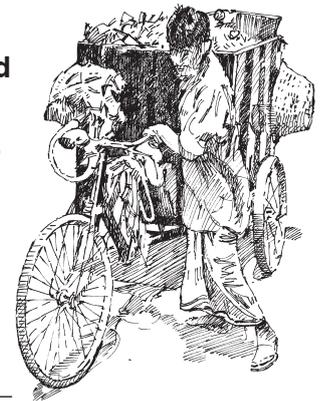




Solid waste management in emergencies

The safe disposal of solid waste is critical for public health, and is especially true during an emergency. Not only will existing collection and disposal systems be disrupted, but there will be extra waste caused by the emergency itself. Initially, for camps of displaced people or refugees and similar new sites, there will be no arrangements in place at all. If solid waste is not dealt with quickly, serious health risks will develop which will further demoralize the community already traumatized by the emergency. This technical note highlights the key issues to consider in managing solid waste during and shortly after a disaster.

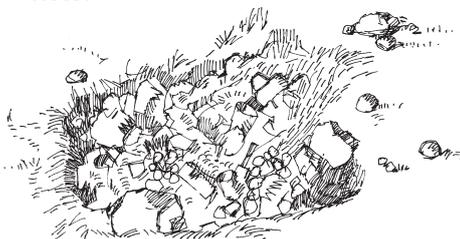


What is solid waste?

In this technical note, the term 'solid waste' is used to include all non-liquid wastes generated by human activity and a range of solid waste material resulting from the disaster, such as:

- general domestic garbage such as food waste, ash and packaging materials;
- human faeces disposed of in garbage;
- emergency waste such as plastic water bottles and packaging from other emergency supplies;
- rubble resulting from the disaster;
- mud and slurry deposited by the natural disaster; and
- fallen trees and rocks obstructing transport and communications.

Other specialist wastes, such as medical waste from hospitals and toxic waste from industry, will also need to be dealt with urgently, but they are not covered by this technical note.



There could also be a large number of dead bodies to dispose of during and after an emergency (see Technical Note 8).

The objective of managing solid waste

The Sphere standards state that people should be able to live in an environment that is uncontaminated

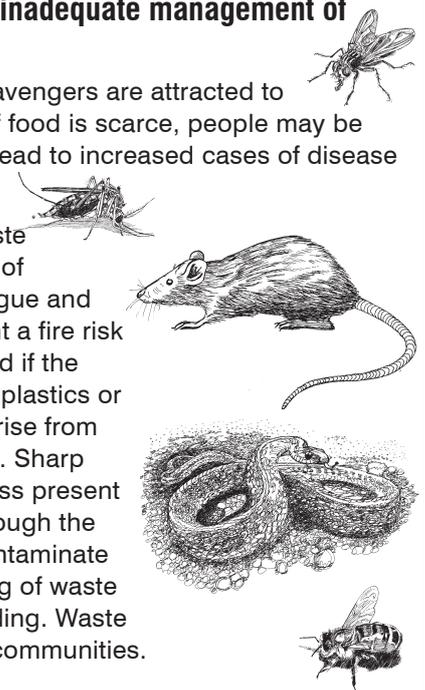
by solid waste, including medical waste, and have the means to dispose of their domestic waste conveniently and effectively.

In addition to this objective there is also the need to make the environment safe and provide access for people and services in the area.

Box 7.1. Health risks related to the inadequate management of solid waste

Flies, rats, dogs, snakes and other scavengers are attracted to garbage, particularly in hot climates. If food is scarce, people may be forced to scavenge as well which will lead to increased cases of disease (e.g. dysentery).

Pools of rainwater associated with waste collection will propagate the breeding of mosquitoes that transmit malaria, dengue and yellow fever. Heaps of garbage present a fire risk and smoke can also be a health hazard if the burning waste contains items such as plastics or chemicals. Breathing difficulties can arise from the fungi that develop on garbage tips. Sharp items such as needles and broken glass present a further hazard to people walking through the area. Garbage washed by rain can contaminate water supplies. Indiscriminate dumping of waste can block water courses causing flooding. Waste is unsightly and lowers the morale of communities.



Assessment

It is important to assess the issues and priorities before beginning work. Consider the following:

Waste streams

- What types and volumes of wastes are there and how much is being produced each day?
- How is waste currently disposed of (if at all)?
- Who (if anyone) is responsible for waste collection and disposal and what resources do they have?
- What is the quantity and what are the types of waste that have been produced by the disaster, and where are they situated?

