the conduct of their inhabitants. This, in turn, engenders different kinds of awareness and behaviour patterns among people that necessitates different kinds of interventions at different places.

Waste collectors

The importance of waste collectors as one of the key stakeholders in any kind of solid waste management system cannot be underestimated. Working primarily in the informal sector, they

treat about 10 to 15 per cent of the total waste of a city.

Waste collection requires no skill or investment and entry is open for all. As a result, the urban poor take to it readily. Apart from serious occupational and safety hazards associated with the work there are different kinds of social and economic harassments that waste collectors are subjected to, especially women waste collectors.

The usual working pattern of waste collectors is more or less similar at all the interventios. They work from morning to afternoon. They collect waste from households as per fixed schedules and in the vehicles provided by the organisations. After sorting out recyclables from mixed or source segregated waste, they dump the remaining waste in municipal containers. If organic waste is being composted they look after the composting work as well. Community organisations have negotiated with municipalities to issue identity cards to these waste collectors. The issuing of identity cards or any other informal arrangement which validates the work of these waste collectors saves them from many kinds of social harassment.

There are significant and noticeable variations in working conditions of waste collectors across the community interventions. For example, organisations like MJS do not provide any salary to its waste collectors since they have the rights over the recyclables. Organisations like CDC and NBJK provide a fixed salary and also give the rights over recyclables to their waste collectors. On the other hand, SE and EGC provide a fixed monthly salary to their waste collectors but have kept the rights over recyclables to themselves. At Mumbai, SMS trains its waste collectors in composting and they work in SMS negotiated areas and composting projects. This provides them with an extra source of income.

Earning more money: one among the motivators

Earning more money is definitely a basic motivator for these waste collectors to join the intervention. However, it is not the most important motivator. There are more important factors governing the motivation of waste collectors. This

is reflected from the field data shown in the visual on the next page.

Here, 49 per cent of the waste collectors responded that they earn less money than in their previous work, or when they were working as informal waste collectors. Some of the important reasons cited by waste collectors to continue working in community interventions despite earning less were:

- **A distinct identity:** The practice of community organisations to provide uniforms to their waste collectors has helped in creation of a distinct identity of these waste collectors amongst the community. To a waste collector this recognition is of great value.
- **Assured livelihood:** Monthly salaries guarantee a constant flow of income. This security attracts waste collectors to the interventions, even if it means earning lesser than when they were working independently in the informal sector.
- **Less harassment:** The formal or informal arrangement of community interventions with concerned municipal authorities has ended the harassment of waste collectors at the hands of municipal as well as police personnel. Com-

Earning more money is definitely a basic motivation, but it is not the most important motivation, especially in the case of socially low ranking occupations. There are more important factors governing the motivation of waste collectors such as greater social acceptance

munity organisations have got municipal authorities to issue identity cards to their waste collectors. Even when there are no formal identity cards, the uniforms and separate collection vehicles with a unique identity give a sense of legitimacy to their work.

- **Greater social acceptance:** Waste collectors were of the opinion that they have greater social acceptance among the community. There is increased understanding about their work and the contributions they make in waste disposal of a city. The community no longer harbours a negative impression about them.

Was any training imparted?

Reponse	In per cent
Yes	35.5
No	63.2
Cannot Say	1.3

Are you provided with uniforms?

Response	In per cent
Yes	58.7
No	41.3

Are you provided with any kind of health care accessories?

Response	In per cent
Health accessories	11.4
Primary medical aid	24.3
Medical insurance	7.2
None of the above	57.1

Are you satisfied with the job?

Response	In per cent
Yes	85.2
No	14.8
Cannot say	0.0

Pune's KKPKP has succeeded in persuading the municipality to provide medical insurance to its waste collectors

An informal sector indeed

Despite all the efforts of community organisations to formalise the works of waste collectors, there is still a continuing degree of informality associated with their work. This is evident from the informal methods of their recruitment.

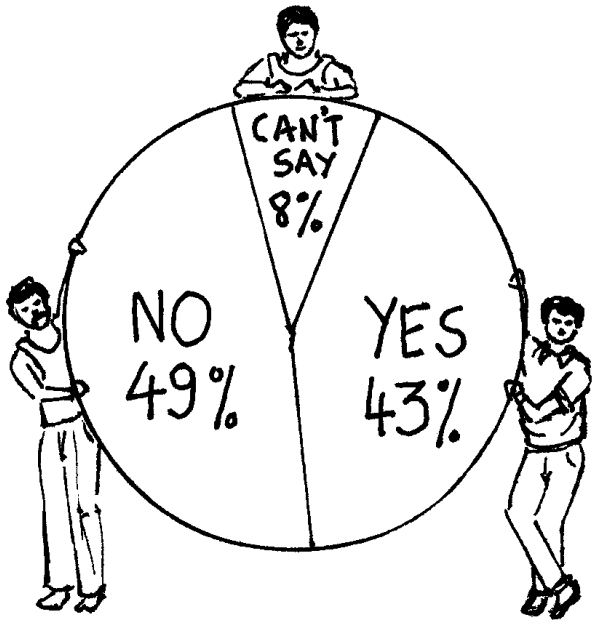
About 60 per cent of waste collectors got their present job either through their relatives and friends or by their own efforts. Only 36 per cent joined due to the efforts of the service providing organisations. The remaining 4 per cent were recruited on the recommendations of RWAs and municipal staff. Moreover, the majority of them (74 per cent) are working as waste collectors for the first time.

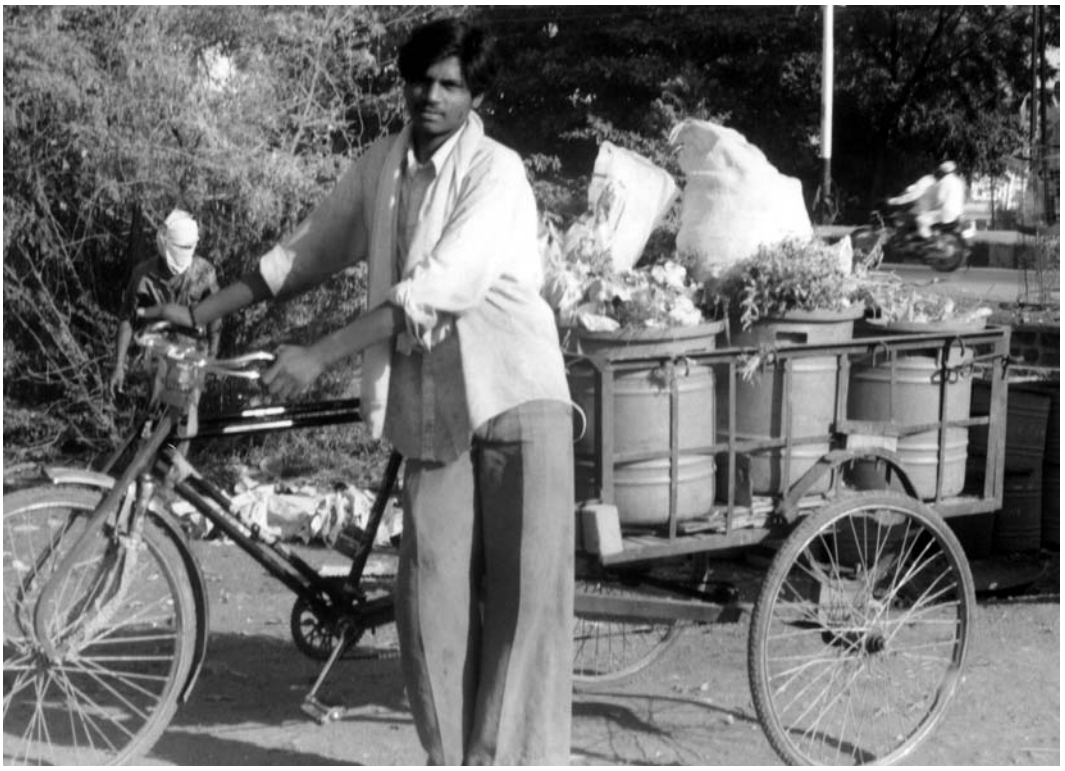
This is understandable since waste picking is a low skilled job and can be easily learned. Though community organisations do claim to train them, the survey reveals that only a small percentage of the total respondents have been given some kind of training in waste management.

But, as has been mentioned earlier, the study clearly demonstrates that, due to the efforts of these community organisations, this sector is increasingly becoming formalised. This formalisation process is evident from the following: the practice of CBOs/NGOs to provide regular salaries, the issuing of uniform and identity cards, the provisions of health related facilities, etc.

It needs to be mentioned here that, at Pune, KKPKP has succeeded in persuading the municipality to provide medical insurance to its waste collectors.

Do you earn more money?





Regular salaries, identity cards and health related facilities have improved living standards of waste collectors.

The last response of waste collectors explicitly demonstrates that, despite all the ifs and buts associated with the efforts of community organisations regarding the welfare of waste collectors, most waste collectors are satisfied with their present job. And, this has happened due to the commendable efforts of these organisations.

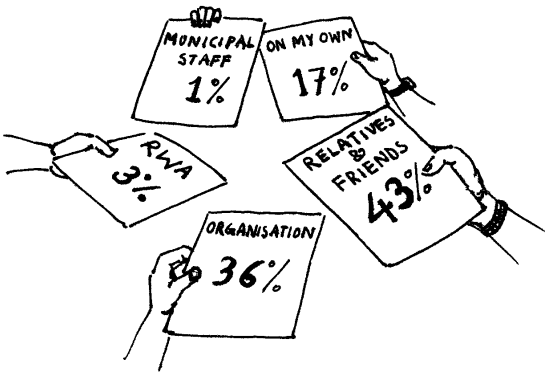
Composting: centralised vs decentralised systems

In India, the need for composting biodegradable waste is much more pronounced since it constitutes about 60 per cent of the total municipal waste. At present, there are two types of composting systems prevalent in the country. On the one hand, municipalities have established capital-intensive technology-based centralised compost plants where the mixed waste of the entire city is composted. For instance, municipal corporations of Delhi, Nasik, Jalandhar, Trivandrum, Calicut, Bhopal and Ahmedabad have established centralised and mechanised compost plants under different arrangements.

On the other hand, several communities are engaged in composting their organic waste locally by adopting indigenous and labour-intensive technologies. Here, we have examples of Exnora Green Cross (Vellore), Jana Chaithanya (Vishakapatnam) and Stree Mukti Sanghatana (Mumbai) which are involved in successful composting of the organic waste.

Now, the important question is, which of these two systems is better and should be promoted? This issue becomes more critical in the light of 54 municipality's agreement with Excel Industries to set up mechanised compost plants. To answer the question we need to do a compara-

How were you recruited?



The compost plant of Exnora Green Cross (EGC) uses indigenous technology and provides many jobs.

tive study of both the systems. First, let us study the centralised composting systems.

Centralised composting systems

First, it needs to be mentioned that any information about these mechanised compost plants was hard to get as municipal and plant authorities were reluctant to share it with the research team. The mechanised compost plants about which we could gather relevant data are: Ahmedabad, Nasik, Bhopal, Gwalior and Jalandhar.

Except the Excel plant at Ahmedabad, no other mechanised compost plant has been able to break-even, not to speak of making profits. The Nasik plant's statistics reveal that the production cost is greater than the selling cost of the compost. The sustainability of these mechanised plants will always remain in doubt

Ahmedabad: Here, Excel Industries has set up its own compost plant with an investment of about Rs 6-7 crore. The plant has been able to reach the break-even point in its four year running period.

Nasik: At Nasik, the Municipal Corporation has set up a compost plant at the cost of Rs 5 crore. Though the plant is running, its sustainability is doubtful. As per statistics, the rate of production of compost is Rs 2,500/tonne whereas it is being sold at the rate of Rs 1,700/ tonne. Owing to this fact, Leaf Biotech Private Limited, a Thane based firm which established and ran the plant for two and half years, has backed out of the contract.

Bhopal and Gwalior: In 1993, Madhya Pradesh State Agro Industries had set up two compost plants at Bhopal and Gwalior. As has been the pattern across the country, these two compost plants were set up with the technical help of Excel Industries. The compost is being sold under the brand name of 'Agrorich'. But, MPSAI had to shut down its Gwalior compost plant because it could not find a market for its compost. Till last year, the Bhopal plant was also running at a loss. But this year it is reported that it will make some profit because it has received a bulk order for 5,000 tonnes of compost from a Jaipur based firm. However, the plant has to produce and supply the compost under the brand name of Croprich Gold.

Jalandhar: Here the plant agreement was originally signed between the Jalandhar Municipality and Excel Industries. But later on Excel subcontracted it to Punjab Grow More Fertilizers Limited, Jalandhar. The brand name of the produced compost is Shakti Jaivik Khad. This plant is running at a loss because of mixed waste feed stock and a lack of market for the compost.

To sum up, except the Excel plant at Ahmedabad, no other mechanised compost plant has been able to break-even, not to speak of making profits. The Nasik plant's statistics reveal that the production cost is greater than the selling cost of the compost. The sustainability of these mechanised plants will always remain in doubt. With establishment costs of these centralised compost plants running into crores and their economic sustainability yet to be demonstrated, there is a need to re-consider the decision of municipalities to opt for centralised compost plants.

Decentralised compost systems

According to the data collected during the documentation process, 11 out of 16 community-based interventions are composting the organic waste. Out of these 16 interventions, Exnora Green Cross, Vellore, Stree Mukti Sanghatana, Mumbai, and Jana Chaithanya, Vishakapatnam, have been quite innovative in their approach. They compost a significant amount of the organic waste. For example, SMS workers compost about 20 tonnes of organic waste daily. Moreover, SMS, with the help of ALMs, has

been able to construct and run compost systems even on roadside drainages and in multi-storey apartments. SMS, by training its waste collectors in composting, has provided them with extras source of income as well. EGC has set up compost sheds in places like fish markets and other places, at temples on land allotted by the municipality or the Panchayat. Furthermore, it has involved cattle in its compost projects, since it uses their dung to expedite the process of decomposition. EGC, at its Palavansethu village intervention, has produced compost worth more than Rs 8,00,000 and has tied up with the district forest department to sell this produce.

Other community interventions have however not been successful in marketing their compost. MJS had stopped making its compost because its arrangement with the Central Government department had run into problems and it could not find an alternate market. Generally, compost produced in these interventions are sold locally to the participating residents of the intervention, and in some cases, distributed freely among them. However, since the establishment costs are low for these decentralised compost systems, they do not run the risk of running into losses.

But, there are many other challenges confronting centralised as well as decentralised compost systems.

Challenges associated with composting

Infrastructural problems

The most important infrastructure required for a composting site is land which is a high priced commodity in an urban area. Siting a compost plant at an economically viable and socially acceptable site is a key challenge. Different government agencies, which usually work at cross purposes, own tracts of urban land. It is therefore very difficult to find land for a compost plant.

Procedural and technical problems

Good quality compost can be generated only if the waste is being segregated. The problem of odour in composting is more of a maintenance problem than a procedural problem.

