

lid Waste Management in Class 1 SoCities in India

**Report of the Committee constituted by the Hon.
Supreme Court of India**

March '99

C O N T E N T S

FOREWORD

1

PREFACE

2

EXECUTIVE SUMMARY

7

CHAPTER - 1 URBANISATION IN INDIA

1.1 Urban growth

17

1.2 Municipal Management

17

1.3 Apathy towards SWM

18

CHAPTER - 2 PRESENT SCENARIO OF SWM

2.1 Waste generation

2.1.1 Waste generation rates

19

2.1.2 Total Waste generation

19

2.2 COMPOSITION OF WASTE

2.2.1 Physical Characteristics of Waste

20

2.2.2 Chemical Characteristics of Waste

20

2.3 PREVALENT SWM PRACTICES AND DEFICIENCIES

2.3.1 Storage of Waste at Source

21

2. 3. 2	Segregation of recyclable waste at Source
26	
2. 3. 3	Primary collection of waste
27	
2. 3. 4	Waste storage depots
28	
2. 3. 5	Street sweeping
29	
2. 3. 6	Timing & methodology of street sweeping
30	
2. 3. 7	Tools used
32	
2. 3. 8	Handcarts
33	
2. 3. 9	Drawbacks
34	
2. 3. 10	Transportation of waste
35	
2. 3. 11	Drawbacks
37	
2. 3. 12	Disposal of waste
38	
2. 4	INSTITUTIONAL DEFICIENCIES
40	
2. 4. 1	Institutional Weakness
40	
2. 4. 2	Division of responsibility
41	
2. 5	PRODUCTIVITY OF SWM STAFF & EQPT
41	
	i
2. 5. 1	Manpower Productivity
41	
2. 5. 2	Productivity of Equipment
42	
2. 5. 3	Protective Equipment
43	
2. 5. 4	Service level to poor communities
43	
2. 5. 5	Peri-urban areas
44	
2. 6	LEGAL ASPECTS
44	

2.7	FINANCIAL SITUATION
44	
2.7.1	Financial Discipline
44	
2.7.2	SWM services neglected
45	
2.7.3	Public - Private Partnership
45	
2.7.4	Cost Recovery
46	
2.8	LACK OF COMMUNITY INVOLVEMENT
46	
2.8.1	Community apathy for improved SWM
46	
2.8.2	Waste-pickers and informal recycling
47	

CHAPTER - 3 RECOMMENDATIONS FOR MODERN- ISATION: TECHNICAL ASPECTS

3.1	STORAGE OF WASTE AT SOURCE
48	
3.1.1	Households
49	
3.1.2	Shops, Offices, Institutions, Workshops
52	
3.1.3	Hotels & restaurants
53	
3.1.4	Vegetable Fruit market
54	
3.1.5	Meat and fish market
55	
3.1.6	Street and food vendors
55	
3.1.7	Marriage halls, Kalyan mandaps etc.
56	
3.1.8	Hospitals, nursing homes, laboratories etc.
56	
3.1.9	Construction & Demolition wastes
57	
3.1.10	Garden waste
58	

3.2	SEGREGATION OF RECYCLABLE	
59		
	/NON-BIODEGRADABLE WASTE	
3.3	PRIMARY COLLECTION OF WASTE	
60		
3.4	MODUS OPERANDI	
64		
3.4.1	Door-step collection through containerised	
64		
	handcarts with bells/whistles	
3.4.2		Role of the Sweeper
3.4.3		Collection through motorised vehicles
3.4.4		Collection of waste from societies/colleges
3.4.5		Collection of waste from slums
3.4.6		Collection at the door in push carts
3.4.7		Collection of duly segregated recyclable waste
3.4.8		Collection of waste from shops and offices
3.4.9		Collection of bio-medical waste
	ii	
3.4.10	Collection of hotel/restaurant wastes	70
	-market waste	
12	Collection of garden waste	
	71	
13	Collection of waste from marriage halls etc	
	71	
14	Collection of constr. and demolition waste	
	71	
15	Dairy and cattle shed waste	
	72	
3.5	SWEEPING OF STREETS & PUBLIC SPACES	
72		
3.5.1	Street sweeping to be done on daily	
basis	73	
3.5.2	All SWM services to be provided	
	on Sundays and public holidays	
3	Substitution of sanitation workers	
4	Prevent burning of waste by sweepers	75
3.6	TOOLS TO BE GIVEN TO SWEEPERS	
3.6.1	Brooms	
3.6.2	Metal tray & Metal plate	
3.6.3	Handcarts/ tricycles	
3.7	NORMS FOR WORKS FOR SWEEPERS	

