

## 4. Emergency response

Emergency response is the phase of the disaster-management cycle that often attracts the most attention and resources. During this phase, environmental health services may have a great impact on the health and well-being of affected communities. However, the impact achieved in the early days of the response is largely a test of previously-planned local and national preparedness and mitigation measures. Moreover, the way the emergency response has been planned and the way the emergency is managed will have a significant influence on post-disaster recovery and future development possibilities. The emergency response phase should therefore be seen as a critical part of the disaster-management cycle.

Emergency response is sometimes a cyclical process, involving repeated assessment, planning, action and review, to respond appropriately to needs and capacities as they evolve. It starts with an initial assessment and may be triggered spontaneously by the disaster event, or officials may authorize the mobilization of people and resources. Rapid and effective mobilization is facilitated by proper disaster preparedness.

### 4.1 Assessments

Following a disaster, rapid and effective action is needed to save lives, protect health and stabilize the situation, to avoid making the emergency worse. But even in an acute emergency, an assessment, however brief, is needed to ensure that any action undertaken is effective. This section deals primarily with two types of assessment: rapid initial assessments to establish the nature and scale of the emergency and the likely need for external assistance; and detailed sector assessments to plan, implement and coordinate a response. Other types of assessment are required at various stages of the response, such as continual assessment (i.e. monitoring or surveillance) and assessments for post-emergency rehabilitation.

In acute emergencies, initial assessments should be rapid and produce the information required to start an appropriate response. In less acute emergencies, or once an acute situation has stabilized somewhat, a more detailed assessment is needed to design longer-term measures with adequate provision for monitoring and management. More thorough assessments are needed for recovery and resettlement programmes. Whatever form the assessment takes, it is essential that information is collected and rapidly transmitted in a way that makes it clear what actions should be taken and why.

#### 4.1.1 Purpose of emergency assessments

Emergency assessments should allow the following (Adams, 1999):

- an initial decision to be made on whether assistance is needed;
- a decision to be made on whether local capacity is adequate or external resources are required;
- priorities for intervention to be established and an intervention strategy identified;

- necessary resources to be identified;
- base-line data to be collected, to facilitate monitoring;
- information to be collected for fund-raising and advocacy work.

#### 4.1.2 Process of assessments

It is important to use standardized processes and standard report formats for assessments, to ensure objectivity and to enable the humanitarian response to be made in proportion to the needs identified. Assessment questions should be considered before field work, and information recorded in a way that can be understood by decision-makers who may not visit the disaster area. When several teams assess different geographic areas their findings can be compared and resources directed to where they are most needed. Training on assessment techniques is an important element of emergency preparedness for environmental health services.

Checklists can be a useful way to ensure that assessments are thorough and that no important issues are missed. Checklists may be found in a number of publications, including: International Federation of Red Cross and Red Crescent Societies (1997a); Sphere Project (2000); United Nations High Commissioner for Refugees (1999); and United States Agency for International Development (1988). Checklists should be used with common sense and good judgement to ensure that each emergency is assessed according to its specific characteristics.

Assessments often begin with a brief review of information about the area and the population affected, the type of disaster and the environmental health infrastructure that may have been affected. Accurate information on disasters such as floods may be rapidly available from satellite images of the affected area. When combined with preliminary information from the disaster area, this can provide a rapid overview of the situation and an indication of likely damage and needs. In some cases, it may be possible to start organizing an initial response on the basis of this second-hand information.

Field-based assessments allow preliminary information to be confirmed and the details necessary for organizing specific relief to be gathered. The process may start with an aerial view of the disaster area, or an overview from a high point on a hill or tall building. For assessment staff from outside the affected area, discussions with local colleagues may provide a similar overall picture of the situation, which allows field assessment work to concentrate on areas of most pressing need. Information available might include health data; approximate figures on the number of people affected, displaced, killed and injured; the number of houses and other buildings destroyed; and the major impact of the disaster on water supplies and sanitation.