Quality assurance

Creating quality compost is another key challenge. The quality of compost is based on the nature of organic waste; presence of undesirables like weeds, heavy metals and other objects in it will adversely affect the quality. In the absence of source segregation of waste in India, producing good quality compost is a real challenge. Without any government guidelines or certification processes to determine the quality of compost this challenge becomes even more acute. But if one can ensure that only organic matter is being composted and no toxic material is mixed, the quality of compost will generally be good. Some of the compost plants have reported that their operation and maintenance cost goes up by 30 per cent due to mixed feed stock.

Marketing challenges

To market compost at affordable as well as an economically viable price is another challenge, which is inextricably linked with issues of quality control and government policies.

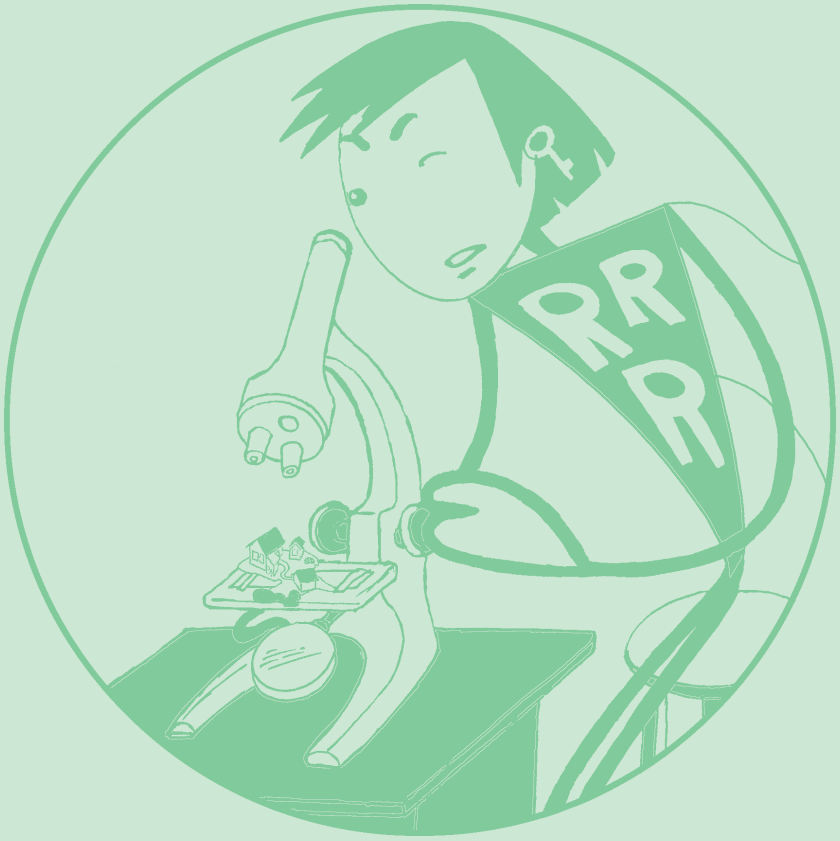
In the absence of any certification authorities, compost makers are not able to put up their case strongly before the consumers, who have more faith in scientifically certified chemical fertilisers. Moreover, these fertiliser units are provided with government subsidies which gives them an unfair advantage over compost. In order to create a level playing field, it is necessary that compost products are also provided subsidies to make them competitive. The government should also set up an exclusive agency to promote compost manure.

Fertiliser units are provided with government subsidies which gives them an unfair advantage over compost. In order to create a level playing field, it is necessary that compost products are also provided subsidies to make them competitive

SECTION 3

Upscaling people's participation in urban solid waste management

Successful community interventions



- Center for Development Communication, *Jaipur*
- Center for Environment Education, *Bangalore*
- Exnora Green Cross, *Vellore*
- Friends of the Urban Poor, *Kerala*
- Jana Chaithanya Exnora, *Vishakapatnam*
- Jan Sewa Ashram, *Solan*
- Kagad Kach Patra Kashtakari Panchayat, *Pune*
- Muskan Jyoti Samiti, *Lucknow*
- Nav Bharat Jagriti Kendra, *Ranchi*
- Naya Savera, *New Delhi*
- Pramukh, *Dehradun*
- Stree Mukti Sanghatana, *Mumbai*
- Sukuki Exnora, *Hyderabad*
- Vatavaran, *Vasant Kunj*
- Vikash, *Bhubaneshwar*
- ITC, *Bhadrachalam*
- People's Movement for Civic Action, *Panjim*

Center for Development Communication, Jaipur

Center for Development Communication (CDC) was started by a group of professionals in 1995. Initially, it focused on health issues – that of the mother, child and adolescent children. Realising that health and cleanliness are intrinsically linked, CDC started working in the area of primary collection of solid waste and it's proper disposal in Jaipur. With the support of the Mayor of Jaipur Nagar Nigam (JNN), it started a programme in a locality called Bapu Nagar serving 500 households with a population of approximately 2,500 people.

Intervention

CDC is currently working in fifteen cities which include Nanded, Nagpur, Surat, Ahmedabad, Gandhinagar, Indore, Bhopal, Agra, Aligarh, Allahabad, Kanpur, Lucknow and Mirzapur. The number of households receiving the service has shot up to approximately 7.5 lakh. The turning point for CDC was when the Nagpur Municipal Corporation, impressed by CDC's intervention in a zone of the city, requested it to increase its coverage to the entire city. CDC has been able to upscale its operations from about 10 per cent to nearly 90 per cent of the city within a span of three months.

In Nanded and Nagpur, CDC has been able to provide an integrated waste collection and disposal facility with the support of the municipal corporation. Thy have adopted door-to-door-collection of waste and are also involved in cleaning of drains and streets. The organic waste is composted.

CDC believes in a flexible approach and has developed various user-friendly models of service delivery. Depending on a city's requirements, they opt for manual or mechanised collection of waste. Where the municipality finds it difficult to provide services due to financial constraints, they involve the community. Further community participation is also encouraged in proper waste collection and disposal.

Tricycles are used to collect and transport waste.

The process

About 3,500 CDC workers are involved in the primary collection and transportation of waste. They have 2,500 tricycles at their disposal. User fee is charged in accordance with the income level and in agreement with municipal bodies. Higher and middle-income groups are charged Rs 30 per month whereas the user fee for the lower groups is Rs 15 per month. CDC in collaboration with another NGO works on the composting of the organic wastes. Rs 10-15 per day is generated by the sale of compost, mostly to farmers. Recycling is left under the care of the workers for their additional income.

For more information, please contact:
Dr Vivek Agarwal
Center for Development Communication
21, Raghu Vihar, Durgapura,
Jaipur
Phone: +91-(0)141-2760955
E-mail: cdcindia@hotmail.com

Center for Environment Education, Bangalore

The project was conceived by the Bangalore Development Authority (BDA) to integrate development and maintenance functions of any developing colony with solid waste aspects. The integrated environment plan brought together various agencies on a common platform: Tata Energy Research Institute (TERI), Mythri Sarva Sewa Samithi (MSSS), Technology Informatics Design Endeavor (TIDE) and Center for Environment Education (CEE). A report prepared by BDA, in partnership with CEE and TIDE, was presented to the the donor organisation – Norwegian Agency for Development Cooperation (NORAD).

Called the Integrated Urban Environment Improvement Programme, the project had three components to it: solid waste management, management of open spaces and geographic information system (GIS). Out of an allocation of Rs 3 crore, Rs 2.3crore was spent on the GIS plan for the identified layouts and the remaining Rs 70 lakh was spent on solid waste management and the management of open spaces.

Intervention

Solid waste management was undertaken by CEE in a phased manner at two layouts (HRBR and HBR) on a block-wise basis. An awareness campaign, consisiting of meetings and distribution of pamhplets educated people about waste segregation The layouts had a mixed occupancy of middle and higher income groups. The project started with 800 households in March 1998.

The process

Rs 15 was charged from each household as user fee for door-to-door collection of waste. The money was spent on salaries and site maintenance. About two tonnes of waste was collected per day, 70 per cent of which was compostable, while the rest was recyclable. The organic waste is composted in the land provided by BDA with technical help from the agricultural university in the city. Vermicomposting and aerobic composting are done to treat the organic waste. Roughly 250-300kg of compost is generated per month which is sold to residents and government agencies. Aerobic compost is sold at Rs5/kg while vermicompost at Rs 8/kg. Recyclables are sold by the waste collectors. Wastes that cannot be sold/recycled is handed over to the municipality.

CEE undertook rainwater harvesting for maintaining the gardens. The project has been handed over to the Waste Management Committee formed by Residents' Welfare Associations. Around 1,800 households were covered at the time of the hand over.

For more information, please contact:
George Verghese
CEE , Southern Regional Cell
"Kamala Mansion", 143, Infantry Road
Bangalore 560001
Phone: +91-(0)80-2869094, 2869907
Fax: +91-(0)80-2868209

Exnora Green Cross, Vellore

The organisation is a part of Exnora International. The solid waste management programme started on a small scale with the composting of organic waste from vegetable and fish markets. The compost was sold to generate revenue. Composting sheds were made from bamboo and coconut leaves. The expansion of the project led to building of more sheds. Slowly, the project catered to almost the entire town of Vellore. As a result, the amount of compost produced far exceeded the utilisation rate. Consequently, a project on hill restoration has been taken up where the compost is utilised for restoring the soil fertility of the surrounding hills.

There are 20 projects running all over the city which include waste management, composting, vermicomposting, cattle shed maintenance, poultry and selling recyclables for recycling. The services are aimed at all the middle and low-income households around the city. At present, the organisation is functioning at Palavamsathakuppam.

Intervention

The municipality and Village Panchayat have been extending support in terms of providing land and money for the compost sheds. At the initial stage, campaigns were held to raise awareness of waste segregation. Various meetings were conducted to garner the community's support. Initially, the programme covered 3,500 households.

The process

Waste is collected through a door-to-door-collection system. Cleaning of drains, sweeping of roads and pruning of trees is also undertaken. There are 33 workers associated with the project of which 16 are waste collectors, five are supervisors and two are senior supervisors. A user fee of Rs 15 is collected from every household. The organisation utiises 11 tricycles with a carrying capacity of 300 kg each. Rs 7,000 is earned per month from the sale of recyclables. The compost is sold primarily to the Department of Forest and the Village Panchayat. Approximately Rs16,000 is generated from the sale of compost every month.

For more information, please contact:
C. Sreenivasan
Exnora Green Cross,
1/15. Kesavapillai 1st Cross Street,
R.R. House, 1st Floor,
D.K.M.College Road,
Sainathapuram,
Vellore 632 001.
Tamil Nadu
Phone: +91-(0)416-2263500, 2266500, 2264500
E-mail: velloresrini@hotmail.com

Friends of the Urban Poor, Kerala

Friends of the Urban Poor (FUP) started working on solid waste management in Thiruvananthapuram, Kerala, since March 2003. The project is a joint venture of Kudumbashree Project and FUP. It began under the Clean Kerala programme with five wards of Thiruvanthapuram City Corporation.

Intervention

Awareness about waste segregation was created through campaigns and meetings. Five units were selected and trained by Kudumbashree (pilot project of Klean Well). Each unit comprised of 10-15 women who were below the poverty line. Sixty women were selected and trained to drive autos to collect waste. The municipality provided three tipper autos to each unit. At the initial phase, the project served only 800 households which has now gone upto nearly 2,000. The project aims to cover around 3,000 households. The capital investment required in each solid waste unit is approximately Rs 4,50,000.

The process

The women workers move from house to house or shops collecting waste in their autos. In all, 39 workers are employed for the primary collection and transportation of waste. The waste is then deposited at the municipality dumping yards. A user fee of Rs 25 is charged. The organisation has the rights over the collected garbage but, so far, no income has been generated from selling the recyclables or composting the organic waste.

For more information, please contact:
Friends of Urban Poor
Kalavihar Lane,
Kunnukuzhi P.O
Thiruvananthapuram, Kerala

Jana Chaithanya Exnora, Vishakapatnam

The Vishakapatnam municipality has, since 2001, contracted out few residential areas to an NGO, Jana Chaithanya Exnora. Jana Chaithanya works in Wards 25 and 26 and areas that fall under the Murlinagar and PMT colony. It began by servicing 600 households and today manages waste generated by approximately 7,000 households.

Intervention

The municipality has provided infrastructural assistance to Jana Chaithanya and two vermi-composting sheds and tricycles. The NGO uses 19 rickshaws to collect waste from around 1,800 families. Along with managing waste that comes from the assigned area, the NGO also manages waste from 4,600 families in the vicinity and two weekly vegetable markets.

The process

Jana Chaithanya has implemented door-to-door-collection of house waste and resource recovery through composting and recycling. Forty municipal tricycles bring waste to the compost site everyday. About 4 tonnes of organic waste is composted and half-a-tonne of recyclables are handled everyday. The project provides livelihood to at least 55 workers. The medical officer, an employee with the municipality, visits the site every morning for supervision and monitoring. He checks the daily proceedings at the site, paying particular attention to operational and maintenance problems. Jan Chaithanya also carries out street sweeping, drain cleaning besides lifting waste from two vegetable markets.

For more information, please contact:
Ashok Nanda, Secretary, or **Pallavi** (Mobile: 9437132123)
Jana Chaithanya

Jan Sewa Ashram, Solan

Jan Sewa Ashram (JSA), at Solan, is a sister organisation of JSA-Delhi. JSA is providing services at three places: Delhi, Solan and Fatehpur (Uttar Pradesh). All units are run by JSA-Delhi. JSA-Solan was established in 1996, but became operational in 1998. The purpose of the unit was to engage in decentralised waste management of the city through door-to-door-collection of waste and to produce bio-fertiliser from the organic waste by composting.

Intervention

JSA started its operation with an awareness campaign to educate the residents about segregation and its subsequent benefits to the community, rag pickers and the environment. A Committee was formed to supervise the work and motivate the residents to participate in the project. The Municipality provided land for segregation, composting and other physical infrastructure. Norwegian Agency for Development (NORAD) had provided the initial cost for setting up the compost plant. They also negotiated with the municipality for secondary transportation of waste so that the area looked clean and created the desired impact. The municipality also agreed to supply waste from other areas to the compost plant.

The process

Bins were placed at various places and waste collectors were hired to collect the waste from the households. A user fee ranging between Rs10-20 was charged depending on the income category. The project started off well but door-to-door-collection has been stopped.

The compost plants have been operational since the last seven years and are being fed with the organic waste provided by the municipality. They generate an income of Rs 2.5-3 lakh per annum. The residents, farmers and the dealers buy the compost for their purposes. The recycling plant is also running successfully. Solan municipality sees to the cleanliness and maintenance of the city.