3. 7. 1	Working hours	
		79
3. 8		CLEANING OF SURFACE DRAI
3. 9	REMOVAL OF SILT FROM UG DRAINS	
		81
	/MANHOLES	
3. 10		PROVISION OF LITTER BINS
3. 11	TEMPORARY WASTE STORAGE DEPOT	
		82
3. 12	TRANSPORTATION OF WASTES	
		86
3. 12. 1	Domestic/ trade/ Institutional wastes	
		87
3. 12. 2	Routing of vehicles	
		87
3. 12. 3	Use of vehicles in two shifts	
		88
3. 12. 4	Type of vehicles to be used	
		88
3. 12. 5	Bio-medical wastes	
		89
3. 12. 6	Transportation of food wastes from Hotels & Restaurants	
		91
3. 12. 7	Transportation of Construction wastes	
		91
3. 12. 8	Transportation of Waste from narrow lanes	
		92
3. 13	SETTING UP OF A TRANSFER STATION	
		92
3. 14	WORKSHOP FACILITY FOR	
		93
	VEHICLE MAINTENANCE	
3. 15	PROCESSING & DISPOSAL OF WASTE	
		94
	OPTIONS AVAILABLE TO LOCAL BODIES	
		96
3. 15. 1	Composting	
		96
3. 15. 2	Sanitary landfilling	
		97
3. 15. 3	Incineration	
		97

3. 15. 4	Power generation, fuel pellets, bio methanation	98
3. 15. 5	CHOICE OF TECHNOLOGY	98

iii

3. 16	RECOMMENDED PROCESSING AND DISPOSAL OPTIONS	99
3. 16. 1	Composting Options	99
3. 16. 2	Microbial Composting	99
3. 16. 3	Vermicomposting	100
3. 16. 4	Identification of Land for Processing & Waste Disposal	101
3. 16. 5	Site selection	103
3. 16. 6	Buffer Zone	103
3. 16. 7	Development of site	104
3. 16. 8	Landfill operation	105
3. 16. 9	Closure of land fill site	106
3. 16. 10	Handling and Disposal of Bio-Medical Waste	106
3. 16. 11	Disposal Of Slaughter-house Waste And Carcasses of Dead Animals	107
3. 16. 12	Disposal of Industrial Waste	108
3. 16. 13	Common Treatment and Disposal Facilities	108
3. 16. 14	Closure Of Old Disposal Sites	108
3. 16. 15	"NIMBY SYNDROME"	108
3. 16. 16	Marketing Mechanism for the Sale of Compost	109
3. 16. 17	Demonstration farming using compost	109

FLOW CHART OF MUNICIPAL SOLID WASTES

110

CHAPTER - 4 INSTITUTIONAL ASPECTS & CAPACITY BUILDING

4. 1	Decentralisation of Administration
111	
4.1.1	Ward Level Administration
112	
4.1.2	Zonal Administration
113	
4.1.3	City Level Administration
113	
4. 2	Delegation of Powers
113	
4. 3	Induction of Environmental / Public Health Engineers
114	
	Typical Organisation Chart for a 30-lac City
116	
4. 4	Human Resources Development
117	
4. 5	Work Norms
118	
4. 6	SWM Administration to be under One Umbrella
119	
4. 7	Safeguarding supervisory staff against abuses of the SC, ST (Prevention of Atrocities) Act, 1989
119	
4. 8	The Tenure of the Municipal Commissioner & Chief Executive Officers
120	
4. 9	Interdepartmental Co-ordination
120	
	iv
4. 10	Encouragement to NGOs
121	
4. 11	NGO / Private Sector Participation
122	
4. 12	Incentives to the Private Sector
123	
4. 13	Amendment to Central Labour (Regulation

	& Abolition) Act 1970
123	
4. 14	Levy of Administrative Charges
123	
4. 15	Mobile sanitation courts
124	
4. 16	Role of Technology / Educational & Research Institutions
124	
4. 17	Documentation of Best Practices
124	

