

## **Key points about solid waste management**

- Successful solid waste management depends upon an efficient operational system from the outset.
- Household solid waste should be collected at least three times every week in hot humid climates and preferably daily.
- Many towns and cities in South Asia have well-developed but informal systems of resource recovery from solid waste. It is important to identify and understand these systems when planning any changes at the municipal level.
- In the absence of local information, the amount of solid waste generated in low income areas in South Asia can be assumed to be 0.35 kg per person per day.
- Communal containers for solid waste tend to create problems, particularly when they are only emptied infrequently.
- It is important to identify and build upon local initiatives which are developed independently of the municipality by householders and sweepers.
- Possible initiatives include those based on agreements between individual households and sweepers and those which involve area based organisations facilitating or managing the relationship between households and sweepers. These may involve small scale local contractors.
- The key issue is to define the interface between such local initiatives and municipal involvement in waste collection from designated transfer points.
- Sanitary landfill is the most appropriate option for solid waste disposal; this involves the controlled deposition of waste which is covered daily by soil or other inert material.

## Section 4e

# **Solid Waste Management**

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### **Tool SW1 Solid Waste Management: Objectives and options**

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#### **Objectives**

The objectives of solid waste management services are to ensure the satisfactory storage, collection and disposal of solid wastes and the cleaning of streets and other public places. More specifically, the aims include:

- maximising resource recovery through the reuse and recycling of discarded materials;
- regular collection of waste from houses or communal collection points;
- eliminating solid waste from drains, roadsides, open plots and around solid waste storage facilities; and
- appropriate disposal of the waste.

Achievement of these objectives will bring about obvious improvements in the aesthetic quality of the environment. It will also have an impact on public health; elimination of heaps of putrefying waste will remove a breeding medium for flies and a home for rats. At the same time, the number of places where mosquitoes can breed will be reduced as stagnant pools of water caused by solid waste-induced drain blockages are eliminated.

An important overall objective of solid waste management improvements is to provide services at a cost which is affordable to both the consumer and the

organisation responsible for managing services. There is a lot of scope for developing small scale private activities at the local level to satisfy the demand for improved service.

### **The need for operational management**

Solid waste is generated by many human activities. In residential areas, it comprises kitchen waste from food preparation, a wide variety of materials for which no further use can be found within the household and street sweepings. Commercial, industrial and institutional activities will also generate solid waste and particular attention may have to be paid in upgrading schemes to the wastes generated by food shops and markets.

Less than 50% of the solid waste generated throughout some cities is collected and observation suggests that the situation is worse in low-income informal areas. The result is that solid waste is deposited and accumulates along roadsides, on undeveloped plots and in drains, causing unpleasant smells, encouraging the breeding of flies and rats and blocking drains and sewers. Apart from the obvious deterioration in the environment caused by this situation, there are potentially serious consequences for health.

Solid waste management differs from all other components of physical infrastructure in that it depends upon an efficient operational system being established from the very outset. Other services, such as roads or drainage, can operate adequately for a considerable period of time after construction with practically no input on the maintenance side until something actually goes wrong. Thus solid waste management is concerned more with operation than with design and construction. In this respect, it is worth noting that solid waste management may consume between 20% and 40% of municipal revenues. In India, for example, it employs between 3 and 6 people per 1000 population. At present, street cleaning usually comprises a significant proportion of the solid waste management budget. Nevertheless, good design, leading to more efficient operation, is important.

It is rarely possible to dispose of solid wastes within the boundaries of an upgrading area; the wastes must be collected and transported away from the site, usually to a municipal disposal area on the fringes of the town or city.

It is necessary to explore different strategies for operational management and to see how the approaches can best be integrated in order to provide the optimum service. These are:

- municipal management;
- maximising waste recovery; and
- promotion of local micro-enterprises.

Note that on its own, none of these is likely to provide a satisfactory solution to the problems. The planning process needs to look at the extent to which each can contribute in particular local circumstances at the neighbourhood, ward and city levels.

As a very general guide, municipal level interventions should focus on secondary collection, transport and disposal whilst micro-enterprises linked to waste recovery and local collection initiatives deal with neighbourhood level waste management.

### **Options: municipal management**

This is the current statutory approach in most town and cities, where the municipality is responsible for all stages of solid waste management from street cleaning and emptying of communal bins through to final disposal. The services are rarely adequate because:

- in many cities, formal municipal responsibility starts with street sweeping; household collection of waste is excluded;
- most municipalities consider waste transportation to be their main responsibility;
- municipal institutions are poorly financed and have no mechanisms for direct cost recovery;
- links between the service provider and the users are weak with no systems for complaints and consultation; and
- there exists difficulties in the efficient management of a large, unskilled and highly organised workforce.

### **Options: maximise waste recovery**

In many south Asian cities there are well developed but informal systems for the recovery, reuse and recycling of domestic, commercial and industrial wastes. The composition of solid waste entering the municipal waste stream indicates that (in contrast to Europe and America) there is very little paper, plastic, glass or metal; it is mainly silt (from road sweeping) and organic

vegetable matter. This is because solid waste is an important resource, and as a result there exists a highly developed and complex system of waste recovery, reuse and recycling which operates on a commercial basis. This is not a system which has been developed by the public sector, nor is it an environmental hobby; it is market based and market driven, sometimes with NGO, CBO and municipal involvement in promoting local schemes.