For more information, please contact:
S.R. Dixit
Jan Sewa Ashram (Delhi)
65-E, Near Canara Bank
Munirka
New Delhi 110 048
Phone: +91-(0)11-26189137
Fax: +91-(0)11-26179721
E-mail: dixit@jansewaashram.com

Kagad Kach Patra Kashtakari Panchayat, Pune

Kagad Kach Patra Kashtakari Panchayat (KKPKP) is a 10 year old association of 4,500 waste pickers in Pune-Pimpri-Chinchwad areas of Maharashtra. One of the of aims of KKPKP is to improve the working conditions of waste pickers through their integration into systems of solid waste collection.

The organisation works closely with the municipality and resident associations. It also employs various innovative measures to sensitise residents such as door-to-door campaigns, environment fairs, rallies, street plays and radio programmes.

Intervention

KKPKP covers 40,000 households/commercial establishments. Though source segregation has been promoted since 1990, the door-to-door collection of waste was introduced only last year, after the MSW Rules came into force. In 1995-96 the municipality endorsed the identity cards of association members authorising them to collect scrap. Cleaning of stairs is also done on a need basis.

The process

Four hundred waste pickers are engaged in primary waste collection, segregation and transfer of organic garbage to the vermicompost pit or municipal container. The residents pay a user fee of Rs10-50 per month to the waste pickers, depending on their income level. The income generated from selling scrap comes to Rs 300 per waste picker in high-income areas.

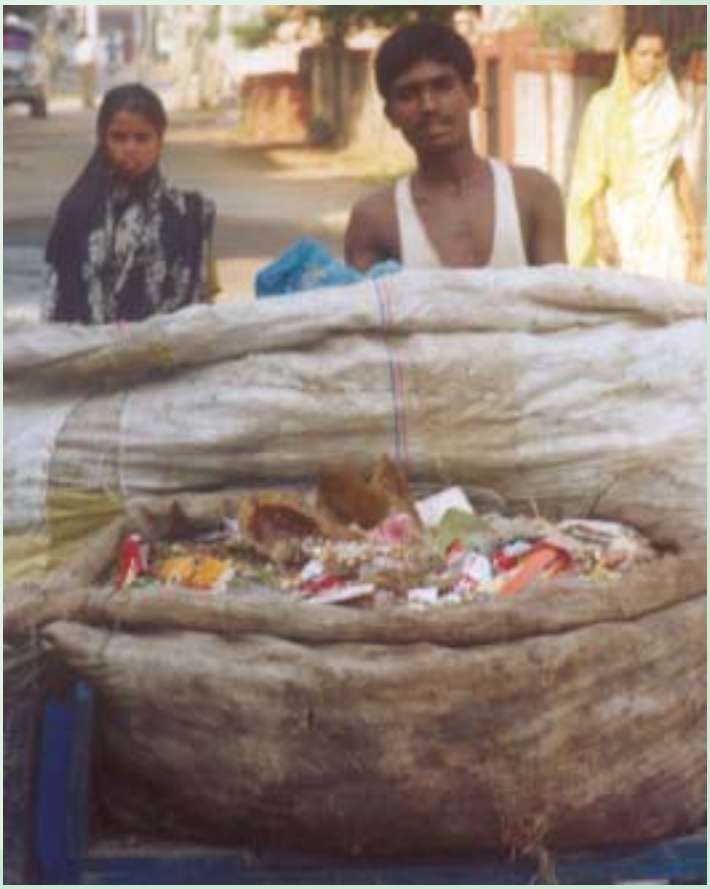
For more information, please contact:
Ms Laxminarayan, or **Dr Purnima Chikermane**
Kagad Kach Patra Kashtakari Panchayat (KKPKP)
89, New Timber Market
Bhawani Peth
Pune 411 042
E-mail: kkpkp1993@vsnl.net

Top: Waste pickers sort and sell the recyclables to enhance their income.
Above: Blue and green bins are used by residents to segregate waste.

Muskan Jyoti Samiti, Lucknow

Muskan Jyoti Samiti(MJS)was formed on October 2, 1994, with a seed capital of Rs 25,000. Mewalal, the founder member, has been a school teacher and secretary of the Labourer's Cooperative Society, Lucknow. Moved by the plight of private sweepers and waste collectors, he decided to do something for the them. He realised that organised waste collection could improve the working conditions of rag pickers and contribute towards better management of the city's waste.

To begin with, 150 households of Sector 16, Indra Nagar were covered by MJS. The services offered were daily collection of waste from door-to-door and sweeping of roads, twice a week. In the first year, MJS suffered a loss of Rs 17,000. However, the situation improved as MJS was provided with few rickshaw trolleys and two autos by the Collector.



Waste pickers collect the waste from households and segregate it on the rickshaw itself, for which they carry two separate bags.

Intervention

MJS has received the support of State Land Development Corporation (SLDC), State Urban Development Authority (SUDA) and Lucknow District Development Authority. SLDC has allocated 65 acres of land, free of cost, for vermi-composting. SUDA has provided Rs 1,24,000 for preparation of compost beds and pits, and 100 cycle trolleys for transporting the waste. Similarly, the Lucknow District Urban Development Authority (DUDA) has provided four tractor trolleys. Interestingly, no support has ever been provided by Lucknow Nagar Nigam (LNN).

At present MJS serves upper, middle and lower income colonies. About 75,000 households of Indra Nagar, Vikas Nagar, Aliganj, Jankipuram, Triveni Nagar, and Gomti Nagar receive services from MJS. It charges different user fee in different colonies, which varies between Rs 15-30 per household per month. It has employed about 900 waste pickers for door-to-door garbage collection and sweeping of the roads.

Waste pickers have a right over the recyclables and are not paid any salary. On an average, every waste collector gets between Rs1,200-1,500 per month by selling recyclables.

The process

Waste pickers collect waste from the houses and segregate it on the rickshaw trolleys. For this, they carry two separate sacks on each rickshaw. After the collection, organic waste is put into LNN dhalaos and recyclable waste is sold in the open market. MJS used to compost the organic waste but due to the problems of mix waste and marketing, it has stopped the practice.

For more information, please contact:

Mewalal
Muskan Jyoti Samiti, 13/295 Indra Nagar
Sector 14, Rani Laxmibai School
Near Munshi Pulia, Lucknow
Phone: +91-(0)522-2711905

Nav Bharat Jagriti Kendra, Ranchi

In October 2002, NBJK launched the Clean Jharkhand Project with the help of the India Canada Environment Facility. The programme will be operational till October 2007. NBJK's model revolves around communities and municipalities. Before starting work, they conduct an awareness campaign and form a Pocket Development Committee, whose responsibility is to look after the SWM of the area. The initial infrastructural help is provided by NBJK, and later the Committee has to collect the user fee and make the programme sustainable.

The project at Ranchi will be replicated in 14 other municipal areas of the state. The objective is to make people aware about solid waste management issues and encourage their participation. This will be done through policy advocacy at the state level and by demonstrating model projects at Ranchi.

Intervention

Community participation was mobilised through various meetings and campaigns. Pamphlets were distributed and membership forms were also maintained. The project began with 150 participating households. NBJK has expanded it to cover 10 of the 37 municipal wards covering 16,000-17,000 households.

The process

Door-to-door-collection of waste is undertaken through 105 transport trolleys. A user fee is charged varying from Rs10 for low income groups to Rs100 for high income groups. Primary segregation has not yet started in these areas and the disposal of waste is being done on an ad-hoc basis. The collected waste is dumped either in municipal dhalaos or in a nearby plot of vacant land. Since mixed waste is being collected, there is no effort to compost the waste.

NBJK is also conducting workshops for the municipal staff. There is also a continuous effort to enhance the residents' participation through supervisors.

For more information, please contact:
Vishwa Ranjan
Policy and Training Officer,
Nav Bharat Jagriti Kendra (NBJK)
'Gayatri', Manda Bagicha, Harihar Singh Road
Morabadi, Ranchi 834 008
Phone/Fax: +91-(0)651-543402 (office)
E-mail: nbjkran@rediffmail.com

A community bin placed by NBJK doubles up as a display panel for relevant messages.

Naya Savera, New Delhi

Naya Savera was formed as a non-governmental organisation in 2001. The organisation was born out of the experiences of the Campus Recycling Programmeme (CRP) at the Indian Institute of Technology, New Delhi. Two hundred households were covered in the first year. To begin with, there was source segregation in half the households and marginal segregation in the rest. This positive development led to the programme being upscaled to the entire campus consisting of 1,600 households. The CRP was discontinued after three years in 2001, and Naya Savera has since been running the waste management programme at IIT, New Delhi. Naya Savera also provides solid waste management services in other places in Delhi.

Intervention

Naya Savera started with 200 households but today provides waste management services in more than 4,400 households in different parts of the city. Recycling ia an important component of its process. Almost 90 per cent of the waste is either utilised for compost or sold as recyclables.

The process

At IIT, Naya Savera carries out door-to-door collection, secondary segregation and composting. It also lifts waste from roadside bins and maintains parks. Residents are asked to deposit the food waste in the relevant bins and the inorganic waste in the recycling bin. Waste is tied in a plastic bag before putting it in the bins. Waste from the drop site is collected everyday and taken to the Collection Centre. The waste is segregated and food waste is composted, while the other waste is sorted, bagged and provided to recycle dealers.

For more information, please contact:
Sarvinder Kohli or **Ashok Aswal**
Naya Savera
25 A, Begumpur,
Malviya Nagar,
New Delhi 110 017
E-mail: naya_savera@hotmail.com

Pramukh, Dehradun

Pramukh was started in 1995 by Dr Ramprasad who is now based in USA. The organisation has been running on its own and does not receive funds from any donor agency.

The process

The organisation covers two colonies in Vasant Vihar and Defence Colony. Few schools and hostels have also approached it to manage their waste. From an initial 30-40 households, it has increased its coverage to approximately 3,500 households. Pramukh services middle and high-income groups. The residents are charged a service fee of Rs50 per household.

About 20 quintals of waste is generated every day from the areas covered by Pramukh. It owns 27 partitioned rickshaw pullers for collecting and transporting waste. The waste collectors, who are appointed on a contract basis, collect waste from the doorstep.

The organic waste is disposed into the municipal bins while the recyclables are kept by the waste collectors. Till 2000, the wet garbage was sent for composting at a site provided by the society. But composting has stopped due to scarcity of land. The organisation is however keen to start it again.

For more information, please contact:
Tikaram or **Col J. S. Mann**
Pramukh
25/1 Vasant Vihar,
Dehradun 248006.
4/1 Tek Bahadur Road
Opposite Hydel Office
Dehradun 248 001
Uttaranchal
Phone: +91-(0)135-2760455

Stree Mukti Sanghatana, Mumbai

Stree Mukti Sanghatana (SMS) is a women's organisation working in Mumbai since 1975 for the upliftment of society in general, and that of women in particular. To achieve this, SMS carries out various activities such as counselling centres, day care centres, adolescent sensitisation programmes, publication of books, magazines, audio-visual materials, etc.

In 1998 Stree Mukti Sanghatana (SMS) set up a separate cell called *Parisar Vikas* to address the problems of waste and self employed poor women, engaged in the menial tasks of cleaning up the waste.

Intervention

SMS started by initiating self-help groups of women rag pickers, providing educational opportunities to them and their children, organising health camps and crèche facilities, and counselling their families. The Municipal Corporation of Greater Mumbai (MCGM) has cooperated in this programme.

Waste collectors have been trained to collect and segregate waste. Women workers have also been trained in composting and gardening to supplement their income. They are also given lessons in leadership.

SMS was given its break in 1999 by Tata Power's residents' association. The contract included door-to-door collection of waste, disposal of dry waste, conversion of wet waste into manure and cleaning of roads.

SMS carries out similar activities now in colonies of Public Sector Units, Navy and Reserve Bank of India, among others. It also handles the waste of housing colonies of companies such as Pfizer, T.C.S. and about 80 small and big housing societies in Mumbai and Navi Mumbai. SMS was instrumental in making the IPCL township at Nagothane a zero waste township.

As an innovative programme SMS has also taken special efforts to bring the rag pickers under Swarna Jayanti Shahri Rozgaar Yojana (SJSRY) with the help of MCGM.

The segregated waste is composted in specially constructed bins that are placed at street corners or even above storm drains, as shown here.

The process

The waste is collected from house to house by waste collectors. They segregate the waste and compost the organic waste in specially constructed pits at street corners or above storm drains. *Parisar Bhaginis* – a more popular name for the women waste collectors – sell the recyclables to kabariwalas.

Besides the household waste, they also collect horticultural waste. The non-recyclables are disposed at dhalaos provided by the municipality. The waste collectors are paid Rs10 per hour. The salary therefore varies among them depending on the hours of work that they put in. Money for the payment of workers is generated from a service fee collected from the Resident Welfare Associations or the societies.

For more information, please contact:
Jyoti Mhapsekar
Stree Mukti Sanghatana
Old Municipal Dispensary
R.C. Marg, Chembur Naka
Chembur, Mumbai 400 071
Phone: +91-(0)22-25220690

Sukuki Exnora, Hyderabad

The focus of this organisation is to create zero waste residential enclaves in partnership with the municipality and residents. It is registered as an NGO and receives continuous guidance and assistance from Exnora-Chennai.

Sukuki Exnora has implemented projects in various parts of Hyderabad like Begumpet, Qutubullapur and Indira Park, among others. It also provides free consultancy services to volunteers in this field. The year-long school outreach programme on solid waste management conducted by Sukuki Exnora in Hyderabad inculcated environmental awareness amongst students. Sukuki Exnora has also advocated GIS mapping of the city and the state to facilitate overall development.

Intervention

There are altogether nine tricycles with a carrying capacity of 100 kg. The municipality has provided land for segregation and composting. A user fee is charged to the residents. The project started with 2,500-3,000 households and has grown to 13,500 households.

The process

There are 20 workers employed fro the primary collection and transportation of waste from door-to-door. Of the total waste collected, 60 per cent is compostable, 13-15 per cent recyclable and the remaining 25 per cent is non-recyclable. The organisation collects a user fee of Rs 5-20 depending upon the income group of the household. Besides this, it earns approximately Rs15,000 a month from the sale of recyclables. It also carries out composting where municipality has provided sheds or land for the purpose.

For more information, please contact:
Suresh Bhandari
Sukuki Exnora
H-N 6-3 1216/50, Flat No. F2
Nest Apartments, Methodist Colony
Begumpet, Hyderabad 500 016
Phone: +91-(0)40-33320099
E-mail: suresh@sukuki.com

Vatavaran, New Delhi

The organisation was formed in 1996 with the aim of establishing an effective solid waste management in a decentralised manner. Various campaigns were organised to raise the awareness of residents about waste segregation. The RWA provided the capital for initiating the project which started with a small number and has now reached over 30,000 households.

Intervention

Waste is collected through a door-to-door-collection system. The service area includes both middle and high-income households. To begin with, the service was provided to 200 households, which has increased to 750 households. The RWA has managed to have the Delhi Development Authority allocate land for waste segregation and composting. The RWA provides rickshaws, brooms and uniforms to the workers. The participation of residents is enhanced through meetings during festivals.