It is most important to work with local partners and government agencies to ensure that assessments seek to find information that is not already available and that information gathered is shared with interested parties. Assessments should be coordinated, and new staff arriving in a disaster-affected area should contact whatever body has been established to coordinate the emergency response before carrying out field assessments.

#### 4.1.3 Field assessment techniques

First-hand information may be gathered in the field using a variety of techniques, including the following:

- on-site visual assessment, with both structured and nonstructured observation techniques (e.g. a health observation walk);
- expert measurement and testing (e.g. water quality testing, or diagnosis of mechanical failure of a pump);
- surveys, to provide statistically valid information from a sample of the population;

- interviews with key informants, community leaders, groups of disaster-affected people, focus groups or household members;
- participatory techniques, such as ranking or diagramming, to gain a rapid understanding of the way the disaster has affected different parts of the population and what peoples' own assessment of the situation and options for response might be.

Whichever assessment techniques are used, they should be adapted to the urgency of the situation and the degree of detail and accuracy needed to mount an appropriate response.

There is growing acceptance that disaster survivors themselves should be partners in the relief process. Relief is far better done *with* people, rather than for them. For the most part, a disaster-affected population will take action itself. Professional health staff need to take into account existing coping mechanisms used by groups of survivors and be willing to reinforce any spontaneous activity that appears to be appropriate. It is vital also to explore the survivors' own perceptions of their needs, which may differ from the views of those providing help. This is an important complement to more formal systems of "needs assessment" (Campbell & Chung, 1986; Pan American Health Organization, 1987). Effective intervention is almost always characterized by consultation and by efforts to empower those for whom help is intended.

#### 4.1.4 Organizing an emergency assessment

A field assessment, particularly following a large-scale disaster, requires organization, resources and management in the same way as any other professional activity. Where teams of people are required, they need to be mobilized, briefed and often trained before starting the assessment. Environmental health staff may often carry out assessments in teams with specialists in related professions, such as engineering, health and social welfare, from other government departments or organizations. In such cases, close coordination is needed between different institutions and a clear management and reporting structure should be established. Assessment teams need to be given clear terms of reference and be aware of the type of information and recommendations that are expected from their work.

Staff carrying out assessments may also carry out initial relief activities simultaneously. For instance, a team visiting an isolated water treatment works may carry with them spare parts, fuel or treatment chemicals. However, a sensible balance must be found between the need to act quickly and the need to gather sufficient information to ensure that action is effective and appropriate. It is usually more effective to concentrate on assessment activities that enable an appropriate and substantial response to be launched than to spend time on initial relief activities, even when this sometimes means not responding to obvious needs during assessment work.

The provision of material and other support to assessment teams is discussed in section 4.5. Further details on technical assessments are provided in the relevant chapters in Part II.

## 4.2 Evacuation

Evacuation can be an important component of prevention, preparedness and response. It involves the temporary transfer of a population (and to a limited extent, property) from areas at risk of disaster to a safer location. Environmental health staff are involved in ensuring that evacuations do not create health hazards.

#### 4.2.1 Disaster warnings and emergency instructions

The following points should be borne in mind when designing and implementing disaster warnings and instructions for public evacuations or other emergency measures (adapted from Walker, 1989):

- language used should be simple and non-technical;
- if different warning systems are used, they should not give conflicting messages, or people will tend to ignore them;
- messages should state clearly the exact nature of the impending threat and its implications for the target population;
- the potential victims of a disaster should be clearly identified.

Even if the warning creates awareness of an impending disaster, people may fail to react, and it is likely that environmental health workers will be part of a broad effort to persuade the population that the warning must be taken seriously.

Radio broadcasting is likely to be restored relatively quickly and should be used to the fullest extent. Reliable information will enable the survivors to understand the situation, how the problems are being addressed, and what steps they should take to ensure their safety and the success of the relief operation.

#### 4.2.2 Organized evacuation

Organized, pre-impact evacuation is commonly carried out on a massive scale in some countries in response to warnings of tropical storms (e.g. in India and the USA). Various forms of evacuation may be organized as a precautionary measure in response to the threat of air attack or other military action.