Itinerant waste buyers purchase recyclable items door-to-door from householders or their servants; this material is sold on to middle dealers who may specialise in certain types of waste. Finally, there are the waste reprocessors; it has been estimated that this 'informal' industry could provide employment for up to 40,000 people in Karachi (an important centre for waste reprocessing). At the micro-level, there are particularly complex intra-household relationships involving women and domestic servants which have gender implications. There are also large numbers of waste pickers who are not part of the formal system, who make their living from picking out material for reuse/recycling from communal bins, transfer points and waste disposal sites. These people may be amongst the poorest of the poor.

It is essential to recognise the scale and importance of such activities in the overall planning of neighbourhood and city level solid waste management.

## **Options:**

### **local enterprises as a response to poor service**

One response to the generally poor service provided by municipalities is that residents themselves take initiatives to improve the primary collection of solid waste from their neighbourhood; rich and poor alike are prepared to pay for additional waste services. Area based organisations and NGOs have played important roles here and the basis is some form of local enterprise. This may involve municipal sweepers being paid extra, local activists either facilitating or managing collection, or a small contractor providing local services.

Whilst these may appear to be ad-hoc solutions, they provide many important lessons for future strategies to promote micro-enterprise development in solid waste management. Official programmes to improve solid waste management tend to be city-wide and top-down, and are coupled with official policy and procedures. Public initiatives, however, are usually small-scale, local and dynamic. There is nevertheless scope for integrating them with official services.

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## **Tool SW2 Solid waste management: Planning**

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### **Components of solid waste management systems**

Municipal solid waste management involves a number of inter-related operations. These are:

- storage of waste in household or communal containers;
- method of collection of the waste from the storage containers;
- frequency of collection of the waste;
- transfer of waste from smaller containers to larger ones;
- haulage of waste to a disposal site; and
- location and management of the disposal site.

Some of the options to be considered in the storage and collection process are presented in Figure SW1.

### **Investigating the existing situation**

Planning for improved solid waste collection services must take into account existing conditions, organisational structures, practices and attitudes. Investigations should cover the following specific subjects:

- the amount and characteristics of solid waste;
- present responsibility for solid waste collection;
- existing solid waste collection services;
- any financial incentives or other financial consideration which affect the quality of service provided;
- attitudes of householders and solid waste collectors; and
- any informal recycling practices.

If this preliminary investigation is omitted, there is a grave danger that any proposals made will be inappropriate and unworkable.

In order to estimate storage requirements and collection frequencies and devise suitable collection methods, it is important to know the volume, density and weight of solid waste produced. Knowledge of its composition will be required when considering disposal methods and the possibilities for

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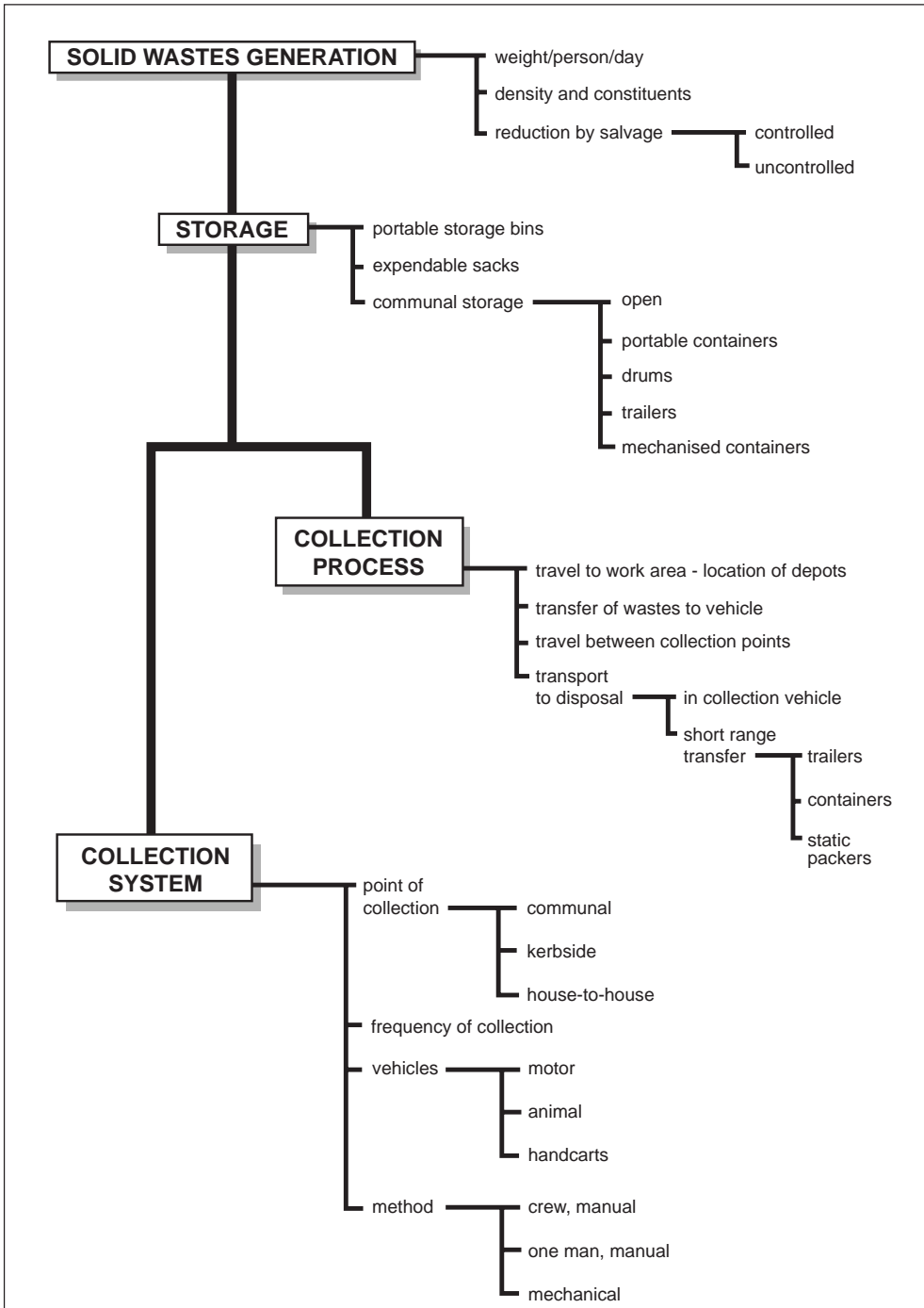