CHAPTER - 5 MANAGEMENT INFORMATION SYSTEM

125

5.1	General information to be collected
126	
5.2	General Information on SWM
126	
5.3	Monitoring of SWM Services
126	

CHAPTER - 6 FINANCIAL ASPECTS

6. 1	Financial discipline
135	
6. 2	Review of financial position of ULB
138	
6. 3	Assessment of Gap in finance
139	
6. 4	Fiscal autonomy to local bodies
139	
6. 5	Link obligatory services / Taxes/fees to cost of living index
140	
6. 6	Levy of charges on Central/State Govt. properties
140	
6. 7	Tax-free status for Municipal bonds
140	
6. 8	Property Tax reform
141	

6.9	Incentives to recycling industry	
141		
6.10	Financial support of Govt. of India & State Govts.	
141		
11	Transfer of savings of 10th Finance Commission	145
12	Local bodies to avail of loans from HUDCO / financial institutions funds with ministries	145
13	Channelise SWM funds with Ministries	145
14	Allocation of large fund to urban sector	146
15	Govt. of India to have schemes to have SWM Component	146
16	Support to peri-urban areas	146

v

CHAPTER - 7 HEALTH ASPECTS

147

7.1	Special attention to slums & traditionally dirty areas	
148		
7.2	Implement low cost sanitation programme	148
7.3	Temporary toilets at construction sites	148
7.4	Covering of buildings under construction	148
7.5	Cattle nuisance	149
7.6	Health monitoring for sanitation workers	149
7.7	Prevent indiscriminate use of pesticides	149
8	Non Municipal authorities also to follow	

9 **these instructions**
 149

CHAPTER - 8 LEGAL ASPECTS
 150

CHAPTER - 9 PUBLIC AWARENESS
155

1 **Reduce -- Re-use – Recycle**
 155

2 **Public participation**
 157

3 **Public Information, Education,**

 Communication & Awareness programme
 157

CHAPTER - 10 CONSTITUTION OF TECHNOLOGY
 MISSION
 164

CHAPTER - 11 CLASSIFICATION OF
 RECOMMENDATIONS
 167

11. 1 Mandatory recommendations for citizens
167

11. 2 Mandatory recommendations for local
bodies
 167

11.3 Discretionary recommendations for urban

 local bodies
169

CHAPTER - 12 SUGGESTIONS FOR THE
 CONSIDERATION OF CENTRAL
 & STATE GOVERNMENTS
 170

CHAPTER - 13 TIME FRAME FOR
 IMPLEMENTATION **173**

LIST OF ANNEXURES

- A Order of the Hon'ble Supreme Court of India
176**
- B Bin : Population ratio in Class I cities in India
179**
- C Sweeper : Population ratio
180**
- D (i) Type of waste to be put in the bin meant for
Food waste
181**
- (ii) Type of recyclable waste in separate bags
181**
- E List of some domestic hazardous wastes
182**
- F De-centralised composting
183**
- G Aerobic Microbial Composting
185**
- H Process of Vermicomposting
192**

Solid Waste Mgt in Class 1 Cities in India :

FOREWORD

The Hon'ble Supreme Court of India constituted a Committee for suggesting improvements in SWM practices in Class I cities in India. The Committee had detailed deliberations on the subject and interfaced with representatives of several States and ULBs in the country through four regional workshops and I have great pleasure in submitting the final report incorporating the recommendations for improving SWM practices in Class I cities in the country and making cities clean and liveable. I am happy to say that all the members of the Committee effectively participated in the deliberations. Many useful suggestions also emerged in the four regional workshops that were conducted by the Committee and these have been appropriately incorporated in the final report.

I would like to place on record the assistance provided by the Govt. of India, Ministry of Urban Affairs and Employment for the deliberations of the Committee and the State Governments of West Bengal, Tamil Nadu and Maharashtra for the smooth conduct of the regional workshops.

I would also like to put on record my deep appreciation for the dedicated and untiring efforts of Mr. P. U. Asnani, member of the Committee who has been instrumental in providing technical inputs as well as the framework for discussions and finalisation of the report. Mrs. Almitra H. Patel, member has also been a source of inspiration and information in facilitating the task of the Committee. Last but not least, the efficient and timely secretarial services provided by Mr. Sumit Chatterjee, Section Officer, Department of Urban Development have been commendable.