Organized post-impact evacuation may also occur in response to industrial accidents and after earthquakes (e.g. in the severe winter conditions following the Armenian earthquake of December 1988). Officially supported and comprehensively organized population relocation has also occurred extensively after volcanic eruptions.

#### 4.2.3 Spontaneous evacuation

Spontaneous pre-impact evacuation commonly occurs in response to a perceived threat, such as tropical storms, volcanic eruptions, droughts, floods and chemical or nuclear accidents. Military operations can also set off massive migrations. Communities facing severe food shortages may move *en masse* in search of food or income to avoid starvation.

Post-impact spontaneous evacuation occurs in response to the loss of shelter or essential services in an area. In tropical storms and flooding, there is a tendency to move to the periphery of an affected area, especially where some existing services remain, or to higher ground or raised roads, such as happened in Bangladesh and Mozambique. In many emergencies, those relocating will move quickly to stay with friends and relatives, in preference to staying in public facilities (public buildings, schools, stadiums, military camps, etc.).

#### 4.2.4 Environmental health services on evacuation routes

Travel time in evacuations should be kept as short as possible, but where longer journeys are necessary, the support of environmental health personnel is required. People travelling long distances on foot require considerable support to reduce risks to their health.

Clean drinking-water should be provided, preferably at periodic rest stations along the way, at the rate of three litres per person per day in temperate climates, rising to at least six litres per day in hot desert areas. Safe water should also be provided for per-

sonal hygiene. Ideally, water should be disinfected with chlorine or another appropriate chemical. If possible, evacuees should be shown how to choose safe water sources. Non-perishable food should also be provided.

At rest stops, excreta and solid wastes should be buried in holes or trenches. These should be at least 60 centimetres deep and, when the contents reach 30 cm from the ground level, should be backfilled with excavated earth and trampled down. Where the evacuation is likely to take several days, the use of temporary toilets should be considered.

Where appropriate, existing facilities such as hotels, schools and offices may be temporarily taken over as evacuation rest stops, and their water supplies and toilets used.

When evacuation is on foot, as is often the case, rest-stops should be provided every two hours' walk, if possible, and evacuees should be given information about road conditions and access to water, food, shelter and medical assistance on the next section of the route.

Special precautions may be needed to protect people living along evacuation routes from possible health risks due to the passage of the evacuees, particularly from defecation on the roadside, which may require clean-up activities.

#### **4.2.5 Environmental health problems associated with evacuations**

Any large-scale population movements into an area are of primary concern for environmental health. Such movements involve settlement in marginal conditions, usually away from services. In particular, people are often moved into areas where there are no piped water supplies.

Relocation can result in high population densities, associated with wholly inadequate water supplies and sanitation. There is almost always an increased risk of faecal–oral transmission of diseases related to poor hygiene.

Other risks include contact with pathogens not found in the home area (e.g. the malarial parasite), including those transmitted by vectors unfamiliar to the evacuated population. Generally, the evacuated population will be more susceptible to these diseases than the local population, as occurs in areas endemic for malaria.

The relocation of a population into high-density emergency settlement will usually greatly increase the risk of outbreaks of common childhood diseases. Measles is a particular risk when the population has low immunization coverage. Health conditions and nutritional status before displacement are also important.

Evacuation can also place people in the vicinity of unfamiliar environmental hazards (e.g. dispersal into damaged industrial areas where a range of toxic substances are stored).

#### **4.2.6 Influencing settlement in evacuations**

Patterns of settlement can sometimes be closely controlled in organized evacuations. To this end, it is necessary to:

- avoid creating points of high density at any stage of the movement, including at organized transit centres and final destinations;
- deal with potential conflicts in priorities during the planning stage. For example, staff security, logistics and distribution are sometimes facilitated by high-density settlements, but this may be to the detriment of public health;
- ensure that the capacity of the services can meet the demand at all times, particularly at times of peak—not average—predicted flows.