Figure SW1. Flow chart and decision areas for storage and collection

(after Flintoff, 1984)

recycling. The generation rate of solid waste is usually given in kilograms per person per day (kpd) and its density in kilograms per cubic metre. The volume in litres per day (lpd) is then equal to the mass divided by the density. The typical range of characteristics of solid waste is as follows:

Generation rate	0.25 - 1.0 kpd
Density	100 - 600 kilograms per cubic metre
Putrescible matter which decomposes	20 - 80% by weight

Examples of generation rates from Pakistan are:

- Faisalabad (residential only, 1991): low income 0.20 kpd; middle income 0.23 kpd; high income 0.25 kpd;
- Lahore (residential only, 1981) city-wide average 0.43 kpd.

In India, a countrywide average generation rate of 0.35 kpd has been estimated for domestic solid waste.

Based on these figures an amount of 0.25 kpd plus an allowance of 0.10 kpd for street sweepings giving a total of 0.35 kpd should be allowed for upgrading areas if local information is not available.

The volume generated, which is important in planning the local storage and collection on the site, depends upon the density of the solid waste. In low-income communities much material is salvaged either for sale or reuse; the same material would be thrown away by richer people. As income levels rise, the mass of waste produced increases and its density decreases, leading to marked increases in the volume.

Density increases during the collection and disposal process; typical densities based on data from Faisalabad are shown below.

Location	Density (kg per cubic metre)
Household storage containers	210
In collection trucks	600
In tractor-trailer	450
6 months after disposal	850



Based on these figures, the density in communal bins is likely to be in the range 250-400 kg per cubic metre. It is therefore reasonable to assume a volumetric generation rate of about 1.7 lpd (including street sweeping) at the site level and about 1.2 lpd at the household level.

The composition of solid waste does not have a significant effect on the choice of collection method.

### **Storage of solid waste**

Waste is initially stored within the household, but may at some stage be transferred to a communal storage container prior to eventual collection and removal.

#### ***Household storage***

Ideally, household waste should be stored in a sturdy container of sufficient capacity which is easy to empty and clean, and has a well-fitting lid. Galvanised steel and plastic bins can satisfy these criteria; however, they are not affordable in most low-income communities. Many houses use small containers for which no other use can be found, or accumulate a small pile of waste outside the house which is eventually carried to a communal container in a basket.

Better quality waste containers, suitable for house-to-house, roadside, or street corner collection, may only be appropriate when the level of collection service is highly efficient.

#### ***Communal storage***

The use of communal storage containers to which householders carry their waste is widespread and seems likely to remain a common option for low-income communities. A frequent problem is the provision of too few containers of insufficient capacity which are inappropriately located. Containers are usually open, giving access to rats, flies, and animals, which is undesirable for both hygienic and aesthetic reasons. It is unlikely that many householders will want a communal container outside their house, and location of the containers must be done in conjunction with the residents. In some cases householders are prepared to walk longer distances to a larger communal storage point.

***Enclosures*** constructed from concrete, masonry or timber are commonly used for communal storage as shown in Figure SW2; the capacity is typically in the range 1 to 10 cubic metres. Problems with this type of storage include:

- the full capacity of the enclosure is rarely utilised because people throw their waste just inside the entrance forming small heaps which overflow on to the street;
- removing wastes from the enclosure is unpleasant and unhygienic;
- scavenging animals and flies have unlimited access; and
- a large enclosure may be used for defecation and urination.

**Fixed storage bins** differ from enclosures in having no direct entrance; the walls are normally less than 1.5 metres high so that waste can be dropped directly inside. There is an opening covered by a flap in one of the walls to enable wastes to be raked out.

**Concrete pipe sections** or 200-litre oil drums placed upright along the roadside are sometimes used as communal waste containers. Their capacity is small, they are difficult to empty and waste tends to be spread around.