**ASIM BARMAN
CHAIRMAN**

P R E F A C E

Solid Waste Management is one of the important obligatory functions of Urban Local Bodies in India. This service falls far short of desired levels, resulting in problems of health, sanitation and environmental degradation.

Given the pathetic situation of Solid Waste Management practices in the country and having no solution in sight, a public interest litigation was filed in the Hon'ble Supreme Court of India by Mrs. Almitra H Patel & another v/s Union of India & others, seeking directions from the Hon'ble Supreme Court of India to the Urban Local bodies as well as the Government of India and the State Governments in the country, for improving Solid Waste Management practices expeditiously.

The Hon'ble Supreme Court of India entertained the Writ Petition No. 888 of 1996 and after several hearings felt it appropriate to constitute a Committee of the following members to look into all aspects of Solid Waste Management in class I cities of India and submit a report to the Hon'ble Supreme Court of India:

- | | | |
|-----|--|----------|
| (1) | Mr. Asim Barman
Municipal Commissioner,
Calcutta Municipal Corporation | Chairman |
| (2) | Mr. S. R. Rao
Secretary, SSI, Govt. of Gujarat &
Ex-Municipal Commissioner, Surat. | Member |

- | | | |
|-----|--|---------------------|
| (3) | Mr. S. K. Chawla,
Chief Engineer, CPWD | Member |
| (4) | Mr. P.U.Asnani,
Urban Environment Infrastructure
Representative of India,
USAID & Consultant,
Ahmedabad Municipal Corporation. | Member |
| (5) | Dr. Saroj
Joint Director,
Ministry of Environment & Forests | Member |
| (6) | Mr. Rajat Bhargava
Municipal Commissioner,
Vijayawada Municipal Corporation | Member |
| (7) | Mr. Yogendra Tripathi
Deputy Secretary,
Ministry of Urban Affairs and
Employment. | Member
Secretary |
| (8) | Mrs. Almitra Patel
Convener, INTACH Waste Network. | Member |

The order of the Hon'ble Supreme Court regarding the constitution of the Committee and its terms of reference dated 16th January 1998 is at **Annexure ' A '**.

Pursuant to the order of the Hon'ble Supreme Court of India dated 16-1-1998, the Ministry of Urban Affairs and Employment, Govt. of India issued Order No. Q-11021/1/97-PHE dated 29th January 1998 regarding constitution of the SWM Committee.

This Committee comprises of practitioners in the field and representatives of relevant ministries besides the petitioner. The Committee had several sittings at Delhi, Calcutta, Ahmedabad and Bangalore where the Committee very carefully deliberated on the existing Solid Waste Management practices in Class I cities in the country and identified the deficiencies in the existing systems. The Committee after considering various aspects of Solid Waste Management and keeping in view the present status of the Urban Local Bodies in India, their financial capabilities, technical know-how, availability of technological options in India, the capacities of

Indian industries to supply the machinery and equipment for modernising the systems etc. prepared an Interim Report dated 30th June, 1998 recommending actions to be taken by the urban local bodies and the support that may be extended by the Govt. of India and State Governments for improving Solid Waste Management practices in Class I cities in the country.

The Committee while submitting the Interim Report to the Hon'ble Supreme Court of India, had suggested to the Hon'ble Supreme Court that there was a need to conduct 4 workshops in various parts of the country to field test the recommendations before the Supreme Court gave any directions on the report. The Hon'ble Supreme Court had kindly agreed to this suggestion and directed the Committee to conduct 4 regional workshops at Delhi, Mumbai, Calcutta and Chennai and, after getting necessary feed back on the recommendations, to submit its final report. The regional workshops were conducted

On	24 th October	1998	at	Calcutta
On	21 st November	1998	at	Chennai
On	28 th November	1998	at	Mumbai
On	15 th December	1998	at	New Delhi

The Mayors, Municipal Commissioners / Chief Executive Officers / Chief Officers, Heads of Departments of Solid Waste Management of various cities / corporations / municipalities, Secretaries to Government, Urban Development Department, Directors of Municipal Administration of various States, representatives of various national and international organisations, NGOs associated with SWM, representatives of Medical Practitioners' Associations, Traders' Association, as well as those who are providers of service through the private sector were invited to participate in the workshops.