Influencing the patterns of settlement in self-evacuation is much more difficult. The authorities will have to take a number of major decisions:

- when to encourage such movements and when to discourage them;
- whether to risk the concentration of people or to encourage dispersion;
- the choice of site;
- the choice of organizations to provide services.

Attention to managing population flows is crucial, to avoid creating health and security problems. The most serious environmental health problems can occur where population movements are blocked or channelled in such a way that local requirements vastly exceed supplies. A common misconception among decision-makers is that health risks can be controlled by concentrating displaced people. The reverse is true. The health risks of evacuation will generally be exacerbated, rather than controlled, by concentrating people at centres. Dispersal is generally a more effective strategy.

The provision of services of any type tends to attract settlement and is one means of encouraging a population to move into designated areas. Preplanning, in terms of prior identification of temporary settlement points and arrangements for immediate staffing in an emergency, may help staff encourage patterns of settlement that match available water supplies and logistics capacity, and maintain an acceptable balance between settlement size and accessibility.

Where possible, displaced people should be warned of specific risks. For example, in damaged urban areas, a displaced population may be tempted to drink run-off water from a waste site or from a damaged industrial plant.

In some settings, poor relations between host and displaced populations can exacerbate tension and create local security problems. Relations with the host population needs to be carefully considered and local people be involved as much as possible in the choice of potential sites.

#### 4.2.7 Strengthening services in host communities

Whether the evacuation is officially organized or spontaneous, there will be a need to strengthen the environmental health services in the area of influx. Priority may need to be given to locations with:

- very large, dense, underserved settlements;
- settlements with poor public-health indicators and/or with a risk of epidemics;
- settlements without adequate supplies;
- large numbers of people sheltering in large buildings, such as schools, office blocks and warehouses;
- poorly functioning hospitals, clinics and feeding centres;
- substantial numbers of people with special needs, unaccompanied children, the elderly and disabled;
- understaffed and poorly equipped laboratory services.

Good relations with both the host community and the evacuees is essential in gaining cooperation. In addition, lay people with useful skills among both the evacuees and the host population should be encouraged to volunteer their services.

#### 4.2.8 Problems with temporary emergency settlements

The coverage provided by environmental health services in reception areas is likely to be patchy and in some locations it may be difficult for evacuees and staff to cope.

Some of the more difficult problems include:

- Inappropriate choices of settlement sites. These sites are usually forced settlement sites and the problems include: no reliable water supplies; a high water-table

(which complicates sanitation); the risk of flooding; and the presence of disease vectors (particularly malaria mosquitoes). For more details on site selection and planning, see Chapter 6.

- Random defecation. This is hard to control when populations have no experience of, or access to, latrines.
- A population that is too frightened, too hostile, or too socially fragmented to collaborate effectively.
- Extreme difficulties in case-detection and epidemic investigation. This situation can occur because of continual movement of the population, often combined with insecurity. It is particularly difficult to estimate the size of populations when there is extensive movement between centres.

An adequate number of staff accompanying groups of displaced people can be effective in reducing environmental health risks. A balance may have to be struck between using rescue resources to bring essential supplies to large populations *in situ*, and removing relatively small numbers of people from areas at risk elsewhere. Policies for dealing with such situations must be established during the planning stage.

## 4.3 Environmental health measures in the emergency phase

### 4.3.1 General objective and activities

The general objective of environmental health measures in the emergency phase may be described in terms of health indicators, particularly the crude mortality rate (see section 2.2.5), and the incidence or prevalence of key environmental health-related diseases. It may also be described using indicators of service provision, e.g. the amount of water available per person per day, or the number of people per functioning toilet. It is important to establish a broadly agreed objective and indicators for immediate actions. This will help to avoid the risk of a grossly uneven or disproportionate response that leaves part or all of the affected population vulnerable for an unnecessarily long time, and to focus efforts where they will produce the greatest and most rapid health benefits.

Overall public health priorities in the emergency phase include ensuring access to food, shelter, health care, water supplies and sanitation facilities, control of communicable disease, and public health surveillance.