Small portable steel or plastic bins with fitting lids provide hygienic storage if the collection frequency is high; however, they are expensive and are likely to be stolen as their resale value is significant. The use of portable containers or ‘skips’ which when full can be hoisted on to a standard vehicle and replaced by an identical empty container is another option for communal storage. This method usually depends upon the local authority possessing the equipment, but in some cities the existence of private skip operators may offer an alternative solution for the community.

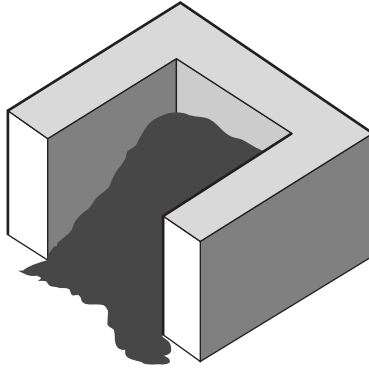
A sensible design for a communal bin is recommended by Flintoff (1984) and is shown in Figure SW3.

## **Collection systems**

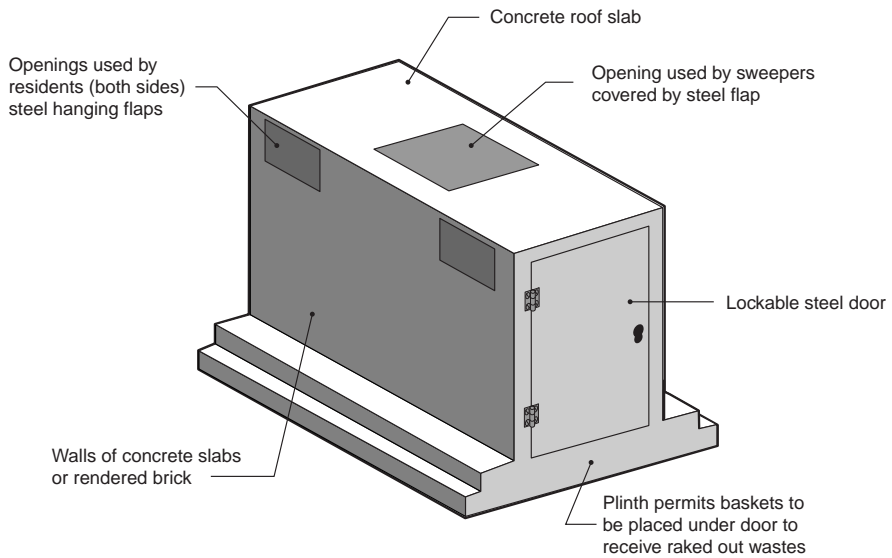
Solid waste should preferably be collected on a daily basis but at least three times per week; longer periods between collections are undesirable in hot climates since organic material putrefies quickly at high temperatures. An important feature of storage and collection systems for solid wastes is the varying degree of participation required from the individual householders. There are four basic options.

*Communal storage*, which requires maximum effort on behalf of the household, who is required to carry the solid waste from the house to the communal storage container, which may entail walking considerable distances.

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**Figure SW2. A small enclosure**



**Figure SW3. Communal solid waste bin**  
(after Flintoff, 1984)

*Street corner collection*, when a collection vehicle halts at predetermined places and householders carry their solid waste to the vehicle.

*Roadside collection*, when the householder leaves the household storage container by the side of the road at an appointed time and it is emptied by the sweeper.

*House collection*, when the workers collect the waste container from within the boundaries of the plot; this involves the minimum effort on the part of the householder.

### **Collection vehicles**

*Handcarts*. The simplest handcart consists of an open box on wheels with a capacity of 200 to 500 litres. Such handcarts are widely used in street sweeping and general cleaning, and can be used for transferring waste from communal containers; they are suitable for areas having a high population density. However, loading and unloading can be messy as it frequently involves emptying the contents out of the cart on to the ground when transferring the waste.

*Tricycles*. The use of either the pedal or motorised tricycles to power a frame carrying portable containers speeds up the transfer operation and increases the radius of collection.

*Animals* may be saddled with baskets and used for waste collection in areas where access or the terrain is especially difficult. Carts drawn by bullocks, horses or donkeys can pull much larger loads over longer distances than tricycle systems, although they are very slow.

*Tractor-trailer units* are much quicker than animal carts and are quite common for moving waste short to medium distances, typically up to a few kilometres. However, this is not always efficient and it is often the case that the trailer could be towed by a much smaller, less powerful vehicle.

*Small pick-ups* provide an attractive option in congested areas. Such pick-ups can penetrate streets where access widths are less than 3 metres. Their capacity is limited to about 1000 - 3000 litres depending on the design.

*Large Vehicles.* There exists a wide range of vehicles for the longer range transfer of waste, and careful selection of appropriate vehicles is essential. It is important to ensure that the design of communal containers and transfer stations enables the urban local authority to adopt the most efficient solution.

### **Short-range transfer**

The waste collected from the site may need to be deposited in a larger container or vehicle at a transfer station; waste is subsequently taken to the disposal area or to a larger transfer station for a long-haul journey to the disposal site. A local transfer station is needed if the vehicles have a short operating range due to limited capacity and low speed.