The process

There are 15 workers who collect waste from door-to-door and transport it on their rickshaws. They also undertake regular sweeping and cleaning of staircases and drains. Approximately 300 kg of waste is collected daily, of which 66 per cent is compostable, 30 per cent recyclable and 3.3 per cent non-recyclable. A user fee of Rs 45-50 is charged to the service recipients. An income of Rs 5,000 per annum is generated from composting while recycling helps in generating Rs 2,000 per month.

For more information, please contact:
Vatavaran
540, Hawa Singh Block
Asian Games Village,
New Delhi 110 049
Phone: +91-(0)11-26493881

Top: Approximately 300 kg of waste is collected on a daily basis.
Above: Recycling is an important source of revenue for the intervention.

Vikash, Bhubaneshwar

Vikash is registered as an NGO working on various issues of sustainable development. It has implemented a pilot project on solid waste management in Bhubaneswar, Orissa, with assistance from NORAD. The experience and expertise gained from the project has inspired other organisations to take up large scale management of solid waste in different urban areas. Vikash specialises in establishing low-cost scientific sustainable waste management systems in urban areas.

Intervention

According to Vikash, a lack of awareness in the urban populatoin is the main reason for the improper management of solid waste. It has therefore resorted to innovative awareness programmes that include door-to-door campaigns, elocution and art competitions, youth jamborees, women's meetings and rallies. During the process, Vikash has also institutionalised its experience and expertise in solid waste management through an independent organisation called Green Circle. The successful implementation of the pilot project utilising low-cost technologies inspired Green Circle to take up large-scale management of solid waste in different urban areas in collaboration with urban local bodies.

A rickshaw trolley of the Green Cirlce with separate compartments.

The process

A community group has been established for every 100-150 households in a locality. Each group is provided with a rickshaw trolley to collect the garbage every morning. Each household contributes a nominal amount as service charges. Some community leaders are involved in this process and take the responsibility for the smooth management of the system.

The urban local bodies also helps by subsidising the service cost of the daily garbage collection. The process of Solid Waste Management includes primary collection at source, transportation, disposal, segregation of non-degradable wastes and debris management. The organic waste is composted and sold on demand.

For more information, please contact:
Vikash
D-2/7Industrial Estate, Rasulgarh
Bhubaneshwar 751 010
Orissa, India
Phone: +91-(0)674-2582006/2581587
Fax: +91-(0)674-2581426
E-mail: vikashbbsr@hotmail.com

ITC, Bhadrachalam

Indian Tobacco Corporation (ITC) Limited initiated a unique initiative at the residential premises of its paper factory in Bhadrachalam, Andhra Pradesh. As part of its environmental initiative, ITC decided to achieve zero waste at the premises. They invited tenders for waste management from organisations that had a proven track record of achieving zero waste, composting and recycling.

The ITC effort, apart from being a good example of corporate concern for the environment, also makes a lot of business sense. Land, which was earlier a dumpsite, is now available for use.

Intervention

At the Bhadrachalam factory, ITC was dumping 2.3 tonnes of waste every month within the factory premises. Concerned by the piling up of waste, it invited tenders for managing its waste. Today, more than 95 per cent of the waste is being utilised, making the dumpsite redundant.

The ITC SWM initiative was backed by extensive public education programme aimed at the residents of the campus.

The process

Initiated in 2000 in collaboration with Sukuki-Exnora, the project promotes segregation of garbage at source. Each household is given one dustbin having three compartments, one meant for dry waste, one for wet waste and one for hazardous waste (including dry cells, fused bulbs, etc).

This segregated waste is collected by a team of six 'street beautifiers' who are paid by ITC. The team collects the garbage and takes it to the Zero Waste Management Centre. At the Centre, a segregation team, comprising of two employees, meticulously segregates the waste. The wet garbage is vermi-composted and the manure is used for maintaining parks and gardens. The recyclables are sold and generate an income of about Rs 6,000/month. The hazardous waste is buried in a concrete pit.

The professional approach of the Zero Waste Management initiative at ITC is evident from these well demarcated areas for plastic and glass waste at the Zero Waste Management Centre.

People's Movement for Civic Action, Panjim

Troubled by the negative impact of solid municipal waste on tourism, People's Movement for Civic Action (PMCA), a Panjim based NGO, decided to launch a campaign to clean up the city. The campaign focussed on plastic bags and PET bottles which were littered indiscriminately.

As a result of the successful campaign, which saw the Panjim municipality joining hands with PMCA, Panjim claims to be the only city to have achieved 100 per cent collection of waste.

The project was launched on December 1, 2001 in a few areas. Later, Sanjit Rodrigues, the present Commissioner widened the coverage by extending the project Ward-wise. By December 2003, the project covered the entire city of Panjim, thereby meeting the deadline put forth for implementation of MSW Rules 2000.

A variety of methods were used to disseminate information and raise awareness about the project. Professionals such as architects and interior designers were also consulted for ideas to make the project a success.

Intervention

PMCA is well supported by Panjim Municipality in it's awareness campaigns. But it is the municipality which is engaged in the door-to-door collection and composting of organic waste. Initially the project served only a small population (70 households) but today, the service caters to all households in Panjim. PMCA monitors the municipality's work as part of the arrangement. The project involved companies such as Coke, Pepsi and Bisleri for handling the PET waste. Five PET bottle collection centres were set up. Twelve tricycles were earmarked to carry the PET bottles from around the city to these centres. The bottles are sold at the rate of 30 paise and 15 paise depending on their size.

The process

There is a door-to-door waste collection system. The waste is transferred to municipal bins, from where it is taken to the dumpsite. At the dumpsite waste pickers recover the recyclables.

For more information, please contact:
People's Movement for Civil Action
E-74, Campal, Panjim
Goa 403 001.
E-mail: hydrote@sancharnet.in

A PET Waste Collection Centre.

SECTION 4

Municipality and SWM

- Significant provisions of MSW Rules
- Analysis of municipalities
- Processing of waste
- Municipal case studies

Municipality and solid waste management

Municipalities have solid waste management (SWM) as one of the most important functions required by the law. They are constitutionally obliged to manage the waste of cities. As outlined in the research framework, it is the most important stakeholder in any waste-related community intervention. Therefore, wherever municipalities took the initiative for SWM, their work has also been documented as per the research objectives. The logic guiding the preparation of the questionnaire to assess the status of implementation of MSW Rules, and barriers/incentives being provided by municipalities for community interventions, have already been discussed.

The municipality shall ensure community participation in waste segregation. This has to be done in a phased manner by organising awareness generation programmes for communities. The awareness generation programmes should involve local RWAs and NGOs

As per the MSW Rules, 2000, every municipality is bound to have started door-to-door community collection from January 1, 2004. The phase-wise implementation schedule for the MSW Rules, 2000, is shown in the table below.

Significant provisions of MSW Rules

Before proceeding further, it would be appropriate to discuss significant provisions of these rules since they structure the policy environment in which municipalities as well as community interventions have to operate.

Phase-wise implementetion schedule for MSW Rules, 2000

S. No.	Compliance Criteria	Schedule
1.	Setting up waste processing and disposal facilities	By 31.12.2003 or earlier
2.	Monitoring performance of waste processing and disposal facilities	Once in six month
3.	Improvement of existing landfill sites as per provisions of the rules	By 31.12.2001 or earlier
4.	Identification of landfill sites for future use and making site(s) ready for operation	By 31.12.2002 or earlier

Source: MSW Rules, 2000

- Littering of municipal solid waste shall be prohibited in cities.
- Municipality shall organise house-to-house collection of municipal solid waste. It is free to adopt any method like community bin collection, house-to-house collection, etc for this purpose.
- City waste has been divided into following categories: household waste, waste from commercial complexes, bio-medical and industrial waste, horticulture and construction waste. All these wastes shall be collected and treated separately.
- Waste (garbage, dry leaves) shall not be burnt.

The municipality shall ensure community participation in waste segregation. This has to be done in a phased manner by organising awareness generation programmes for communities. The awareness generation programmes should involve local RWAs and NGOs.

Municipality shall ensure the storage of wastes in hygienic and sanitary conditions.

Municipality shall ensure that waste shall be transported in covered vehicles.

The biodegradable waste shall be processed by any appropriate biological processing such as composting, vermi-composting, anaerobic digestion, etc. Incineration, with or without energy recovery, and including pelletisation can also be used for processing waste in specific cases. For this, the municipal authority shall have to take necessary clearance from the Central Pollution Control Board. Mixed waste, containing recoverable resources, shall follow the route of recycling.

Rules make it very clear that land filling municipal waste should be the last option. First, biodegradable waste should be treated separately. Then, recyclables should be sorted out separately. Finally, only inerts, non-biodegradable and non-recyclable wastes shall be dumped into scientifically prepared sanitary landfills.

These rules make it amply clear that, from January 1, 2004, municipalities have to give due importance to their solid waste management obligations and will have to start afresh and in a scientific and participatory manner. To develop institutional capacity and to put the necessary infrastructure and other paraphernalia in place, municipalities had been given a three-year preparation period. Moreover, what is significant about these rules is that for the first time municipalities have been legally mandated to involve RWAs and NGOs to ensure community participation for waste segregation and by extension in waste management of cities.

Before discussing the assessments regarding preparedness of municipalities to implement these rules, we need to highlight some of the most important lacunas inherent in these rules. For, only then will one be able to identify the gaps between the ideal and actual external environments in which community interventions have to operate. Moreover, these will help us in identifying some inherent environmental/policy bottlenecks that a CBO/NGO has to factor in before initiating its intervention. Of course, these rules have more direct bearings on the ways municipalities will have to function once they come into force. Some of the most basic and important shortcomings of these rules are as follows:

- First, what is the legal sanctity behind non-enforcement of these rules? In other words, who will be held responsible for non-enforcement of these rules and what remedial actions will be taken?
- The proper implementation of these rules will put significant financial burden on already resource-crunched municipalities. How are these extra funds going to be mobilised?
- Incineration has been mentioned as an alternative to treating mixed waste even though its shortcomings, as well as its infamous failures in the Indian context, are well known.
- There are no provisions to incorporate waste collectors into the mainstream though their contributions are acknowledged by everybody.
- On the issue of community participation the Rules have given clear precedence to municipalities over CBOs/NGOs. Here, it is important to note that communities and CBOs/NGOs have been treated as passive players. It is up to the municipality to decide whether to involve CBOs/NGOs in ensuring community participation or not. What will happen if a CBO/NGO approaches a municipality to offer its services? Is the municipality obliged to incorporate it into the system?

There are no provisions in the MSW Rules to incorporate waste collectors into the mainstream, even though they make an important contribution to the waste collection system.

Most municipalities reported that there has been no internal capacity building or training undertaken to develop requisite skills to implement these rules.

During the documentation process, we visited 32 cities and have prepared a status report on the implementation of the MSW Rules by concerned municipalities. The documented municipalities are: Lucknow, Jaipur, Solan, Bangalore, Vellore, Chennai, Pune, Nanded, Mumbai, Panjim, Suryapet, Vishakapatnam, Hyderabad, Kalyani, Bhadreshwar, Kancharapara, Nasik, Ranchi, Thiruvanantpuram, Calicut, Surat, Ahmedabad, Bhubaneshwar, Cuttack, Chandigarh, Ludhiana, Jalandhar, Amritsar, Bhopal, and Indore, Calicut and Delhi.

Analysis of municipalities

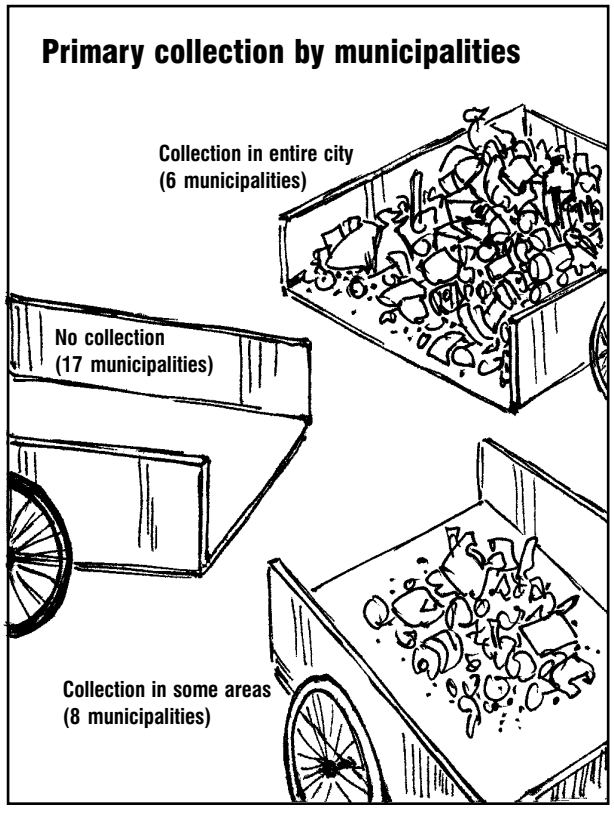
As per the prescribed timeline, the MSW Rules, 2000 were to be implemented in letter and spirit

from January 1, 2004. These rules were expected to create a sense of urgency among the municipalities regarding urban solid waste. Have municipalities, after being provided with a three-year grace period to put in place the necessary system, started implementing these rules from January 1, 2004? Has SWM gained in position on the agenda sheet of municipalities?

The survey reveals that SWM is still a low priority for municipalities. This is evident from the following:

- There have not been any departmental restructuring to streamline solid waste management functions. Most municipalities reported that there has been no internal capacity building or training undertaken to develop requisite skills to implement these rules.
- Even the responsibilities for solid waste functions vary from place to place. At some places (for example, Bangalore) it is the Health Commissioner who holds the ultimate responsibility for these functions while at other places (for example, Mumbai) it is the Chief Civil Engineer who is responsible for SWM. It appears, from general discussion with municipal officials and lower level staff, that there is no clear-cut division of roles and responsibilities allocated to carry out these functions.
- Despite the best efforts, it was difficult to get separate specific budgetary allocations for SWM. It seems that there is no provision to have separate budgetary allocations to perform solid waste functions. Moreover, even if there are specific funds allocated for this, they remain unspent. For example, municipalities in Jharkhand could not spend a fund of Rs 8 crore specifically allocated for SWM services in the state.
- There is a prevalent belief among municipalities that the deadline for implementation of these rules will be extended. Hence, there appeared a lack of urgency in their implementation. Moreover, some municipal officials of small cities argued that when large metropolitan cities were unable to implement these rules within the given time frame, they could not be expected to meet the deadlines.

Municipalities in Jharkhand could not spend a fund of Rs 8 crore allocated for SWM services in the state



Status of implementation of MSW Rules: Despite all their obvious limitations, the MSW Rules are quite comprehensive. Their implementation demands activities at various levels. For example, municipalities have to collect source-segregated waste from households, have to develop partnerships with CBOs/NGOs to motivate communities to do source segregation, have to process biodegradable waste separately, etc. All these provisions, in order to be accomplished ideally and in their totality, require simultaneous and different types of activities from the municipalities.