Each workshop was conducted for a full day in which each recommendation was discussed, item by item, in detail, the feed - back of the participants was obtained and their views were heard. The views expressed by various participants were noted by the members of the Committee and have thereafter been carefully considered by the Committee. The participants were largely in agreement with the recommendations contained in the Interim Report.

The Committee after taking into consideration the views expressed by the members present in the 4 regional workshops and existing constraints of the local bodies etc. has now finalised its recommendations and submits this report for appropriate consideration of the Hon'ble Supreme Court.

This Final Report is drafted in very simple language and made very brief so that even the smaller urban local bodies in the country can easily go through, understand and implement the recommendations without difficulty. Knowing the limitations of urban local bodies and their institutional capabilities, simple technologies and easily achievable standards with liberal time frame have been suggested, so that the municipalities and the Corporations could at least reach a minimum level of service in a period of 3 years. Thereafter these standards can be raised and made more and more stringent with the passage of time to reach higher levels of service. The Committee has also interacted with the Central Pollution Control Board in respect of laying down the minimum standards the local bodies should achieve.

In this report, the Committee has made recommendations for each stage of solid waste management services and has laid down the minimum level of service the local body must provide in a given time frame. While making the recommendations the committee has given various technological options which urban local bodies can consider and choose the options most suited to their local conditions and financial capabilities.

The Committee has suggested amendments in State laws needed to make solid waste management practices effective and has also suggested to the Govt. of India to keep the SWM services outside the purview of the Contract Labour (Regulation & Abolition) Act 1970, so as to enable public private partnerships and private sector participation in selected areas of Solid Waste Management for improving the quality of life in urban areas. This has often been recommended by the Govt. itself. It has also suggested that the supervisory staff of SWM services in the country be kept out of the purview of Schedule Caste, Schedule Tribes (Prevention of Atrocities) Act 1989, to enable the supervisory staff to supervise the work of street sweepers and the labour force employed in collection, transportation, processing and disposal of waste fearlessly and effectively. The Committee has also made recommendations, which the State and Central Governments may

seriously consider, to improve the finances of urban local bodies and to give a boost to the composting of waste and to the recycling industry in this field.

The Committee strongly feels that looking to the vastness of the country and lack of technical know how in the urban local bodies, a Technology Mission for solid waste management at the national level, may be set up by the Govt. of India for a period of 5 years to effectively monitor, guide and support the implementation of these recommendations.

The Committee expresses its deep sense of gratitude to the Hon'ble Supreme Court of India and Ministry of Urban Affairs and Employment of Govt. of India for giving it an opportunity to look into one of the most important aspects of Urban Management and make recommendations which may eventually help in improving the Solid Waste Management Practices in urban areas resulting in environmental protection and improving the quality of life in the cities.

The Committee hopes that this report will meet with the expectations of the Hon'ble Supreme Court of India.

(ASIM BARMAN)
Chairman, Committee on Solid Waste Management for
Class I Cities in India &
Municipal Commissioner,
Calcutta Municipal Corporation

Ahmedabad
25th March 1999

(S. R. Rao)
Member

(S. K. Chawla)
Member

(P. U. Asnani)

(Dr. Saroj)

Member

Member

(Rajat Bhargava)
Member

(Mrs. Almitra Patel)
Member

(Yogendra Tripathi)
Member Secretary

EXECUTIVE SUMMARY

Solid waste management is an obligatory function of Urban Local Bodies (ULBs) in India. However, this service is poorly performed resulting in problems of health, sanitation and environmental degradation. With over 3.6% annual growth in urban population and the rapid pace of urbanisation, the situation is becoming more and more critical with the passage of time. Infrastructure development is not in a position to keep pace with population growth owing to the poor financial health of most of the urban local bodies. Solid waste management is one among the essential services, which suffers the most in such a situation. Lack of financial resources, institutional weakness, improper choice of technology and public apathy towards solid waste management have made this service far from satisfactory.

Present scenario of present solid waste management services.

Waste generation:

Waste generation ranges from 200 gms to 500 gms per capita per day in cities ranging from 1 Lac to over 50 Lacs population. The larger the city, the higher is the per-capita waste generation rate. The total waste generation in urban areas in the country is estimated to exceed 39 million tonnes a year by the year 2001.