The simplest form of transfer station is an open space with sufficient room for small containers to be manually emptied into larger ones, as shown in Figure SW4. It is important to ensure that there are sufficient trailers available throughout the day in order to avoid inefficient ‘double handling’ of waste by dumping it out of one container on to the floor and subsequently loading it up into a trailer. Split-level transfer stations comprise a ramp leading up to an elevated platform, from which the waste is deposited into trailers as illustrated in Figure SW5.

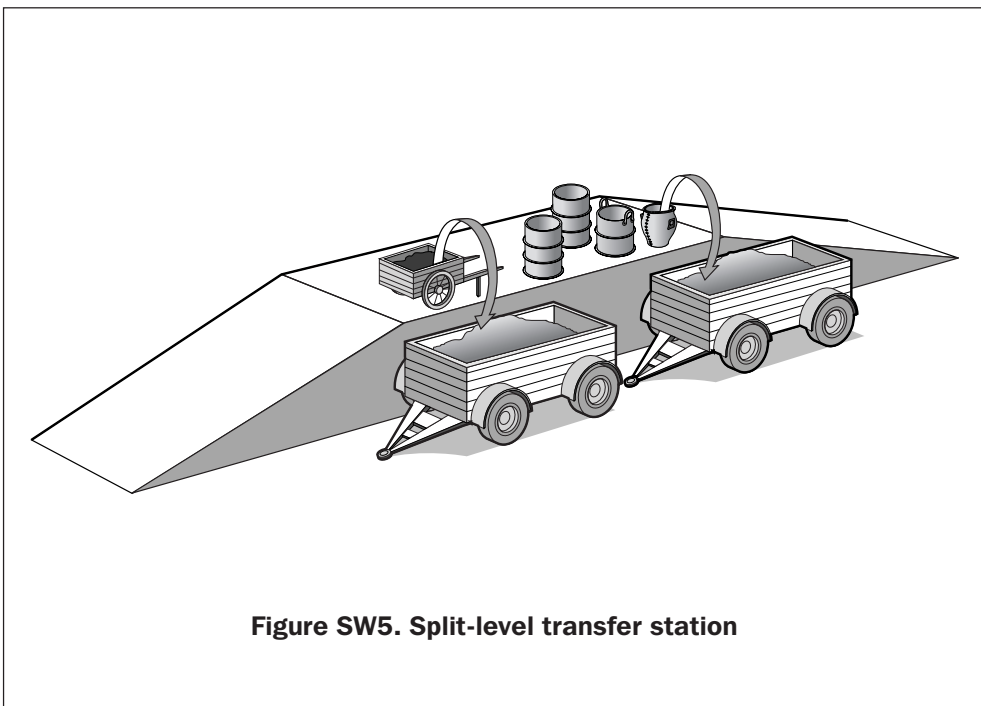
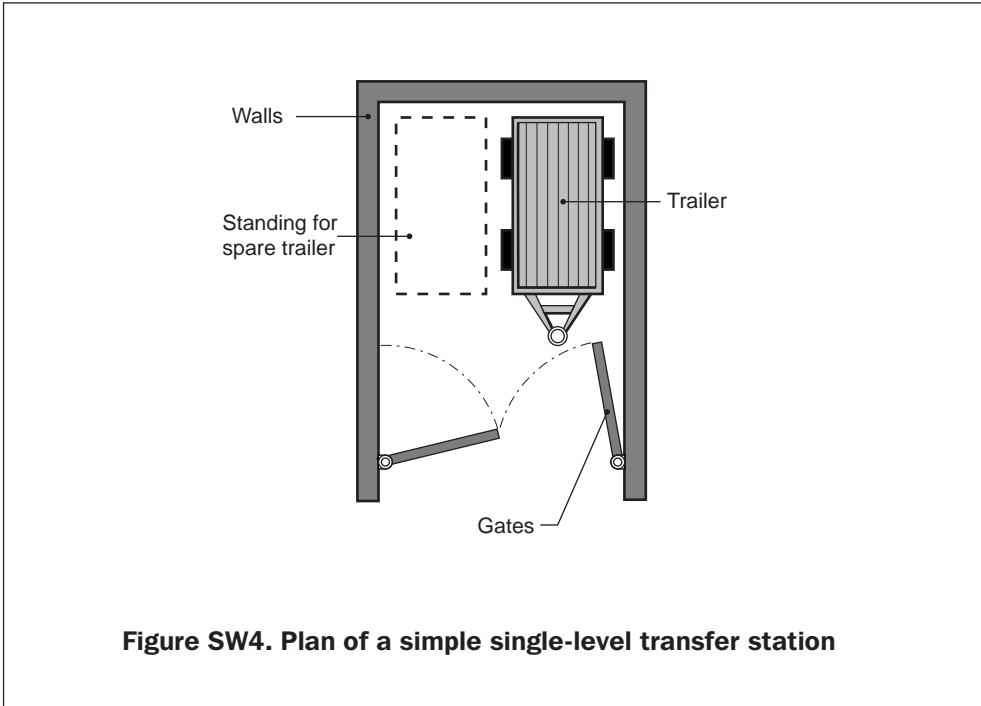
Transfer stations are likely to attract scavengers; whilst this can be an effective way of recycling waste materials it is important to prevent the waste being scattered about indiscriminately. Regular cleaning of transfer stations is needed and it is useful if a water tap is provided to enable the surfaces to be washed down.