These activities can be logically arranged in a sequential order though their sequencing is a subjective matter. For example, some people might prefer to first motivate the community to inculcate the habit of source segregation of waste and then make arrangements for processing of segregated waste: as is the case in Delhi. Here, the MCD has started motivating people to practice source segregation on a pilot basis. On the other hand, the Nasik Muncipal Corporation has first started composting municipal waste, though of the mixed nature, and has then started an awareness campaign to motivate residents to do primary segregation. Based on their different assumptions of different ways of implementing these rules and varying sense of urgency and sincerity regarding implementation of these rules,

municipalities are at different stages of implementation. So, we have to go into all these nuances to assess the implementation status of various municipalities.

House-to-house collection of waste: Out of 32 municipalities surveyed so far, 14 have initiated household collection of waste though not at the entire city level. Again it needs to be mentioned that these municipalities are at different stages of primary collection of waste.

Suryapet, Nasik, Panjim, Kanchapara, Bhadreshwar and Kalyani municipal authorities have initiated household collection of waste in the entire municipal area. Suryapet, Nasik, Panjim have reported more than 90 per cent DTDC. On the other hand, municipalities like Mumbai, Delhi, Chennai, Bangalore, Nanded and Indore have started household collections in some parts. Rest are yet to start any kind of primary collection of waste. Moreover, the means and modes of this primary collection are different at different places. At some places, like Suryapet and Indore, municipalities themselves are doing the primary collection. At places like Nasik, Surat, and Delhi primary collection has been contracted out to private operators.

MSW Rules provide municipalities a broad guideline on managing solid waste of cities. But within the ambit of these rules there is sufficient degree of flexibility available to municipalities to opt out for localised solutions. For example, it is open for municipalities to decide how to arrange for primary collection of waste. It is up to the municipalities to collect the entire waste of the city by themselves or to contract it out to a private agency. Similarly, in the case of treatment of biodegradable waste, they can opt for aerobic composting, vermi-composting, biomethanation or waste-to-energy plants. Thus, the MSW Rules provide enough scope for municipalities to adopt decentralised approaches to implement various provisions of these rules.

What are the solutions being considered and adopted by different municipalities? Municipalities, in order to implement MSW Rules, 2000, are adopting the following approaches:

Workers of CDC, a Jaipur-based NGO, at Nanded.

- **Municipalities on their own:** Some of the municipalities have decided to implement these provisions on their own. For example, Suryapet, Panjim, and Kacharapara municipalities are doing primary collection and disposal of waste all by themselves. Some municipalities are seeking the help of some NGOs/CBOs for awareness generation and mobilisation of communities. Thus, Suryapet took help from an NGO and Panjim has been working along with PMCA.
- **Privatisation:** Some municipalities have opted to contract out collection, transportation and disposal of solid waste to NGOs/ private agencies. For instance, Nanded Municipal Corporation has contracted out a portion of its collection, transportation and disposal responsibilities to CDC, a Jaipur based NGO. On the other hand, municipalities like New Delhi, Surat and Nasik have contracted out these services to private operators.

Processing of waste

Municipalities adopt a mix of centralised and decentralised approaches for processing of the collected waste. Some of the approaches are:

- **Composting:** Various methods of composting are being adopted by municipalities to compost the biodegradable waste. Municipalities like Nasik, Ahmedabad, New Delhi, Mumbai, Bhopal, Kolkata, Gwalior,

Jalandhar, Trivendrum and Calicut are already composting mixed waste or have plans to do so in the near future. Moreover, corporations like those of Nasik and Bhopal have established their own compost plants while corporations in Ahmedabad and Jalandhar have signed agreements with private agencies for composting the biodegradable waste.

- **Waste-to-energy plants:** Municipal Corporations like Mumbai, New Delhi, Surat, Lucknow and Jalandhar have decided to set up waste-to-energy or bio-methanation plants to process the municipal wastes.

Privatisation of solid waste services by municipalities needs a closer examination. This involves several issues: livelihoods of waste collectors, 3R principles of waste management, cost-efficiency of services, and other issues which have a critical bearing on sustainability of these services as well as the environment.

The practice of making payments on the basis of the amount of waste collected/ haulage creates a systemic inbuilt bias in favour of more waste creation

In order to critically examine the privatisation issue, let us first look at some of the significant privatisation efforts:

Nanded: In Nanded, the Corporation has signed an MOU with CDC for collection, segregation and transportation of some portion of solid waste of the city. Under the agreement, the municipality will pay a sum of Rs 476 per house per annum to CDC in lieu of collection and transportation of solid wastes from households. The Corporation plans to levy a solid waste tax to recover this cost. This contract is renewed every year after a performance review of the services of CDC. For this, a complaint book is maintained, which needs to be filled up by residents every month and this will, in turn, be reviewed by municipal officials.

Nasik: Here, the collection and transportation of the entire city's waste has been leased out to a single private operator – Adarsh Ghanta Gadi Prakalp. Nasik Municipal Corporation pays Rs 475 for every tonne of garbage collected and transported to the landfill site. The contract is to be renewed every year subject to a performance review.

Surat: The Surat Municipal Corporation has contracted out its DTDC responsibility of waste to three private operators, namely: CDC from Jaipur, Jigar Transport from Surat and Global Waste Management Cell (GWMC) from Mumbai. Each contractor is to be paid Rs 645 per tonne for the garbage collected from the household and transported up to the transfer station. A different contract had been signed for the transportation of waste from the transfer station to the landfill site at Khajod. In this case, the contractor is paid at a rate of Rs 7.71/km/ tonne of waste transported. In case of DTDC of municipal waste the contract has been given for seven years but there will be a continuous monitoring of the performance of private operators by municipal officials.

New Delhi: As per the terms of privatisation, a constortium of three companies – Subhash Projects Marketing Limited, Dooars Transport and Tetratech India Limited – would be responsible for collection, segregation, storage and transportation of the waste in the city, central and south zones, respectively. These companies will be paid on the basis of the quantity of garbage collected and transported to the designated sanitary landfills. At present, MCD will pay Rs 600 per metric tonne of garbage transported to the landfill site. A third party will monitor the working of these companies and verify the expenditure, then MCD will pay these companies.

Are these privatisation processes leading to sustainable waste management systems? A closer examination of these privatisation processes raises several critical questions:

- The practice of making payments on the basis of the amount of waste collected/haulage creates a systemic inbuilt bias in favour of more waste creation. For the contractor more waste means more money. It clearly ignores the basic principle of waste management: reduce, reuse and recycle. Even in the cases where payment is made on the basis of number of households covered there is no incentive for the contractor to make efforts to reduce the waste generation. Segregation, which is mandatory, is clearly negated as is composting and recycling recovery.
- At places where the contract is renewed every year, it is detrimental to the interests of both

parties. At the outset, it might suggest that it will lead to a strong monitoring system, but in practice this might not be the case. In Nasik, for instance, the entire waste collection of the city requires more than 110 vehicles and a corresponding workforce; this is a huge infrastructural investment which is very difficult to arrange for a contractor in a short period. This calculation might lead to complacence on the part of the existing operator.

- The system of monitoring also leaves much to be desired. Monitoring is being done either by municipal staff themselves or by a third party, as in the case of MCD. But, this monitoring system has failed to provide any roles to community or community-based organisations. This inverts the whole logic of implementation of MSW Rules. The implementation of these rules demand that residents should do source segregation and NGOs/CBOs should be involved to create awareness among residents regarding these issues. But, strangely, such an aware and informed citizenry and NGOs/CBOS have been given no role in monitoring these privatised systems.
- Above anything else, this privatisation process has the potential to work against the interests of the traditional waste collectors. The cost-benefit calculations of these contracts motivate private operators to adopt more mechanised and high-tech equipments, which necessarily entails reduction in labour. This might render several traditional waste collectors and waste pickers jobless.

Municipality case studies

Bhadreshwar Municipality

Bhadreshwar Municipality covers 20,000 households with a population of 1,05,944. Solid Waste Management was taken up by it under the Calcutta Urban Development Programme (CUDP) III. To begin with, an awareness campaign, meetings with ward committee, industrialists, labour officers, welfare associations and schools were held.

Door-to-door collection of waste has been implemented in 60 per cent of the residential areas. The remaining areas have congested lanes that prevent the passage of vehicles.

Separate coloured bins are provided for collecting segregated wastes. Cow dung from dairy areas and vegetables from the markets are composted. The activity is done on a low-scale and does not contribute much to the income. The farmers living in nearby villages purchase the compost. Some local people have opted for vermi-composting. Another noticeable feature of this municipality is the crematorium running on the gas produced by the anaerobic digestion of cow-dung slurry.

Composting of cow-dung is undertaken along with waste from the vegetable markets.

The municipal staff moves from door-to-door to collect the waste. Mostly, the waste collector segregates the mixed waste at the trolley. The biodegradable waste is put into red bins and the non-biodegradable waste is put into blue bins. The waste is then taken to the dump yards through a mechanised container system at 14 different transfer stations. Aerobic composting of organic waste with a high quantity of cow dung is done around the dump yard while the rejects are discarded. A special scheme is in place for waste generated during ceremonies. A sum of Rs 20 is charged for waste collection from the doorstep.

Kanchrapara Municipality

The Kanchrapara Municipality is divided into 24 wards that contain a population of 1.26 lakh people. Three wards belong to the Railways and have their own waste management system. The rest of the area is under the coverage of the municipality. The area generates 65 metric tonnes of waste per day. The municipality was provided Rs 70 lakh by the Department of Environment, Government of West Bengal for solid waste management. Rs 10-12 lakh have been spent on the project. A campaign for source segregation of wastes was conducted with the help of an NGO called AQUANICK.

A compost yard at Kanchrapara.

The wards are divided into blocks consisting of 200 families with a SWM Committee for each ward. The SWM Committee is responsible for collecting the money. Each block has one supervisor and one worker. For the collection, monthly salaries of Rs 300 and 500 are paid to the supervisor and the waste collector, respectively. The remaining amount is invested for further development of the project and for the maintenance of the rickshaws.

At the beginning, the municipality distributed two coloured bins (a red one for inorganic waste and a green one for organic waste) to the residents. Another red bin is provided for the markets. The municipal staff moves from door-to-door for collection of waste. The municipality charges a fee of Rs 5 per family for low-income groups and Rs10 for the rest.

Panjim Municipality

Panjim Municipality has made a conscious effort to organise 100 per cent door-to-door collection of waste. The initiative began in 2002 and by the early 2004 more than 90 per cent of the city was covered by this service. Apart from collection of waste it has also removed most of the community bins from the urban area to make it a bin-less city. It has also negotiated with companies of packaged drinking water to establish PET Bottle Collection Centres.

There are nearly 26,000 households in Panjim including residential and commercial areas. The waste collection was initially started by an NGO called People's Movement for Civic Action (PMCA) in one of the posh localities. The Commissioner, Mr Sanjit Rodrigues, took a special interest in expanding the project to the city level. The residents pay Rs 30 a month for organised door-to-door collection of waste in commercial as well as residential areas.

PMCA and the municipality worked together to bring Pepsi, Coke and Bisleri together on a

The PET Bottle Collection Centre at Panaji which was opened with partnership of companies such as Pepsi, Coke and Bisleri. The companies have pulled out of the initiative.

single platform to establish PET Bottle Collection Centres. Though reluctant at first, the companies came around under pressure to create the collection centres. The rag pickers collect all sizes of PET bottles and deposit it in the collection centre, receiving 30 paise for bottles of a capacity of 1 litre or above, and 15 paise for smaller bottles. A similar approach has been adopted for milk packets: for every 100 milk packets, a half litre milk packet is given free. Most of the milk packets are collected at milk booths. The school children are also actively involved in collection of milk sachets at home.

Awareness on source segregation and waste management was created through the medium of radio and print material which encouraged people to create a zero waste and zero bin city.

Panjim has made it mandatory for all new housing societies, or any other residential construction, to leave some space for composting of organic waste. No permission will be given for construction if space has not been earmarked.

The municipal staff visits every house with a cart to collect the waste. Only a small population does source segregation of waste. The collected waste is then taken to the dump site at Curca which has now completed it's life, but since no new landfill site has been identified, the waste is still dumped here. The recyclables are mostly recovered at the dumpsite by the rag pickers.

A small quantity of waste, mainly from the fruit and vegetable markets of Panjim, is vermicomposted and used by the municipality. The municipality now runs PET Bottle Collection Centres of its own and sells the bottles since the corporates have stopped supporting the project.

Nasik Municipal Corporation

Nasik Municipal Corporation (NMC) is one of the few municipalities which have started the implementation of MSW Rules, 2000, within the time limit set by the Supreme Court.

NMC started door-to-door collection of solid waste in 1997 itself. At the behest of the then city mayor Mr Prakash Mate, NMC decided to make Nasik a dustbin-free city. For this, a team was sent for an exposure visit to Surat. On the recommendations of this team, NMC started the implementation of the MSW Rules, 2000.

The waste is being collected from each household with the help of closed collection vehicles, known as *Ghanta Gadis*. These *Ghanta Gadis* start collection of waste at 7 am and are supposed to dump the garbage at the compost plant by 5 pm Each *Ghanta Gadi* covers about 15 km and collects about 2.5- 3 tonnes of garbage. They have been allotted a fixed route and timetable. They ring a bell to announce their arrival, and hence the name *Ghanta Gadis*. On hearing the bells, residents handover the waste to the staff, who unload these into the vehicle.

Transportation: After collection, the waste is transported to the compost plant. Here the waste is weighed by computerised weighing machines and then spread out for segregation.

Composting: At the composting site, women from Kagad Kach Patra Kashtakari Panchayat of Pune segregate the mixed waste. After a manual segregation of the waste, the waste is subjected to the first round of screening by the mechanical compost plant. This compost plant has been set up at the cost of Rs 5 crore and does three rounds of screening of the waste before making the final product. The entire composting process takes about 45 days. The capacity of the compost plant is 300 metric tonnes. However, the daily collection of garbage is around 250 metric tonnes.

The compost is packed into 50 kg polybags and is sold at the rate of Rs 88 per sack or at the rate of Rs 1750 per metric tonne.

Final Disposal: In the end, the refuse from the compost plant and other dry rejects are dumped into the landfill which has been prepared as per scientific norms.

Suryapet Municipality

Suryapet, a town in Nalgonda district of Andhra Pradesh, is divided into 28 municipal wards. It has numerous slums and a high floating population. Littering of waste was a major problem in the area. Concerned about the situation, the Municipal Commissioner of Suryapet, Mr S.A. Khadar Saheb, initiated door-to-door-collection of segregated waste in January 2003.

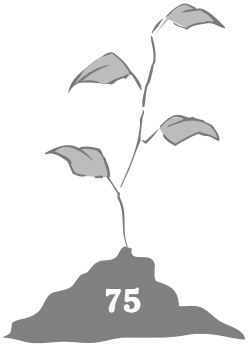
A *Ghanta Gadi* reaches designated spots at fixed times and rings a bell to announce its arrival.

Awareness programmes were held for the stakeholders and the staff were motivated to work constructively. Effort were made to bring coordination among all municipal councilors.