Composition of Waste

Indian mixed waste has a large proportion of compostable material and inerts. As per NEERI studies, compostable matters range from 30% to 57% and inert materials from 40% to 54%. The component of recyclable material is between 5% to 10%.

Technology adopted for storage, collection, transportation and disposal of waste:

The prevalent SWM practices in the country are highly deficient. Generally no storage of waste is being done at source and instead domestic, trade and institutional wastes including bio-medical and industrial waste, are thrown on the

streets, footpaths, drains and water bodies treating them as receptacles of waste. Recyclable waste material is also not segregated at source and is disposed of on the streets, along with domestic, trade and other wastes. Construction and demolition wastes also pose a serious problem as these wastes are also deposited on the roadside or open spaces, obstructing traffic and causing nuisance.

Primary Collection

There is no system of primary collection of waste in most cities in India. The waste thrown on the streets is, therefore, collected from the streets and/or from the street bins, which are inadequate in number and ill designed.

Waste Storage Depots

Open sites or cement concrete bins, metal bins, masonry bins and structures are used for temporary bulk storage of wastes. These bins are very unhygienic and necessitate multiple handling of wastes. Waste is more often seen outside the bins than inside them. They are not cleared daily.

Street Sweeping

Street sweeping is not carried out regularly. Several streets are occasionally swept or are not swept at all. No sweeping is done on Sundays and public holidays in many cities. The tools used for street sweeping are also inefficient and out-dated.

Transportation of wastes

Transportation of waste is done through a variety of vehicles such as bullock carts, three-wheelers, tractors and trucks. Some cities use modern hydraulic vehicles. Most transport vehicles are loaded manually and utilised in one shift only, although the number of transport vehicles is inadequate. The fleet of vehicles is thus not optimally utilised. Inefficient workshop facilities deplete the fleet of vehicles. The transportation system also does not synchronize with the system of primary collection and bulk waste storage facilities. Multiple manual handling of waste becomes necessary.

Processing and Disposal of Waste

Generally no processing of waste is done in the country except in a few cities where de-centralised or centralised composting is done on a limited scale. Disposal of waste is done in a most unscientific manner. Generally, crude open dumping is adopted for disposal of waste in low-lying areas. Most local bodies deposit waste at the dump-yard without ascertaining the suitability of the land for waste disposal and do not bother to cover the waste with inert material. These sites emanate a foul smell and become breeding grounds for flies, rodents and pests and pose a serious threat to underground water resources. Thus the entire system of waste management in the country is out-dated, unscientific and highly inefficient.

Institutional Arrangements

Institutional arrangements are inefficient. There is lack of professionalism in administration in this service, resulting in poor levels of service. The laws governing the urban local bodies do not have adequate provisions to deal with the situation effectively and local bodies do not have the necessary powers to punish defaulters. Filing cases in the court for sanitation offences has become cumbersome, takes a lot of time and energy and does not give the desired results.

Community Involvement

There is total apathy on the part of citizens in the matter of handling their waste and in keeping the city clean. Citizens expect the local body to keep the city clean despite their non-involvement.

NGOs and the informal sector of rag pickers are not optimally utilised in tackling the ever-growing problems of waste management in urban areas.

65% of India's urban population lives in 300 Class I cities having a population above 100,000. These cities have been facing serious problems of solid waste management. The Committee has carefully considered various options to improve solid waste management practices in these cities and, given the present state of SWM

practices in urban areas in the country, the institutional capabilities of local bodies, their financial health and other priorities, the Committee recommends a minimum level of services as under that each local body must provide and has given technological options in the detailed report which the local bodies may consider while choosing the technology suitable for their cities.

RECOMMENDATIONS FOR MODERNISATION OF SOLID WASTE MANAGEMENT PRACTICES IN CLASS I CITIES

Ban on Throwing of Wastes on the Streets

No waste shall be thrown on the streets, footpaths, open spaces, open drains or water bodies.

Storage of waste at source

Waste shall be stored at source of generation in 2 bins/bags, one for food/bio-degradable wastes and another for recyclable waste. Domestic hazardous waste, as and when produced, shall be kept separately from the above two streams.

Multi - storeyed buildings, commercial complexes and group housing shall additionally provide community bins for storage of waste generated by their members. Community bins shall also be provided in slums by the local body for the community storage of waste by slum dwellers.