### **Waste disposal**

Safe and controlled disposal of municipal solid waste is important for the protection of both public health and the city environment. Indiscriminate dumping of waste creates a number of serious problems, namely:

- health hazards to the nearby residents through actual contact with waste and inhalation of smoke from burning of waste, or dust from the waste;
- environmental pollution from burning of waste;
- environmental pollution from leachate (polluted liquid which drains from wastes);

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- blockage of open drains and sewers, creating serious secondary problems relating to public health and environmental pollution; and
- health risks to municipal workers.

The local institutional context is of major importance; the appraisal of options for waste disposal has to consider the capacity of urban local government to finance and manage the required operations.

A summary of different possible waste disposal options is presented in Table SW1.

<b>Table SW1. Summary of waste disposal options</b>		
<b>Disposal option</b>	<b>Description</b>	<b>Comment</b>
Uncontrolled dumping	Waste is dumped at a designated site without any environmental control measures	This is NOT a 'disposal' option; it has high risks, causes serious environmental problems and is mentioned only because it is so frequently occurring.
Sanitary Landfilling	Controlled application of waste on land	Low cost and low technology solution when land is available. The most common and effective method of disposal for most developing countries, although it presents some risks in certain circumstances.
Composting	Biological decomposition of organic matter in waste under controlled conditions	Not a complete disposal system; needs the correct proportion of bio-degradable material in the waste. By-products have value as a compost, but need to be disposed of or used. Not appropriate if there is no market for compost. Large centralised schemes have not been successful.
Incineration	Waste is burned under controlled conditions in purpose built furnaces (incinerators)	Success depends upon how much combustible material there is in the waste. An expensive high technology solution which needs careful control. Residues need to be disposed of; there is some environmental concern over the nature of the gases emitted.

Other high technology options which have yet to be proved feasible in many developing countries include gasification, pyrolysis and refuse derived fuel. Of the available options for disposal of solid waste, sanitary landfill is by far the most common. This is described in more detail below.

### **Sanitary landfill**

Sanitary landfill is the controlled deposition of solid waste such that dangers to public health and the environment are avoided.

Waste is deposited in strips and levelled in layers of up to 2 metres depth. The width of the strips will depend upon the number of vehicles required to unload waste at the same time, but will typically be in the range 6 to 30 metres. The surface of each layer is covered with soil (or other suitable inert material) to a depth of 150 to 250 mm on the same day as the waste is deposited as shown in Figure SW6. This reduces odours and flies, and helps to contain the heat generated by decomposition of the organic matter, which assists in the destruction of fly larvae and pathogens.

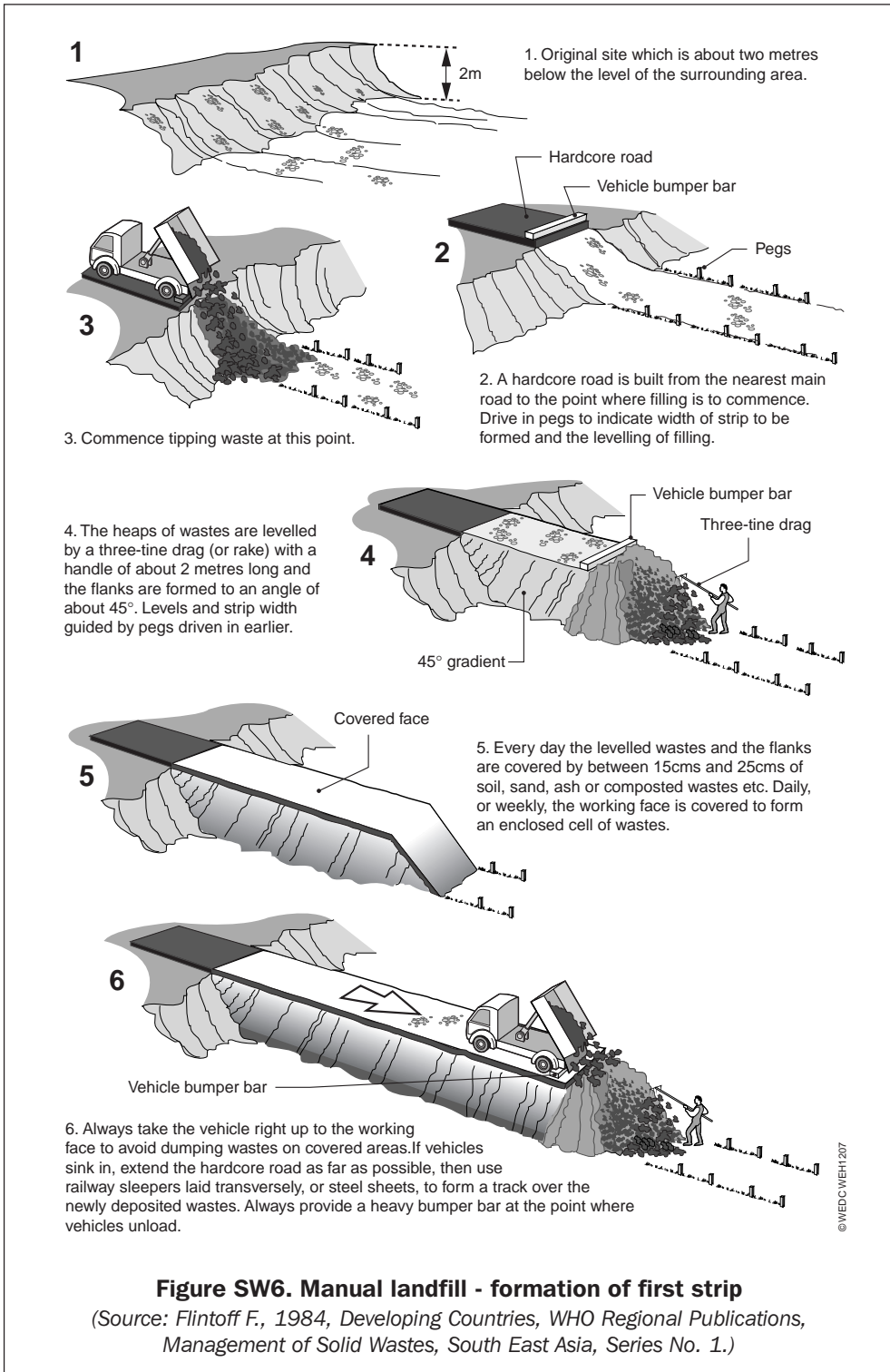
Sanitary landfill is usually the cheapest method of refuse disposal, and is comparatively simple to operate. However, careful site selection and good management are essential to minimise the risk of surface water or ground water pollution.