The town has been divided into seven zones with the allotment of one tractor and few sanitary personnel for daily door-to-door-collection of waste. Municipal vehicles collect waste from the doorsteps of residential as well as commercial establishments.

Two bins have been supplied to the residents. Red bins are meant for dry waste and green bins for wet waste. Hanging bins have been fixed to electric poles for easy accessibility. Ten collection vehicles belonging to the municipality collect waste from different zones of the city from 5 am to 10 am. A penalty of Rs 100 is imposed on commercial establishments that fail to adopt the strategy. A separate vehicle is deployed for the collection of biomedical waste, waste from hotels, restaurants, etc.

The wet waste is transported for vermi-composting. The municipality utilises the compost for its own purpose. Various organisations such as the Lion's Club and industrial houses have contributed resources for the bins and the vermi-compost sheds.



Upscaling people's participation in urban solid waste management

SECTION 5

Developing a model

- Cost break-ups
- Benefits of decentralised solid waste management systems
- Creating a community-based SWM model in Delhi
- Findings of the intervention

Developing a model

Considering India's diversity – cultural, socio-political, geographical and economic – it is unlikely that a single model of a community-based solid waste management system will be applicable to all areas. Still, such an exercise can provide a benchmark against which we can measure field interventions.

Any such exercise will necessarily have to be based on some assumptions, which, in order to be realistic, will need to take into account the ground realities. Having collected data from 25 community and municipal interventions in solid waste management across the country, the research team has attempted to make such assumptions.

As per the calculations of Kancharapara Municipality, a solid waste management intervention covering 14,000 households will need an initial investment of about Rs 122 lakh

Across the world, it has been found that when solid waste management is being provided at the community level, the economies of scale are not so pronounced. But, as per the Full Cost Accounting Handbook of EPA, no economics of scale are thought to exist for communities comprising more than 50,000 people. Given the joint family tradition in India, if we assume that there are five members in each family, it will equal to 10,000 households. Moreover, this assumption seems valid against the actual field data. For instance, as per the calculations of Kancharapara municipality, a solid waste management intervention covering 14,000 households will need an initial investment of about Rs 122 lakh. Obviously, this scale of investment cannot be expected from community level interventions. Hence, we can assume that community-based interventions may be considered up to a maximum of 10,000 households: though, even this will require a substantial investment.

Cost break-ups

Ideally, there are two ways through which one can calculate the cost of solid waste services in a community: activity-based calculations and path-based calculations. MSW activities are:

- Collection of waste
- Transportation of waste to transfer station
- Processing/disposal of waste
- Any sales of recyclables or compost

Solid waste management paths are:

- Recycling
- Composting
- Waste-to-energy
- Land disposal

However, in actual practice, these categories are not discrete; there is an overlap among them. In order to keep calculations simple, it has been decided to break these activities and paths into two categories: costs likely to be incurred and revenues likely to be generated. In an ideal decentralised community-based solid waste intervention, the elements of costs will be as follows:

- Collection cost
- Transportation
- Operation at transfer/disposal station: this includes operation and maintenance of compost sheds too.
- Awareness materials/ trainings of personnel.
- Organisational expenditure.

Elements of revenue will be as follows:

- User fee
- Sales of recyclables
- Sales of compost (if any)

In order to arrive at cost-benefit calculations for a 10,000 household solid waste intervention, we need to make following assumptions. As already mentioned, most of these assumptions are based on ongoing field experiences that have been documented. Some of the basic assumptions are:

- All likely costs and revenues are calculated at the present and fixed value.
- Land and shed for segregation and composting has been provided free of cost by municipality/ some other agency.
- Kinds of services offered: door-to-door collection and sweeping of nearby roads.
- One waste collector collects waste from 150 households, sweeps the nearby roads and then works on the compost shed.
- There is one supervisor for every six waste collectors.
- Two waste collectors share one rickshaw trolley covering 300 households.
- Each waste collector is paid a salary of Rs 2,400 per month. Basically, his/her salary is Rs 1,800 per month. The remaining 600 are being given for recurring expenditures like primary medical health, maintenance of rick-

shaw trolleys and uniforms and other equipments given for the waste collection.
- Each supervisor is paid a monthly salary of Rs 3,000.
- Only 80 per cent of the households are expected to pay the user fee.
- Each Ricksaw trolley costs about Rs 9,000.
- Each waste collector is provided with one time inventory worth Rs 2,500. This includes items like uniform, gloves, shoes and other equipment.

Based on the above assumptions, we can calculate the likely expenditure to be incurred and revenues likely to be generated for any number of households. Let us first, attempt this calculation for 10,000 households.

Estimation of cost

For reasons of simplicity, it will be better to first calculate the one-time establishment charge and then calculate the recurring monthly expenditure. One-time establishment cost can be broken down into the following cost elements:

1. Expenditure on rickshaw trolleys
Number of rickshaw trolleys needed is 10,000/300= 34.
Cost of one trolley=Rs 9,000
Total expenditure on rickshaw trolleys= 9,000 x 34 = Rs 3,06,000.

2. Expenditure on accessories for waste collectors
Cost on accessories such as uniform, gloves, boots, etc worth Rs 2,500.
Total expenditure=2,500x67=Rs 1,67,500.

3. IEC material/ awareness workshops for the community
Assuming that at if at least 40 awareness workshops, catering to 500 residents per campaign, are organised and expenditure incurred on each workshop is Rs 5,000, the total expenditure on awareness workshops of residents will be Rs 200,000. Finally, we can assume that there will be an expenditure of about Rs 1,00,000 in publication and distribution of the IEC material. Thus, the total expenditure incurred under this head will be (2,00,000+1,00,000)=Rs 3,00,000.

4. Training of waste collectors/ supervisors:
Assuming that all the waste collectors and supervisors are trained for a minimum of 30 days and they are paid as per their monthly salary, total incurred expenditure will be Rs 1,96,800.

5. Organisational overheads
One-time establishment cost of intervening organisation can be safely assumed to be about Rs 40,000.

Total one time establishment cost (in Rs.) is 1+2+3+4+5=10,10,300.

Recurring cost per month: Having calculated the one-time establishment cost, now we need to calculate the recurring expenditure per month, since salaries to the workers will be paid on a monthly basis and the user fee will also be collected on a monthly basis. The elements of recurring cost per month will be as follows:

1. Salary to waste collectors = 67 x 2,400 = Rs 160,800.

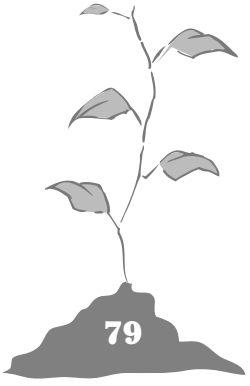
2. Salary to supervisors = 12 x 3,000 = Rs 36,000.

3. Organisational expenditure = Rs15, 000.

4. Incidental expenditure = Rs10,000.

Based on the above assumptions, the cost-revenue calculations, for different number of households can be put down into tabular forms as shown in the following pages.

Now, all these elements of costs and revenues can be put up into a simple linear equation to calculate the time period needed for the attainment of break- even point of the intervention and the subsequent profits thereof. If we denote:
- Recurring monthly expenditure as Mc
- Revenue from sales of recyclables as Rr
- Revenue from sales of compost as Rc
- Revenue from user fee as Rf
- Total establishment cost as Ec.



Break-even table

Number of households	Break-even period (in months)	
	Revenue from user fee + sale of recyclables	Revenue from user fee with recyclables given to waste collectors
10,000	17	20
5,000	24	31
2,000	44	63

If the intervention attains the break-even point in *n* months, then this equation will be:

$$Rf \times n + Rc \times (n-3) + Rr \times n = E_c(1+r^*/12)^n - Mc \times n$$

* r is the rate of interest per annum, which has been assumed as 6 per cent.

Based on the above equation, break-even periods (in months) for different number of households can be presented in the tabular format on the left.

Benefits of decentralised solid waste management systems

The different models discussed above have different spin-offs, though many of these are common across the models. However, here, we will be primarily concerned with the ideal model identified by us which would be applicable in practice as well. The ideal model will be one in which:

- There is source segregation of waste.
- There is door-to-door collection of waste.
- There is no mechanical vehicle involved in primary transportation of waste. They are used only for secondary transportation (to transfer the inerts and other remains from the composting and recycling shed up to the landfill site by the municipality).
- Biodegradable waste is being composted.

Apart from providing a sustainable solution to waste management, this system has many direct as well as indirect economic, social, health and environmental benefits. Some of the important benefits are:

Economic benefits

- **Livelihood creation**: As has been described earlier, this model is labour intensive rather than capital intensive. Thus, a solid waste management system of this kind covering a household population of 10,000 has the potential to provide employment to 67 waste collectors, 12 supervisors and 2-3 persons of the intervening organisation.
- Source segregation keeps the recyclable material cleaner, which, in turn, fetches higher prices.
- Consequently, the quality of end products

Cost calculation for 10,000 households

Cost (in Rs)				Revenue generated per month (in Rs)	
Establishment cost		*Recurring cost*			
Elements	Cost	Elements	Cost	Elements	Revenue
Rickshaw trolleys (34@9,000)	3,06,000	Salary–waste collectors (67@2,400)	1,60,800	User fee (@ 30)	2,40,000
Cost of accessories (67@2,500)	1,67,500	Salary–supervisors (12@3,000)	36,000	Recyclables	50,000
Capacity building (workers)	196,800	Organisational expenditure	15,000	Compost	–
IEC material/training	3,00,000	Incidental expenditure	10,000		
Organisational overheads	40,000				
Total	**10,10,300**		**2,21,800**		**2,90,000**

made from these recyclables improves many folds, which in turn, fetches higher prices and helps in preserving and promoting the faith of committed consumers in these recyclable goods. Plus, it can give a new fillip to the recycling industry.

Economic benefits for municipality

- Municipality can save up to Rs 4,32,000 per annum in secondary transportation for a 10,000 household programmes.
- Municipality can save labour cost, as there will be no need for it to employ people for primary transportation of waste.
- It will reduce the burden of municipal staff as there will be less need of regular road sweeping and drainage cleaning.

High landfill diversion rate

Apart from offering direct economic benefits, the model offers many types of indirect economic benefits. For instance, this model succeeds in attaining a landfill diversion rate of more than 80

Cost calculation for 5,000 households

Cost (in Rs)				Revenue generated per month (in Rs)	
Establishment cost		*Recurring cost*			
Elements	Cost	Elements	Cost	Elements	Revenue
Rickshaw trolleys (17@9,000)	1,53,000	Salary–waste collectors (34@2,400)	81,600	User fee (@ 30)	1,20,000
Cost of accessories (34@2,500)	85,000	Salary–supervisors (6@3,000)	18,000	Recyclables	25,000
Capacity building (workers)	99,600	Organisational expenditure	15,000	Compost	–
IEC material/training	1,50,000	Incidental expenditure	5,000		
Organisational overheads	40,000				
Total	**5,27,600**		**1,19,600**		**1,45,000**

Cost calculation for 2,000 households

Cost (in Rs)				Revenue generated per month (in Rs)	
Establishment cost		*Recurring cost*			
Elements	Cost	Elements	Cost	Elements	Revenue
Rickshaw trolleys (6@9,000)	54,000	Salary–waste collectors (12@2,400)	28,800	User fee (@ 30)	48,000
Cost of accessories (12@2,500)	30,000	Salary–supervisors (2@3,000)	6,000	Recyclables	10,000
Capacity building (workers)	34,800	Organisational expenditure	15,000	Compost	–
IEC material/training	60,000	Incidental expenditure	2,000		
Organisational overheads	40,000				
Total	**2,18,800**		**51,800**		**58,000**

per cent, which not only saves money in terms of excess land to be acquired for the new landfill site but also conserves such a natural resource for some other useful work.

Health benefits

The provision of formalising the working conditions of waste collectors provides them with the opportunity to work in healthier conditions. The provision of gloves, uniforms and other safety equipment improves their working condition.

A clean neighborhood makes the area less prone to diseases.

The reduction in number of mechanised vehicles used for primary transportation of waste results in reduced emission of many harmful gas, which is healthier for residents of the entire city.

The practice of making payments on the basis of the amount of waste collected/ haulage creates a systemic inbuilt bias in favour of more waste creation

Social benefits for waste collectors

The waste pickers could be substituted as waste collectors and their livelihood would be formalised.

They get better recognition and dignity by working as formal waste collectors than as waste pickers. Also, there is reduced or no harassment by municipal staff or the police.

Compost

Composting not only provides an extra source of revenue for the intervention but also helps reclaim the lost fertility of the soil. The dangers of chemical fertilisers are well known and the promotion of compost as a natural manure is a pressing need of the time.

Empowered citizenry

Decentralised solid waste management systems, premised upon the management and ownership by local people, have a lot to contribute to the strengthening of civil society. Due to their participative nature, these systems will result in aware and empowered citizens who will utilise their knowledge in other spheres of life.

Creating a community-based SWM model in Delhi

The issue of waste management can only be solved by ensuring active participation of all stakeholders, ranging from policy makers, producers, consumers/ waste generators/residents, waste operators and representatives of the regulating body.

A holistic approach is needed that takes into account the infrastructure, technology and socio-economic dimensions of existing waste management practices.

Though many grassroot initiatives have taken place, such initiatives have no legal status. They focus mainly on organised collection of waste and in a few cases have also obtained land from the municipality for on-site composting. Still they remain outside the ambit of formal institutional arrangements. In many cases, municipalities/civic authorities, instead of recognising successful community initiatives and incorporating them into the mainstream, replace them with systems that force the residents/service recipients to be detached from participatory models.

NGO initiatives have not been able to address the issue of waste management at the city level. This could be because the work is carried out on a community-to-community basis and remains local with very less infrastructural support and recognition at the city level by the municipality. There are many examples of community initiatives that have locally managed their waste and have been able to turn it into a useful resource. Such initiatives encourage recycling, and result in material recovery and preservation of natural resources.

The purpose of the intervention was to create a Zero Waste residential colony with active involvement from municipality, residents and civil society groups.

Chronology of events

- **March 1,2004:** Community mobilisation begins
- **May 25:** Source segregation begins
- **June 1:** Trial run begins; dumping of organic waste begins in the first pit
- **June 24:** First pit filled up
- **June 26:** Inauguration of the programme by the Councilor; dumping in the second pit begins
- **August 27:** Second pit filled up
- **August 28:** Barrel dumping begins
- **September 1:** Third pit begins
- **October 1:** Compost sieving from the first pit begins
- **October 9:** Compost ready
- **November 10:** Third pit filled up

The irony of the situation is that community initiatives fulfill the greater objectives of environmental safety and natural resource conservation and get little recognition and support from the municipal departments.

Since municipalities do not own such community-based initiatives, the programme eventually stops when the NGO withdraws itself and hands over the initiative to the residents and the municipalities.