Specific environmental health measures in the emergency phase aim to reduce loss of life and protect health by changing the adverse conditions of the physical environment affecting or endangering health. These measures can include the provision of shelter, water supplies, sanitation, vector control and the burial of the dead, as well as measures to protect food, control epidemics and communicable disease, and to limit chemical and radiation hazards.

Priorities in the acute emergency phase include:

- providing facilities for people to excrete safely and hygienically;
- protecting water supplies from contamination;
- providing a minimum amount of water for drinking, cooking and personal and domestic hygiene;
- ensuring that people have enough water containers to collect and store water cleanly;
- ensuring that people have sufficient cooking utensils, equipment and fuel to cook and store food safely;
- ensuring that people have the knowledge and understanding they need to avoid disease;
- ensuring that people have soap for hand washing;

- containing or removing sources of chemical or radiological contamination, or evacuating people, to ensure they are no longer exposed to these hazards.

#### 4.3.2 Priorities for emergency response

It is not possible to define a universally applicable order of priorities for emergency environmental health measures, as each situation demands a specific response. The priorities following a population displacement in southern Africa, where a cholera epidemic is imminent, are likely to be different from the priorities following a tornado in the United States. To make rational decisions about priorities, and to revise those priorities as the situation changes, means that an adequate assessment must be combined with basic environmental health and epidemiological principles.

In practice, several priorities usually need addressing simultaneously, as they are closely related, both epidemiologically and operationally. For instance, containing and disposing of human excreta is an important aspect of protecting water supplies from contamination; providing water collection and storage vessels and increasing water production are both needed to ensure the adequate collection and consumption of water for personal hygiene.

Although the most effective environmental health measure in most emergencies, in terms of public health impact, is ensuring that basic water supplies and facilities for safe excreta disposal are provided to the affected population, serving hospitals and feeding centres may be more urgent in some situations (e.g. when a large number of people have been injured, or a significant proportion of the population depends on mass feeding centres).

Refuse collection and disposal, drainage and vector control are usually lower priorities than water supply and excreta disposal. However, malaria may rapidly become the most important health risk after a disaster, and an environmental and health surveillance system should be established rapidly, to enable a rapid response to a malaria epidemic. Again, priorities differ from situation to situation and change for each emergency as it evolves, so establishing and using epidemiological and environmental surveillance systems is also a high priority.

Support for laboratories, stores and offices used for the emergency response should be provided rapidly, to ensure that assessment, response and monitoring are effective.

Services should be established, or re-established, as rapidly as possible, either through setting up temporary systems, or through the repair and/or temporary modification of existing systems. For more information on this, see the relevant chapters of Section II. The complete repair and reconstruction of services after a major disaster can take years. This book is concerned mainly with the early stages of the emergency repair and recovery of essential facilities for maintaining environmental health.

#### 4.3.3 Hospitals and relief centres

In an emergency, existing centres providing specialized care will probably have already become the focus of organized relief activity. Small numbers of supervisory environmental health staff can often improve conditions greatly by:

- supervising any emergency modifications to water and sewerage systems, including improvising the repair of damage;
- providing emergency facilities for the disposal of wastewater and solid wastes;
- ensuring the destruction or safe disposal of medical wastes (e.g. dressings, syringes, etc.);
- supervising the hygiene of food services;



- supervising arrangements for washing, cleaning and disinfecting facilities, equipment and materials;
- monitoring the water distribution arrangements to ensure equity of access to water.

Where first-aid posts and temporary health facilities are required, the following environmental health considerations should influence their location and organization:

- First-aid stations should be located in open spaces, but sheltered from intense heat, cold or rain.
- They should be far enough from potential secondary hazards (fire, explosion, flood, landslide) or the effects of earthquake aftershocks to be safe, but reasonably close to sites where the injured are concentrated, so as to minimize the need for transportation.
- A safe and adequate water supply, drainage for wastewater, latrines and hand-washing facilities for first-aid workers should be provided.
- The proper disposal of medical wastes should be organized as soon as possible.