### **Reference**

Flintoff F., 1984, *Developing Countries*, WHO Regional Publications, Management of Solid Wastes, South East Asia, Series No. 1.



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**Figure SW6. Manual landfill - formation of first strip**

(Source: Flintoff F., 1984, *Developing Countries, WHO Regional Publications, Management of Solid Wastes, South East Asia, Series No. 1.*)

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## **Tool SW3 Solid waste management: Local Initiatives**

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### **Introduction: micro-enterprises**

There exists a number of distinct systems around which local initiatives in primary solid waste collection systems are based:

- those based around agreements between householders and sweepers on a purely individual basis; and
- organised local initiatives which involve an Area-Based Organisation (ABO) facilitating or managing the relationship between households and sweepers or which involve small scale local contractors.

These operational systems are now considered in more detail.

### **Individual-based initiatives**

In this system we can identify individual waste collectors as the fundamental unit of micro-enterprises for primary collection. Municipal and private sweepers offer household collection services against an agreed payment; we refer to this as the 'sweeper system'.

Municipal sweepers need permission from their supervisors to perform this private work and in return agree to pay them a proportion of their earnings. A further agreement is made between fellow sweepers that they will not compete with each other by offering services in each other's territory; rights to private work may also be exchanged or bought with cash or favours. In summary, the sweeper system is based on a set of three verbal agreements:

- between sweeper and household;
- between sweeper and supervisor (if s/he is a municipal sweeper);
- between sweeper and fellow sweepers.

Advantages of the sweeper system include:

- simple and flexible in operation;
- minimal overheads;
- direct benefits flow to the service providers who are amongst the poorest in society;

- users have powers to hire and fire the service provider based on performance criteria; and
- the price for the service is based on users willingness to pay.

The sweeper system does have several disadvantages:

- as it is market-based, the poor are less able to pay the costs and the services do not often reach into low-income areas;
- from the perspective of city managers, there are problems in regulating the service, particularly in terms of lack of control over sweepers performance of their designated duties for the municipality; sweepers may and do perform private work when they should be carrying out municipal duties;
- in practice, there is less competition to provide a better, lower cost and more reliable service than might be supposed due to the informal agreements between sweepers;
- a further consequence of this is that users have less control over their sweepers; organising into local user groups is one way of overcoming this.

### **Organised local initiatives: general**

This term refers to a broad category of micro-enterprises initiated by households or entrepreneurs using municipal and/or private sweepers for primary collection. These arise when users organise themselves collectively to hire a private or municipal sweeper to collect their waste. There are examples of such schemes initiated and managed by private individuals, municipal councillors and community based organisations (CBO's). Their motivation, organisational structure, mode of cost recovery and links with municipal institutions vary widely.

These systems can be split into three groups:

- area-based systems in which individual householders pay sweepers;
- area-based systems in which the sweeper is paid centrally by the local organisation; and
- small-scale local contractors who organise service delivery and collection of payments.

These are described in more detail below.

**Organised local initiatives:  
Area-based system which pays sweepers individually**

*Initiating the system.* A group of households or a local activist decides to improve the waste collection system in their area by hiring a waste collector, introducing him/her to other households and fixing a minimum collection fee. Households pay sweepers directly. The activist or group may initiate the activity because of a perceived need or as a result of a community awareness-raising campaign from an outside agency.

*Sustaining the system.* The system is managed by the local group or activist. The sweepers' interest is to have a regular group of customers and to receive regular, known payments. A social obligation to pay arises from collective action and any defaulters are reported to the activist or group.