Since municipalities do not own such community-based initiatives, the programme eventually stops when the NGO withdraws itself and hands over the initiative to the residents and the municipalities

It is therefore imperative that the process of an ongoing project is well documented and carried out delving into the causes of its success or failure, with a focus on upscaling them. A grassroot implementation of community-based solid waste management programme, in partnership with Residents' Welfare Associations, needs to be undertaken for better understanding of the subject. Toxics Link made an effort to initiate a Zero Waste Community by following the principles of decentralised waste management through segregation, recyclable recovery and composting.

During preliminary discussions residents were more interested in finding solutions to their daily problems such as unclean drains rather than understanding the functioning of the municipality.

Implementation process

The implementation strategy of the project included choosing contiguous areas, existence of Community-based organisations or Residents' Welfare Associations for easier impact assessment analysis. Awareness generation programmes and capacity building workshops were conducted with the target population for implementation and monitoring of the programme. Individual contacts and group meetings were organised regularly to promote understanding of the roles of each stakeholder. Training programmes were organised with all the potential stakeholders on various aspects of good waste management: source segregation, types of composting, roles and responsibilities of each stakeholder, etc. All the stakeholders were brought under one common platform and were made partners to the initiative.

General observation on RWAs

- There is a need for assigning legal status to RWAs
- RWAs should be empowered on government dealings
- Strong Federation formation should be encouraged
- Better information sharing within the RWA and amongst the RWAs needed
- RWAs should open up themselves to new ideas and suggestions from residents

Objectives

The purpose of the intervention was to create a Zero Waste residential colony with active involvement from the municipality, residents and civil society groups. Since the intervention demanded contiguous residential areas with registered community-based organisations, three such localities in South Delhi were contacted, namely Alaknanda, Saket and Sarita Vihar. All these areas were middle-income residential pockets, developed more than 10 years back by the Delhi Development Authority.

The intervention

Sarita Vihar is a middle-income residential colony, situated in South-east Delhi. It falls under the Municipal Corporation of Delhi, Ward Number 65. It has a sizeable number of tenants. It is spread over 14 separate residential pockets with households, ranging from 200 to 700. Out of these, 9 residential pockets have a registered welfare association.

Residents' Welfare Association is a registered body of people who are selected through a defined procedure of election by the residents for conducting welfare activities within the boundaries of the pocket. Elections take place once in two years while an annual general meeting is held with all residents.

Generally, RWA office bearers are volunteer residents, mostly retired, who find it a better way of keeping themselves occupied. Services like day and night security services and facility for payment of electricity, telephone and water bills are provided by the RWA at a monthly contribution from every householder, ranging from Rs 100 to 200. Some RWAs also arrange for plumbers and electricians. Since RWAs have not been given any legal power they cannot make it binding on any resident to pay the monthly contribution. Typically, RWAs manage to collect the monthly contribution from 60-70 per cent of the residents.

Various prominent registered social groups in Sarita Vihar

- Mahila Mandal
- Senior Citizens' Welafare Council
- Harit Kranti Association
- Kitchen Garden Association
- Market Association
- Arya Samaj Mahila Samiti
- Residents' Welfare Association
- Federation of RWAs

Other than RWAs, there are various other registered social and religious groups such as Arya Samaj Samiti, Dharmarth Samiti, Mahila Mandal, Shri Guru Singh Sabha, Senior Citizens' Welfare Council, etc. Each of these associations have their own agenda and have never worked jointly in the past for a common cause. According to the members of these associations, all kinds of community development work are supposed to be handled by the chosen members of the RWAs.

To make Sarita Vihar a Zero Waste colony, efforts were made towards bringing members of different RWAs, federations and social groups to a common platform. A coordination committee was formed with those who volunteered for maintaining cleanliness and dealing with the issue of sanitation. The members felt that before catering to the problem of solid waste management and expecting residents to cooperate, it would be necessary to cater to the day-to-day problems of the residents like daily drain cleaning, road sweeping and regular lifting of collected waste from the neighbourhood community bin. The members of this group started meeting with the zonal and site level representatives of MCD Works (Sanitation, Horticulture and CSE departments) on the last day of every month. The Deputy Commissioner of the Central Zone was informed about the formation of this group to enlist her support from time-to-time.

Findings of the intervention

❦ **Identify stakeholders:** Members from Residents' Welfare Association of various pockets of Sarita Vihar and Federation of these RWAs were contacted to acquaint them with the purpose of Toxics Link's intervention at Sarita Vihar. Slowly it was realised that there were various groups of residents, which had been formed for a reason specific to them.

A rapport building exercise was undertaken with each group to understand its perspective towards community development. Enthusiastic members from Mahila Mandal, Kitchen Garden Association and Senior Citizens' Council were mobilised to participate and concentrate on solid waste management issues in Sarita Vihar.

Since the existing Federation of RWAs had failed to create a platform for exchange of information within the RWAs, efforts were made towards forming a common platform of all like-minded associations. These groups were providing their services within a confined range of operation and it was very difficult to make them think about issues beyond their immediate area of concern. Our experience has been that people living in pockets are less sensitive to the problems of other pockets; everybody thinks of their problem being the most acute.

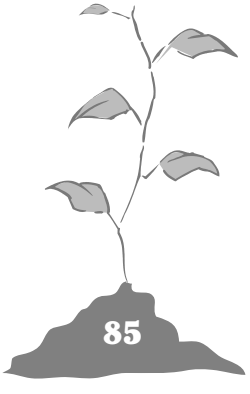
After regular meetings and group discussions, a Coordination Committee was formed with members from residential pockets of blocks B, C, D, G and J. These members meet on the last working day of every month, discuss their problems regarding sanitation in the presence of the site and zonal level representatives of CSE, Sanitation and Horticulture departments of the municipality.

Constraints faced by the department staffs due to the irresponsible behavior of the residents were also shared and solutions were sought out jointly. This unique platform gave the residents an oppotunity to think beyond their immediate problems. Seeing the success of this platform, residents of other pockets also started attending the meetings.

This platform was eyed with suspicion by the members of the Federation of RWAs, for they started viewing this as a parallel structure that was stepping on their toes.

❦ **Awareness generation:** Awareness generation programmes organised for the members

Sarita Vihar is a middle-income residential colony, situated in south-east Delhi. It falls under the Municipal Corporation of Delhi, Ward Number 65. It has a sizeable number of tenants and is spread over 14 separate residential pockets



Services demanded by residents

- Daily clearing of community bins, street sweeping and drain cleaning;
- RWA members should be given the charge of monitoring the performance of local MCD *safai karamcharies*;
- Municipality to provide door-to-door collection of waste.
- Municipality should not charge residents any extra money in their new schemes for waste management. Since lot of technical know-how and financial backing is required, municipality should take up the whole responsibility.
- Municipality should back RWAs with financial help for initiatives regarding waste management.

of the Coordination Committee were mainly directed towards making them sensitive towards the need for public participation in managing Delhi's solid waste issue. Several focus group discussions were conducted with the members of each RWA of Sarita Vihar that showed even a minimal interest in the subject. They were told about the present policies and future plans of the department regarding managing Delhi's solid waste management issue.

Initially, people's reaction on the subject was minimal, since their knowledge on the subject was poor. They perceived the Municipal Corporation of Delhi as being responsible for all facilities since every house owner in Delhi pays a house tax to the department

Awareness generation sessions covered the following topics:

- Municipal Solid Waste (Management & Handling) Rules, 2000
- MCD's stand on implementation of MSW Rules
- Essence of public-private partnership
- Identification of stakeholders
- Roles and responsibilities
- Segregation
- Composting

Initially, people's reaction on the subject was minimal, since their knowledge on the subject was poor. They perceived the Municipal Corporation of Delhi as being responsible for all facilities since every house owner in Delhi pays a house tax to the department.

They demanded that the daily clearing of the accumulated waste from the community bins should be done by the department on a timely basis. Secondly, they wanted the department to hand over the task of monitoring the performance of *safai karamcharies* to the members of RWAs, who in turn would report to the Deputy Commissioner of the Zone, to improve the sanitary condition of the area. These meetings also witnessed a few residents demanding services from the department for door-to-door collection of household waste, which was being done through private waste contractors and waste collectors who charged a monthly subscription of Rs 30-50, depending on the floor they collected the waste from.

The residents were least concerned about the waste management techniques that were being employed in Delhi or in other big cities of India. People were more interested in finding solutions to their immediate problems regarding sanitation – daily cleaning of drains, sweeping of streets and clearing of community bins.

How does the department manage waste? Where do they take the collected waste from the community bins? What problems do they face currently? These were questions that the residents were not much concerned about as they felt that these involved technical know-how and financial backing, which was the MCD's domain. In all the meetings, the residents made it quite clear that MCD should not expect any monetary help from residents/citizens to run the show.

Some of these group meetings coincided with the *Bhagidari* workshops being conducted by the Delhi Government. The focus of these workshops was to bring a common understanding amongst MCD site level staff, private waste collectors, teachers and children from various Eco-clubs, representatives from RWAs and NGOs on the issue of better waste management in Delhi. The workshops utilised different mediums of communication such as audio-visual and print, and received an enthusiastic response.

At first, the residents resisted source segregation of waste because it meant keeping two bins for storing waste separately. This involved additional expenditure, over the monthly payment for door-to-door collection of waste by the private waste collectors. As per the new scheme each

household was expected to spend a total of Rs 80 per month (Rs 50 for the waste collector and Rs 30 for purchase of 30 biodegradable polybags) for the daily disposal of waste. Apart from this monthly expense, the residents usually spend money for cleaning their neighbourhood drains or for having piles of garbage removed from the roads due to the poor quality of services delivered by the local municipal staff.

People were skeptical about the municipaility's capability of meeting its end of the agreement. They also doubted if the funds generated for this scheme would be used properly.

❦ Information, education and communication (IEC) materials

To raise the level of interest and to increase understanding of the target population about the importance of waste management, the project developed attractive IEC materials, covering all stakeholders.

The IEC material included flyers on "How to become a Zero Waste Community by implementing Supreme Court Ruling on Waste Management?". These were printed in English and in Hindi for better coverage. The flyers were distributed to every resident, often accompanied by a personal explanation.

Each resident was also handed a wall calendar with messages about source segregation. Biodegradable and non-biodegradable items were pictorially depicted in the calendar. Residents were encouraged to hang the calendars on their kitchen wall to serve as a readily available chart and a reminder to the domestic help and family members to segregate waste at source.

Two colorful flip charts were also designed. While the first flip chart focused on 'Community Mobilisation for Decentralised Waste Management System', the second one highlighted composting methods. The purpose for developing these flip charts was to serve as a training kit for stakeholders. Both the flip charts were used in training programmes with the housewives, domestic helps, private waste collectors and local level municipal sanitary and horticultural staff.

Capacity building: Training programmes focused on the following topics:

- ❦ Identification of stakeholders
- ❦ Roles and responsibilities of residents
- ❦ Community mobilisation
- ❦ Negotiation with municipality
- ❦ Different composting methods
- ❦ Importance of source segregation

Source segregation and on-site composting of organic waste in D-Block, Sarita Vihar

Pre-implementation phase

D-Block, Sarita Vihar has 231 households, with a registered Residents' Welfare Association which has been serving the block for more than a decade. The RWA provides facilities like green parks, round the clock security and takes care of overall cleanliness at a price of Rs 150 per month.

As far as cleanliness is concerned, the residents of the pocket have hired the service of a waste collector at Rs 40 per month. The waste collector would collect the waste from the houses, pick up the recyclables for sale and dump the remaining waste in the MCD community bins constructed outside the pocket. MCD loaders would collect the waste from the bins and from other dumping spots (both situated outside the D-pocket) twice a week. Residents who were not part of this arrangement would give away their

IEC materials developed

- ❦ Flyers titled *How to become a Zero Waste Community by implementing Supreme Court Ruling on Waste Management*
  Medium: Hindi and English
- ❦ Year calendar, with messages on source segregation.
  Medium: Hindi and English
- ❦ Flip chart on 'Community Mobilisation for Decentralised Waste Management System'.
- ❦ Flip chart on 'Techniques of Composting'.

Natural pits were dug for aerobic composting of the waste.

daily waste to their domestic helps to dump in the MCD dhalao. But in most of these cases, the domestic help would either leave the bag under the staircase or back lane of the flats or would throw it in the community bin in a haphazard way, spilling its contents on the road. As a result, residents staying near the community bins had to face the problem of bad odours, especially when the loaders carried the waste.

Toxics Link facilitated the relationship between the zonal and site level municipal officials and the residents. Various capacity building workshops and monthly meetings were organised jointly for the residents and the municipality representatives

Implementation

At the beginning the members of the pocket were contacted and community meetings were conducted to share various kind of information: the current quantity of waste being generated and its disposal pattern, problems that the municipality is facing due to incorrect practices, roles and responsibilities of every stakeholders, etc. Door-to-door mobilisation through the circulation of the IEC materials on importance of source segregation went on for three months before the actual implementation started. Continuous assistance was provided to the residents to overcome difficulties involved in source segregation.

Some prominent events

- Recognition by MoEF; mention in the Parliament session
- Visits by the Municipal Councilor, Deputy Commissioner- MCD, Central Zone, Deputy Director (Horticulture) DDA, Deputy Director (Horticulture) MCD, Engineers of MCD-Works and CSE
- Visit by Sarita Vihar Federation members
- Visits by members from other RWAs
- Visit by partner NGOs
- Visits by Environmental Science students and professors from Jamia Millia Islamia University
- Visit of a research student from Leh
- Covered by The Hindu and Hindustan Times

The residents' were made aware about environmental issues, especially solid waste management. At the same time they were also given opportunities to know more about the municipal corporation – its various departments, dealing with officials and complaint redressal prcedure, etc.

Toxics Link facilitated the relationship between the zonal and site level municipal officials and the residents. Various capacity building workshops and monthly meetings were organised jointly for the residents and the municipality representatives. Through all these diverse opportunities, the stakeholders were able to understand each other's role and responsibility and develop a team spirit. The perception regarding the private waste collector was also changed as the residents understood the value of their contribution. In the presence of Toxics Link, both the residents and the municipality found it easier to relate to the project objective since they were working together with a thorough knowledge of the subject.

Next came the issue of land for on-site composting. This was selected with common consensus of the residents and equal participation from site level municipal staff. Permission was sought and granted by MCD's Horticulture Department to dig up two natural pits of size 12 x 5 x 2.5 ft in one of the MCD owned neighborhood parks to undertake aerobic composting. For makeshift arrangement, two barrels of 250 litres were also placed to demonstrate the barrel composting technique in places with less available land. Two more elevated pits were constructed in MCD-Works owned land for composting and storing compost (this was done because no separate storage space was avail-

able at the site). The site was fenced in order to avoid stray animals.

On a trial basis, the programme started with the collection of segregated waste from each household by the private waste collector in two separate bins. After collection of waste from the entire pocket, the private waste collector (who was employed by the waste contractor before the project initiated) would bring the collected waste to the composting site and undertake secondary segregation, and take away the recyclables. Then the total amount of organic waste generated for the day was weighed and recorded. After this it was spread in the pit, sprinkled with cow dung slurry, along with EM* (Effective Microorganisms) and covered with jute sheets.