Waste problems

- Are the current waste disposal systems coping with the volume of waste?
- Are there any hazardous wastes that require special attention (such as medical waste)?
- Can the organizations responsible for waste collection cope with the demand?
- Are steps being taken to deal with the wastes produced by the disaster? Are these sufficient?
- Are there suitable disposal facilities for all wastes being produced?

Disposal of waste caused by a disaster

Disasters such as floods, earthquakes and hurricanes (cyclones) can produce large quantities of rubble. This will be a danger to people, block access roads, conceal trapped persons and block drainage channels. It will also hinder the access of other emergency services (Figure 7.1).

Once all survivors have been released from the rubble (they can survive for up to seven days), its removal and the demolition of dangerous structures should be a priority. If there is no approved waste disposal site near by, the

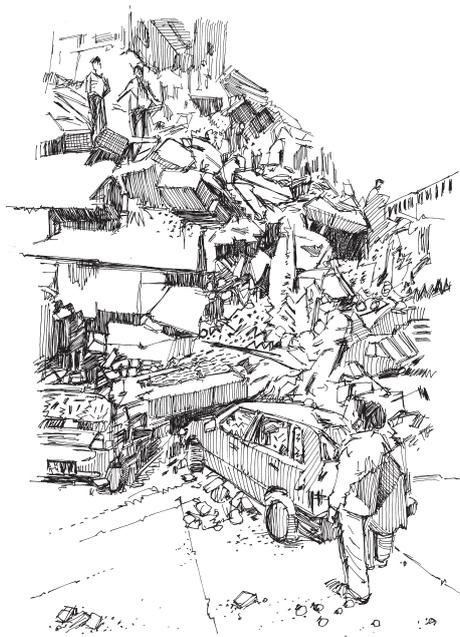


Figure 7.1. Disasters can produce large quantities of rubble

wastes can be piled, in the short term, on areas of waste land. Not all rubble is waste. Items such as zinc roofing sheets, furniture and bricks can be reused. If possible sort the rubble as it is being removed, storing reusable materials separately from the rest of the waste. Waste piles can be a serious fire risk so provide a security fence to keep out the public and ban the use of all naked flames, including cigarettes.

Work with the community

People affected by major disasters are badly traumatized. Giving them a task to perform can help them overcome the trauma. Employ neighbourhood groups to clean up their areas. This will bring money into the communities and strengthen their links with their areas. Introduce a rotation system so that all families in the community can benefit.

Protect the workforce

The workforce should be protected from physical injury by the provision of masks, overalls, gloves and boots (Figure 7.2). They should be vaccinated against common diseases such as tetanus.

Consult local health services for advice on vaccination.

Domestic waste

A major disaster will not stop people producing garbage but the content may change. If people have stayed close to their homes it is best to support the use of traditional practices. In rural areas this is likely to be burial, either within the family compound or in shared neighbourhood pits.

Most urban areas will have had some form of communal collection system prior to the emergency. It may be necessary to set one up and support it financially, by supplying vehicles and by employing personnel. When recruiting people, hire from the local community.

Collection and transport

In the early stages of an emergency, provide communal storage bins (Figure 7.3). As the situation stabilizes, the number of bins can be gradually increased to the density there was before the disaster. Immediately after a disaster, a 100 litre container will serve 200 people. This drops to 50 people per container in the long term.

The type of transport used for moving the garbage from bins to its final point of disposal depends on the quantity of waste produced, the distance over which it has to be transported and available local resources. Box 7.2 illustrates some of the common vehicles used.

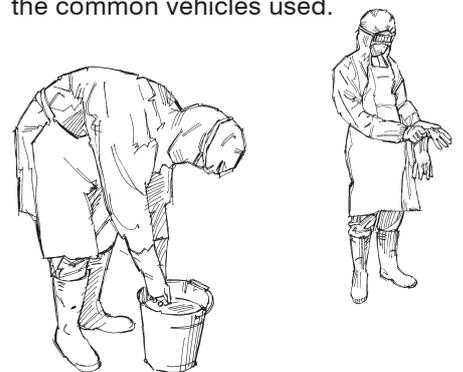


Figure 7.2. Provide the workforce with protective clothing

Disposal

Existing urban areas will almost certainly have established waste disposal sites. Use these if possible. If they cannot be used, set up temporary disposal sites such as communal pits similar to the type shown in Figure 7.4.