*Implications for micro-enterprise development.* This system is significant in several ways:

- it shows the beginnings of a positive change in public attitude, in that users decide to act rather than waiting for government to come and do the work; this opens up the potential for micro-enterprise in primary collection, albeit in a totally unregulated market;
- users have a direct role in performance monitoring; official initiatives often overlook this important task;
- if the system is introduced in previously un-served areas, users can see a definite impact through a cleaner and healthier local environment;
- sweepers have a comparatively secure, emerging market for their service; the assurance of regular minimum payments is an added incentive, and direct payment by households leaves room for the negotiation of higher rates and charges for additional work, which sweepers often do;
- an important consequence of a more secure market is that sweepers are more willing to invest in the purchase of equipment such as simple tools and carts;
- as the houses are located in one neighbourhood, sweepers do not have to collect waste from scattered locations which minimises unproductive travel time; and

- relationships of trust are developed which ensure co-operation in developing an effective service and a more secure livelihood.

### **Organised local initiatives:**

#### **Area-based system which pays sweepers collectively**

*Initiating the system.* A group of households or an activist decides to introduce or improve a collection service in their area by hiring sweepers, introducing them to other households and charging fees. The important distinction here is that the user group rather than the individual householders pay the salary of the sweepers. Some expenses such as buying equipment and paying for simple repairs are also borne by the organisers who perform this work on a voluntary or non-profit basis, but may receive support from external agencies. The activist may be the elected representative for the area and may decide not to charge fees but to use government funds instead.

*Sustaining the system.* As for the previous system, only that fees are paid by householders to the organising group and the sweepers receive a fixed salary from the group. The responsibility for handling defaulters now rests with the local organisation rather than the individual sweepers.

*Implications for micro-enterprise development.* There are important additional implications to those described above for the area based systems which pay sweepers individually:

- monitoring of the system further develops since the user group both facilitates the system and undertakes some financial control;
- the scheme becomes closer to a ‘paid labour’ situation rather than a sweepers’ enterprise; this may not be ideal from the sweepers’ point of view as they lose the benefits of direct negotiation with households; however, they still have some opportunities for additional work and tips;
- sweepers are usually reluctant to invest in the system as the risks are higher and ownership of the system is divided; the need for the user organisation to invest is therefore important; and
- the organising group sometimes keeps a share of the income as ‘savings’; however, it may subsequently be reluctant to invest the money in the system and looks instead for external sources of funding.

### **Organised local initiatives: Small-scale contractors**

*Initiating the system.* An individual or contractor starts a waste collection programme as a business. They employ sweepers, introduce them to the households and charge fixed collection fees. The sweepers' salaries plus all capital and running costs are paid by the contractor, who tries to make a profit. Sometimes the profit motive may combine with an interest in cleaning the area and gaining local recognition.

*Sustaining the system.* The system is driven by the profit motive and survives through its ability to recover costs and generate a cash surplus for the contractor/entrepreneur.

*Implications for micro-enterprise development.* The implications are the same as for the previous area based systems, especially in terms of willingness to pay and user acceptance. These amount to a positive environment for the micro-enterprise development. In addition:

- the role of entrepreneur changes from sweeper to a comparatively larger scale contractor. The sweeper's role becomes that of salaried employee;
- these systems operate on a relatively large scale: typically 500 to 1000 households;
- the entrepreneur usually keeps operations at a level which can be managed individually, without external support or interference; and
- as the contract expands and sweepers again become labourers, some features of the sweeper system may reappear.

#### **Further information:**

The following notes are available on request from WEDC

<b>Document reference</b>	<b>Title</b>
Synthesis Note 1:	The role of micro enterprise in solid waste management
Synthesis Note 2:	Vehicles for primary collection of solid waste
Synthesis Note 3:	The role of community based organisations in solid waste management

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Synthesis Note 4: Recognising livelihoods from urban waste

Synthesis Note 5: Recognising gender issues in the management of urban waste

Synthesis Note 6: Success and sustainability indicators for primary collection of solid waste

Other useful documents for detailed work include:

- Citizens Guide for Dhaka
- Citizens Guide for Karachi

The material in this tool is based on studies undertaken by Dr. Mansoor Ali at WEDC.

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## **Tool SW4 Solid Waste Management: Handy Tips**

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### **Solid waste management: general tips**

- Municipal services are unlikely to reach down to provide household collection in the foreseeable future; it is therefore important to encourage local initiatives and enterprise around neighbourhood collection schemes.
- It is more difficult to improve waste collection and disposal in neighbourhoods where there are a number of unoccupied plots as residents tend to dump waste there.

### **Solid waste management: operating tips**

- Use sturdy containers preferably with a tight fitting lid to store household waste.
- The upgrading programme should try to negotiate suitable locations for local waste transfer points, particularly where residents are paying for a private neighbourhood collection service.
- Look for examples of local initiatives for neighbourhood collection and explore whether similar systems could be introduced in other neighbourhoods.
- Improvements to the municipal collection system must ensure that access to waste is not reduced. Many poor people recover waste; this has the double advantage of sustaining livelihoods whilst reducing the amount of waste entering the municipal waste stream.
- It is important that the municipal vehicle fleet (or fleet contractors) have a number of vehicles sufficiently small to enter and haul waste from settlements with restricted access.
- Plan the routes of solid waste collection vehicles very carefully so that pay loads and journey times are optimised.
- Consider using external contractors for haulage to sanitary landfill sites.
- The operations at sanitary landfill sites are very simple but nevertheless require careful supervision.