Doorstep Collection of Waste

Both the streams of waste, organic / biodegradable waste as well as recyclable waste, shall be collected from the

doorstep. Containerised handcarts or containerised tricycles or small-motorised vehicles shall be used for daily collection of food / biodegradable waste from the doorstep through public participation, using a bell, whistle or horn as a means of announcing the arrival of the collection staff.

For collection of recyclable waste from the doorstep, NGOs may be encouraged to organize the rag-pickers. They may allot them the work of collection of recyclable material from the doorsteps instead of picking it up from the streets, bins or dump-yard, thereby upgrading their status. This waste can be collected once or twice a week according to the convenience of the households, shops or establishments.

Hazardous toxic waste material which is occasionally generated shall however be disposed of by the citizens in special bins to be provided in the city at suitable locations by the urban local bodies.

Sweeping of Streets on All Days of the Year

Sweeping of streets and public places, having habitation or commercial activities on one or both sides, shall be done on all days of the year irrespective of Sundays and public holidays. Arrangements for rotating weekly rest-days are to be made by the local bodies.

Work Norms for Sweeping of Streets

Work norms ranging from 250 to 750 running meters of road length have been recommended, depending on the density of the area and local conditions. Giving a demarcated "pin point" area for street sweeping and waste collection is also recommended for optimum utilisation of manpower.

Provision of Litter bins at Public Places

Provision of litter bins at railway stations, bus stations, market places, parks, gardens and important commercial streets may be made, to prevent littering of streets.

Abolition of Open Waste Storage Sites and Other Unhygienic Street Bins

The pathetic condition of street bins must be corrected by the provision of neat mobile closed-body containers into which waste can be directly transferred from the containerised hand carts or tricycles and all open waste-storage sites as well as cement concrete or masonry bins must be abolished in a phased manner.

Transportation of Waste to Synchronize with Waste Storage Facility - Dispense with Manual Loading of Waste

For the transportation of waste, a system which synchronizes with both primary collection and bulk waste storage facilities may be introduced. Manual loading and multiple handling of waste may be dispensed with and instead, hydraulic vehicles for lifting the containers may be used in larger cities and tractor trolleys or a tractor container combination may be used in smaller cities.

Transportation of waste shall be done on a regular basis before the temporary waste-storage containers start overflowing. For economy in expenditure, the vehicle fleet should be used in at least two shifts. Workshop facilities may be optimised to keep at least 80% of the vehicle fleet on road. Transfer stations may be set up in cities where the distance to waste-disposal sites is more than 10 km.

PROCESSING AND DISPOSAL OF WASTE:

Conversion of Organic Waste / Bio-degradable Waste into Bio-organic Fertiliser (Compost)

With the availability of land for processing and disposal of waste becoming scarce and the food and bio-degradable

component useful to agriculture going waste, measures for conservation of land and organic waste resources shall be taken and organics shall be returned to the soil. To meet these objectives, all food waste and bio-degradable waste shall be composted, recyclable waste shall be passed on to the recycling industry and only rejects shall be landfilled in a scientific manner. Decentralised composting with public and NGOs/CBO participation, may be encouraged wherever possible, and centralised composting of the rest of the waste may be done. Microbial or vermi- composting processes may be adopted. A variety of composting options has been given in the report and their processes are explained.

Caution against using unproven technologies

Local bodies are cautioned not to adopt expensive technologies of power generation, fuel pelletisation, incineration etc. until they are proven under Indian conditions and the Government of India or expert agencies nominated by the Government of India advises cities that such technology can be adopted.

Land to be made available on priority for processing and disposal of waste

Availability of land for setting up processing plants and for disposal of waste is a major problem faced by urban local bodies. Government wasteland must therefore be given on top priority for this purpose free or at nominal cost, and if such land is not available or not found suitable, private land should be acquired or purchased through negotiated settlement. A Committee at the District level should identify suitable land and State Governments should form Empowered Committees to give speedy final clearance and prompt possession of suitable land to the ULB.

Criteria for Site Selection, Site Development and Landfill Operations

Criteria for site selection, development of land fill sites and scientific landfill operations may be adopted. Remediation of old abandoned landfill sites should also be done as suggested in the report. Bio-medical waste, industrial waste

and slaughter-house waste may be managed as per the relevant Rules and guidelines of the Government of India and / or Central Pollution Control Board.