Figure 7.3. Provide communal storage bins for domestic waste in the early stages of an emergency

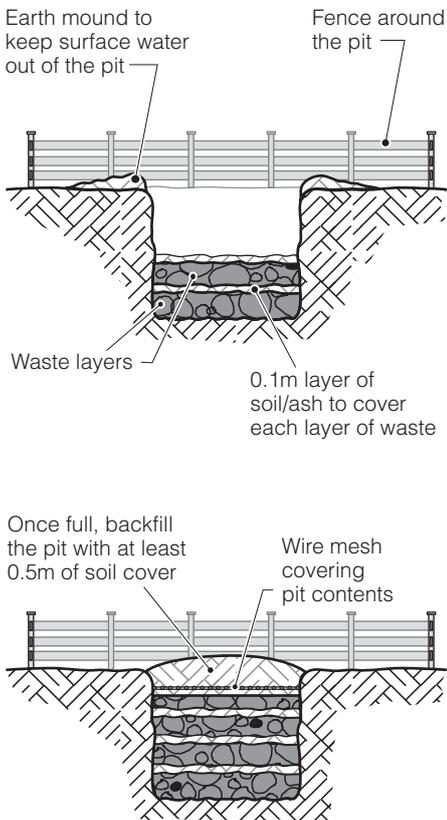


Figure 7.4. A communal pit

Camps

For low-density refugee camps, the best waste disposal option is the family solid waste pit similar to those used in rural communities. If the plot size is too small for family

pits, treat the camp like an urban area by using communal pits or larger disposal sites away from the camp.

Box 7.2 Solid waste collection and transportation

When selecting a suitable vehicle for transportation of waste, the waste generation rates and densities need to be considered along with the areas they need to access, such as narrow alleys or uneven paths, and the distance between collection and disposal points.



Other important issues

Community issues

It is useful and important to consult potential users of a waste management system before and during its design, construction and use. This is particularly true for a displaced community as some

people may not be accustomed to using a communal system.

Recycling

Recycling should be encouraged and managed properly as it provides a local source of income and reduces the amount of waste for disposal.



Figure 7.6. Involving professional staff



Figure 7.5. Consulting with the community

Other disposal methods

Disposal systems such as composting, incineration and sanitary landfill can be considered once the situation has stabilized. They are unlikely to be a first phase emergency response activity.

Management

The key to effective solid waste collection and disposal is good management. It is often necessary to support local institutions with funds and professional staff to enable them to meet their responsibilities.

Further information

Harvey, P., Baghri, S and Reed, R. A. (2002) *Emergency Sanitation: Assessment and Programme Design*, WEDC, Loughborough, UK.

OXFAM (2008) 'Domestic and Refugee Camp Waste Management Collection and Disposal' *Technical Briefing Note 15*. Oxfam UK.

<http://policy-practice.oxfam.org.uk/publications/domestic-and-refugee-camp-waste-management-collection-and-disposal-126686>

OXFAM (2008) 'Composting of Organic Materials and Recycling' *Technical Briefing Note 16*. Oxfam UK.

<http://policy-practice.oxfam.org.uk/publications/composting-of-organic-materials-and-recycling-126187>

OXFAM (2008) 'Large Scale Environmental Clean up Campaigns' *Technical Briefing Note 17*. Oxfam UK.

<http://policy-practice.oxfam.org.uk/publications/large-scale-environmental-clean-up-campaigns-126688>

OXFAM (2008) 'Handling and Storage of Hazardous wastes' *Technical Briefing Note 18*. Oxfam UK.

<http://policy-practice.oxfam.org.uk/publications/handling-and-storage-of-hazardous-wastes-126687>

Sphere (2011). *Humanitarian Charter and Minimum Standards in Disaster Response*, The Sphere Project: Geneva, Switzerland (Distributed worldwide by Oxfam GB) <http://www.sphereproject.org/>

Wisner, B. and Adams, J. (2002) *Environmental Health in Emergencies and Disasters*. WHO Geneva.

http://www.who.int/water_sanitation_health/emergencies/emergencies2002/en/index.html



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