A site level municipal sanitary staff has been assigned to turn the pits every alternate day for better aeration, after finishing his daily chores. The Municipality has also provided a tricycle for the collection of the household waste. This vehicle has two cabins, situated parallel, painted green and blue. While the waste collector dumps all the organic waste in the green cabin, all recyclables are stored in the blue cabin. A trial was done to improve the method.

After the one month trial period during which approximately 2,000 kg of organic waste was managed, the residents of the block expressed their willingness to continue with the project and were ready to set an example for other residential blocks of Sarita Vihar.

After being confident on the results of the programme, this *Bhagidari* initiative was inaugurated by the local Councilor, Mr Hem Chand Goyal, to boost the morale of all those involved in making this possible and thus encouraging them and others alike to march towards fulfilling their responsibilities in the city's waste management strategy.

MCD's Deputy Commissioner, Mrs. Punya Srivastava attended the occasion along with representatives from MCD's Sanitation and Horticulture departments. Representatives from RWAs and residents from other residential pockets participated actively and appreciated the efforts of the residents.

Mr Hem Chand Goyal, local councillor, inaugurating the Bhagidari initiative.

Participation of all the stakeholders continued to grow with the passage of time. Starting from only four families on the first day, by the end of the month the programme had the suport of 30 per cent of the residents. By the end of second month, 73.3 per cent of the residents of the block were participating in the programme.

Representatives of the municipality, residents and Toxics Link jointly monitored the disposal habits of the residents. At times the municipal representatives fined non-cooperating members. Seeing the assertive role-played by all the stakeholders, many visitors to the site appreciated the project and hoped for its long-term sustainability.

Starting from only four families on the first day, by the end of the month the programme had the support of 30 per cent of the residents. By the end of the second month, 73.3 per cent residents of the block were participating in the programme

Seeing the success of the programme, MCD placed few bins around the block to discourage littering. Door-to-door circulars were issued by the RWA and MCD under the guidance of Toxics Link to inform the users about the correct usage of the bins. It was noticed that some households were dumping household waste into these bins instead of giving segregated waste to the waste collector.

The programme witnessed continuous increase in the number of residents hiring the service of the waste collector due to the effective mobilisation by Toxics Link. Residents staying near the municipal community bin, who were worst affected, were pleased by the change in the atti-

tude of their neighbours towards waste disposal.

Today the residents are proud of the fact that they have been successful in becoming a Zero Waste Colony, and that they have managed to compost 9,000 kg of organic waste. Appreciation from visitors to the block acts like a shot in the arm. The change in the attitude of the municipal staff is also heartening.

For programmes like this to be sustainable, cooperation from the local representatives and municipal departments is crucial. A high level of participation from the residents is paramount

For programmes like this to be sustainable, cooperation from the local representatives and municipal departments is crucial. A high level of participation from the residents is, of course, paramount. Involvement of an NGO as a facilitator needs to be recognised. Ongoing incentives in the form of better cleanliness on streets, drains, parks, etc can be ensured by the department to keep participation level high amongst the residents. These programmes need to be institutionalised so that they do not die out once the intervening NGO departs. The municipal department and the residents should start owning the initiative and take the responsibility for its supervision and maintenance.

Lessons learnt

- Residents are not confident about municipality run sanitation programmes
- There is minimal information flow within different departments of the municipality
- There is a lack of coordination between various urban agencies (DDA and MCD)
- There is a lack of clarity on institutional ownership of community projects
- The RWA has no legal powers
- There is a lack of political support and will for SWM programmes

SECTION 6

Alliance for Waste Management (AWM)

- Vision
- The Mumbai workshop
- Training workshops

Alliance for Waste Management (AWM)

Toxics Link took an initiative to bring all the experts and stakeholders on urban waste management together to debate issues and develop a strategy for creating a sustainable waste management system under a collaborative platform.

Forty participants from across the country and Bangladesh attended this meeting in Bangalore on December 12-14, 2003 to form Alliance for Waste Management (AWM). The Alliance has a National Working Committee with seven members from different parts of India. The second AWM workshop in Mumbai added another new member from East India (DISHA).

The collaborative platform was created to:

- Identify people who should be part of the mainstream and have credibility in the field.
- To document success stories in the region.
- To jointly address the waste-to-energy problem.
- Draw up an action plan for taking this forward.

Some of the objectives of th AWM are:

- Initiate a regional group which helps remove these hurdles, while simultaneously fight waste-to-energy.
- To evolve a common understanding of waste from the perspectives of communities and to identify priority areas and initiatives needed to make communities a formal stakeholder in waste management.
- To engage with other stakeholders to neogotiate for the above as well as for policy evolution and interventions.

Vision

- AWM acts as an advocacy and lobby group to use information as a tool to bring about change in the business-as-usual approach in solid waste management.
- AWM will make an effort to influence policies and strengthen local action through collective action; act as a watchdog and a monitoring group to track legal and regulatory changes and developments.

Some issues that the first workshop in Bangalore foccussed on were:

- How to make SWM a priority issue with people.
- Integration of waste pickers and women into the formal sector.
- Use of appropriate technologies.
- Addressing the plastic problem.
- Waste management to be projected as health and sanitation issue it to get more importance.
- Institutional capacity building at different levels.
- Lack of political will to implement MSW Rules 2000 – also hazardous, medical, toxic, etc.
- Extended Producer Responsibility to be brought into focus.

The Mumbai workshop May 19-20, 2004

As a result of the first workshop, many new people joined the alliance, including few municipalities and policy makers. AWM members also helped compile a status report on the implementation of MSW Rules, 2000.

The Mumbai workshop focused on relevant issues of upscaling community involvement and livelihood linkages of informal sector into solid waste management and harness its potential as a pressure group for the implementation of the rules and monitoring the processes through community involvement. It also delved into the relevance of existing policies and lack of policies like Extended Producer Responsibility.

Collaborative members (South) at the meeting held in Bangalore.

Upscaling people's participation in urban solid waste management

A vision and action plan for the six months to an year were formulated in Mumbai which are as follows:

- Regional status reports on implementation of SWM rules in different cities and towns.
- Constitution of group to track all high-power committee reports, PILs, affidavits, articulate AWM's response.
- Proactively involve local bodies, NGOs and practitioners in AWM.
- Advocacy and lobbying on existing rules – MSW, plastics by forming a National Monitoring Committee for SWM Rules, legal activism.
- Prepare guidelines on SWM Rules, and other rules concerned with SWM.
- Explore possibility to influence the national planning processes. Become part of the Advisory Body for National Planning Commission.
- Conduct studies, national awareness programmes, media campaign.
- Identify and evaluate technologies, and promoting appropriate ones.
- Ensure partnership with other networks.

Training workshops

Two Regional Skill share Workshops for 'Upscaling People's Participation in Community Waste Management Systems' were organised in Delhi at India International Centre on August 26-29, 2003 and April 20-23, 2004. The main objective of the workshops was to impart knowledge and build capacity of NGOs, other organisations, municipalities and individuals to develop and adopt sustainable waste management practices. The modules for both the workshops were prepared in consultation with a group of experts. They were planned as a series from how to start a decentralised solid waste management systems to issues and technologies available on recycling and composting. The modules also dealt with the policies regarding municipal solid waste.

The objectives of the training workshop were:

- To train and enhance the capacity of people to upscale their community-based solid management systems to higher levels and also initiate new projects.

AWM members at the training workshop held in Delhi in August 2003.

- To give people and organisations an opportunity to share their skills, which have been learnt over a long period of time.
- To identify the barriers in upscaling successful community-based solid waste management systems to higher levels.
- Provide exposure to different methods and technologies available for SWM.

Experts from different parts of the country were invited to share their experiences. Most sessions were interactive and were combined with field exposures. Besides the listed participants, two judges from the Appellate Court of Sri Lanka also joined the workshop. The first workshop focused on initiating community-based solid waste management systems, mobilising people, budgeting, hindrances, municipal rules, etc. The second workshop concentrated on technical aspects of recycling and it's informal linkages and livelihood options. Participants were exposed to different kinds of composting, recycling machines available, etc.

We received many encouraging remarks from the participants of the workshop besides a request that such workshops should be organised region-wise in the country so that more people can be trained in effective solid waste management.

SECTION 6

Upscaling people's participation in urban solid waste management

SECTION 7
Recommendations

Recommendations

The present study, which was carried out nationally explored the possibility of upscaling and financially sustaining the decentralised community-based solid waste management systems. The study validates the assumption that it is possible to upscale these interventions and make them sustainable provided that certain conditions are fulfilled. In order to make these interventions upscalable and sustainable and to implement MSW Rules, 2000 in letter and spirit, the present study suggests following recommendations:

Upscalability and sustainability of community-based interventions

- The services of solid waste management (door to door collection, nearby road sweeping and drain cleaning) should be integrated. If there are multiple service providers, there should be synchronisation among service providers.
- There should be user fee/collection fee charged from all citizens for the services. There should be different user fee slabs for different income categories. Lower income areas and slums should be cross subsidised.
- Municipalities should provide land and sheds for segregation and composting for higher utilisation of waste and landfill diversion. The money saved in secondary transportation and landfill space can be used or plough back to support community-based systems.
- The contract either to CBO/NGO or private operator should provide inbuilt incentives and penalties for a lack of source segregation, composting, etc.

Implementation of MSW Rules, 2000

There is a definite need to rethink the privatisation process. There should be some in-built conditions in the privatisation contract that should incorporate following conditions:

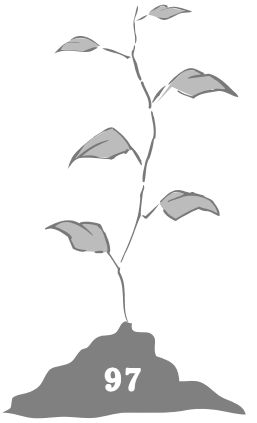
- Private operators should be asked to accommodate all existing rag pickers before employing new people for collection, transportation and processing of waste. In other words, rag pickers should be given preferential treatment in order to incorporate them into mainstream waste management system.
- CBO/NGOs and Community should be given the rights to monitor the services of service providers. Moreover, contract should explicitly mention the service indicators against which services will be monitored and paid.
- The local political leadership and the concerned municipality should take it up as a priority issue. All-important stakeholders-CBO/NGO, community, waste collectors, municipality and local political leadership-should be brought together on a common platform for continuous interaction.

Extended Producer Responsibility (EPR)

EPR provides an overall framework to link formal systems of production to the existing informal system of recycling through a Product Life Cycle approach where the producer is responsible. It provides an excellent opportunity to resolve several inter-related waste problems with a different approach in the current policy. For developing countries like India recycling of waste is the most economical and socially viable option as it generates employment for the urban poor. EPR can make big corporate houses generating huge quantity of waste (for example purified water or mineral water sellers take back their PET bottles) and invest in the recycling sector, which, at present, is facing a resource crunch. Also, active discouragement and higher taxes on packaging materials which are non-recyclable (sachets, tetra packs, multiplayer packaging, etc) in the existing system can help reduce the problem of waste. Thus, there is a clear need to bring in the concept of EPR for better waste management.

References

1. *Municipal Solid Waste [Management and Handling] Rules, 2000;* Central Pollution Control Board (Ministry of Environment and Forests), Gazette of India Notification, July 2003.
2. *Model Municipal Law to Improve Reform Process*; Urban Finance, NIUA, Newsletter Vol. 6 No. 4, December 2003
3. *Community Participation in Solid Waste Management, Factors Favouring the Sustainability of Community Participation;* A Literature Review, *UWEP Occasional Paper;* L. Moningka, M. Muller, F. Laroui, June 2000.
4. *Municipal Reforms for Sustainable Infrastructure Development in India;* Vinod Tewari Director, NIUA, Paper presented at the United Nations Asia Pacific Leadership Forum, Sustainable Development for Cities, Hong Kong, February 2004.
5. *Alliance in Urban Environment Management;* UWEP Working document, December 2001.
6. *Lessons from Community-based Initiatives in Solid Waste*; WELL study; Dr Mansoor Ali and Dr Marielle Snel; March 1999.
7. *Status of Municipal Solid Waste Generation Collection Treatment and Disposal in Class I Cities*; Central Pollution Control Board, April 2000.
8. *Manual on Municipal Solid Waste Management*; All India Institute of Local Self Governance; May 2000.
9. *Manual on Municipal Solid Waste Management*; Central Public Health Environment Engineering Organisation, April 2000.
10. *Guidelines for the Selection of Landfilling Site*; Central Pollution Control Board, February 2003.
11. *Solid Waste Management in Class I Cities in India*; Report of the Committee constituted by The Hon'ble Supreme Court of India, March 1999.
12. *Recycling Responsibility;* Toxics Link report, June 2002.
13. *Solid Waste Management in India: Status and Future Directions;* TERI Information Monitor on Environmental Science; Shaleen Singh and Sunil Pandey, 6(1): 1-4.



Abbreviations

- ALM: Advance Locality Managemnt
- AWM: Alliance for Waste Management
- CBO: Community-based Organisation
- CDC: Center for Development Communication
- CEE: Center for Environment Education
- DDA: Delhi Developmemt Authority
- DSWMS: Decentralised Solid Waste Management Systems
- DTDC: Door-to-Door Collection
- EGC: Exnora (Green Cross)
- FUP: Friends of Urban Poor
- IECF: International Education Collaborative Foundation
- JC: Jana Chaithanya
- JSA: Jan Sewa Ashram
- KKPKP: Kagad Kach Patra Kashtakari Panchayat
- MCD: Municipal Corporation of Delhi
- MJS: Muskan Jyoti Samiti
- MOEF: Ministry of Environment and Forest
- MOUDPA: Minstry of Urban Development and Poverty Alleviation
- MOU: Memorandum of Understanding
- MSW: Municipal Solid Waste
- MSW Rules, 2000: Municipal Solid Waste Rules, 2000
- NBJK: Nav Bharat Jagriti Kendra
- NEERI: National Environment Engineering Research Institute
- NGO: Non-governmental Organisation
- NORAD: Norwegian Agency for Development Cooperation
- NS: Naya Savera
- PMCA: People's Movement for Civic Action
- RWA: Resident Welfare Association
- SE: Sukuki Exnora
- SMS: Stree Mukti Sanghatana
- SWM: Solid Waste Management
- TERI: The Energy Research Institute

Notes

Notes

Toxics Link

for a toxics-free world

DELHI

H2 (Ground Floor), Jungpura Extension, New Delhi 110 014.

T: 91-11-24328006, 24320711 *F:* 91-11-24321747 *E:* info@toxicslink.org

CHENNAI

8, Fourth Street, Venkateswara Nagar, Adyar, Chennai 600 020

T: 91-44-24914358, 24460387 *E:* tlchennai@toxicslink.org

MUMBAI

M1, 404 Riddhi Gardens, Film City Road, Malad (East), Mumbai 400 097

T: 91-22-28498020, 30938967 *E:* tlmumbai@toxicslink.org

www.toxicslink.org

SPLASH