Institutional Strengthening and Capacity Building

Institutional strengthening is the key to success of the SWM system. Professionalism in administration, decentralisation of administration, delegation of financial and administrative powers, induction of environmental/public health engineers in the solid

waste management services and fixation of work norms and proper supervisory levels are recommended. Human resource development through training at various levels needs to be taken up. Municipal Commissioners and Chief Executives should not be transferred frequently and should have a tenure of at least 3 years to perform effectively. Inter-city meets for sharing of experience are recommended.

Adequate safe-guards for the supervisory staff against abuse of the Schedule Caste / Scheduled Tribe (Prevention of Atrocities) Act 1984 may be provided through suitable amendments in the law to enable the Supervisory staff to perform their duties fearlessly.

NGO / Private sector Participation in SWM Services

There is a need to improve accountability and the level of services through NGO / Private sector participation in SWM services to improve overall performance without harming the interests of the existing staff. Suitable amendments in the Contract Labour (Regulation and Abolition) Act 1970 may be done by the Govt. of India to permit private sector participation in this service.

Enforcement

A system of levy of administrative charges or special cleaning charges from those who litter the streets or cause nuisance on the streets may be introduced and powers to

punish offenders may be given to the local bodies through suitable additions to the Municipal Acts & Rules.

Management Information System

MIS is the key to monitoring the performance of manpower and machinery and to help in planning for the future. Detailed management information systems suggested in the report may be introduced.

Financial Aspects

The poor financial health of ULBs is major constraint in improving SWM systems. The financial condition of local bodies may first be improved by setting the house in order and a series of measures towards financial discipline, avoidance of wasteful expenditure, prioritising the expenditure on essential services, as recommended in the report may be taken. Taxes, user charges and fees should be raised and linked to the cost-of-living index. Area-based property-tax reforms may be taken up to improve the finances of the ULBs.

Financial Support to ULBs by States and Central Governments

Financial support to ULBs from the State Government and the Central Government in terms of the 74th Amendment to the Constitution may be given expeditiously and funds may also be allocated to ULBs for a period of three years as per the formula given in the report. In the meantime, transfer of unspent grants by the 10th Finance Commission to the ULBs may be considered for modernising their SWM practices. Fiscal autonomy to local bodies, tax-free status for municipal bonds and incentives to recycling and composting industries may be considered by the Central and State Governments and Union Territories.

Health Aspects

Improper SWM practices give rise to problems of health and sanitation. Twenty-two types of diseases are associated with improper SWM practices. Proper management of processing and disposal sites, special attention to cleaning of slums, provision of low cost sanitation facilities to prevent open defecation, prevention of cattle nuisance, proper training to the workforce and use of protective clothing are some of the measures the local body should take immediately to protect the health of the citizens and the work force.

Legal Aspects

Citizens' active participation may be ensured through massive public awareness campaigns. Simultaneously, adequate provisions may be made in local State laws governing the local bodies to ensure public participation and action against defaulters.

Legislative provisions to be made by each State have been suggested in the report.

Public Awareness Strategy

Public awareness campaign using information, education and communication (I-E-C) techniques may be used. Waste Reduction, Reuse, Recycling (R-R-R) may be advocated to reduce the burden on the local body and citizens may be motivated to store waste at source in a two-bin system, co-operate with the doorstep primary collection system and keep the city litter-free. Hygienic Solid Waste Management needs to find a place in the National Agenda.

Technology Mission for Solid Waste Management

Given the vastness of the country and the present condition of urban local bodies, implementation of these recommendations requires very effective follow-up, monitoring and technical support. A Technology Mission for SWM may therefore be urgently constituted by the Government of India under the Ministry of Urban Development for a period of 5 years, having a mandate to monitor the performance of various local bodies, to guide the local bodies about various technologies for processing and

disposal of waste, to give technical assistance as well as financial assistance by channelising funds from various Government sources as well as financial institutions to develop material for awareness programmes, identify training needs, bench-mark performance indicators and give continued and focussed attention to the reform of SWM practices nation-wide.

Time Frame

A time frame is necessary to implement the recommendations which have been prescribed, ranging from 3 months to 3 years as per the details given in the report.