In some places, mobile emergency hospitals along the lines of military field hospitals will be available. The environmental health considerations applicable to these facilities are the same as those listed above.

#### 4.3.4 Environmental health in search and rescue operations

The most effective search and rescue action is usually taken by people in the affected community before national and international teams are mobilized. Training and support can help local people involved in search and rescue work more effectively and safely.

Environmental health staff may find themselves directly involved in local search and rescue activities, and may be required to provide leadership or technical assistance. In addition, environmental health workers are likely to be involved in providing:

- services for hospitals and medical facilities;
- services for emergency operation centres;
- potable water supplies for organized rescue teams;
- assistance in assessing the risks from hazardous materials during rescue activity and information on the location of hazards. In the case of volcanic eruptions, this can include information on ash toxicity and any other effects;
- information about high-occupancy buildings to help in allocating rescue resources;
- advice on emergency water and sanitation for large, isolated and trapped populations;
- advice on handling human and animal corpses;
- direct assistance with the retrieval, transportation and temporary storage of human bodies.

In addition, environmental health services may be able to provide the following support:

- communications equipment to link newly organized rescue teams;
- fuel supplies for generators, and compressed gases for cutting equipment;
- transportation for specialist teams;
- specific equipment, such as power saws, drills, cutting devices, jacks, air bags;
- portable generators for lighting and water supply;
- support facilities for large volunteer teams.

There needs to be a clear policy on the use of limited specialist resources during the relatively disorganized early stage of an emergency. For example, generators, water storage

equipment, transportation and tools can quickly become dispersed and lost in an uncoordinated rescue effort. A record should be kept of where each major item of equipment is taken or used, and who is responsible for it.

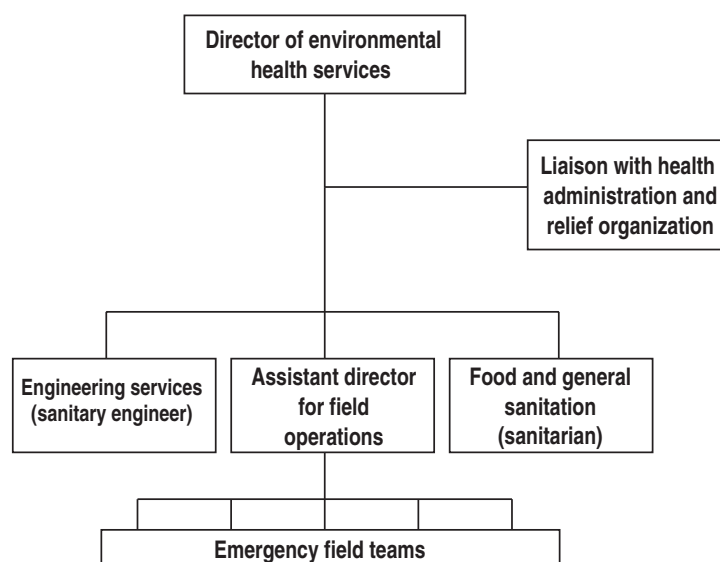
#### 4.4 Organization of environmental health activities during emergencies

Organizational arrangements will be specified as part of the planning process described in Chapter 3, with the aim of providing the framework for a common understanding of the roles and responsibilities of all parties, and ensuring a timely flow of information. An example of an organization chart for emergency environmental health activities is shown in Figure 4.1 Table 4.1 shows typical numbers of environmental health personnel needed in an emergency.

##### 4.4.1 The place of environmental health in the organization of emergency activities

It was emphasized in Chapter 3 that environmental health planning for emergencies and disasters takes place in the context of an interlinked set of coordinated planning processes. This is also true of organizational structure. Thus, environmental health activities have their place in the broader health sector organization for emergencies and disasters, while the health sector, in turn, is part of the national sectoral organization for emergency activities. Figure 4.2 provides an illustration of this.

Figure 4.1 Specimen organization chart for emergency environmental health activities<sup>1</sup>

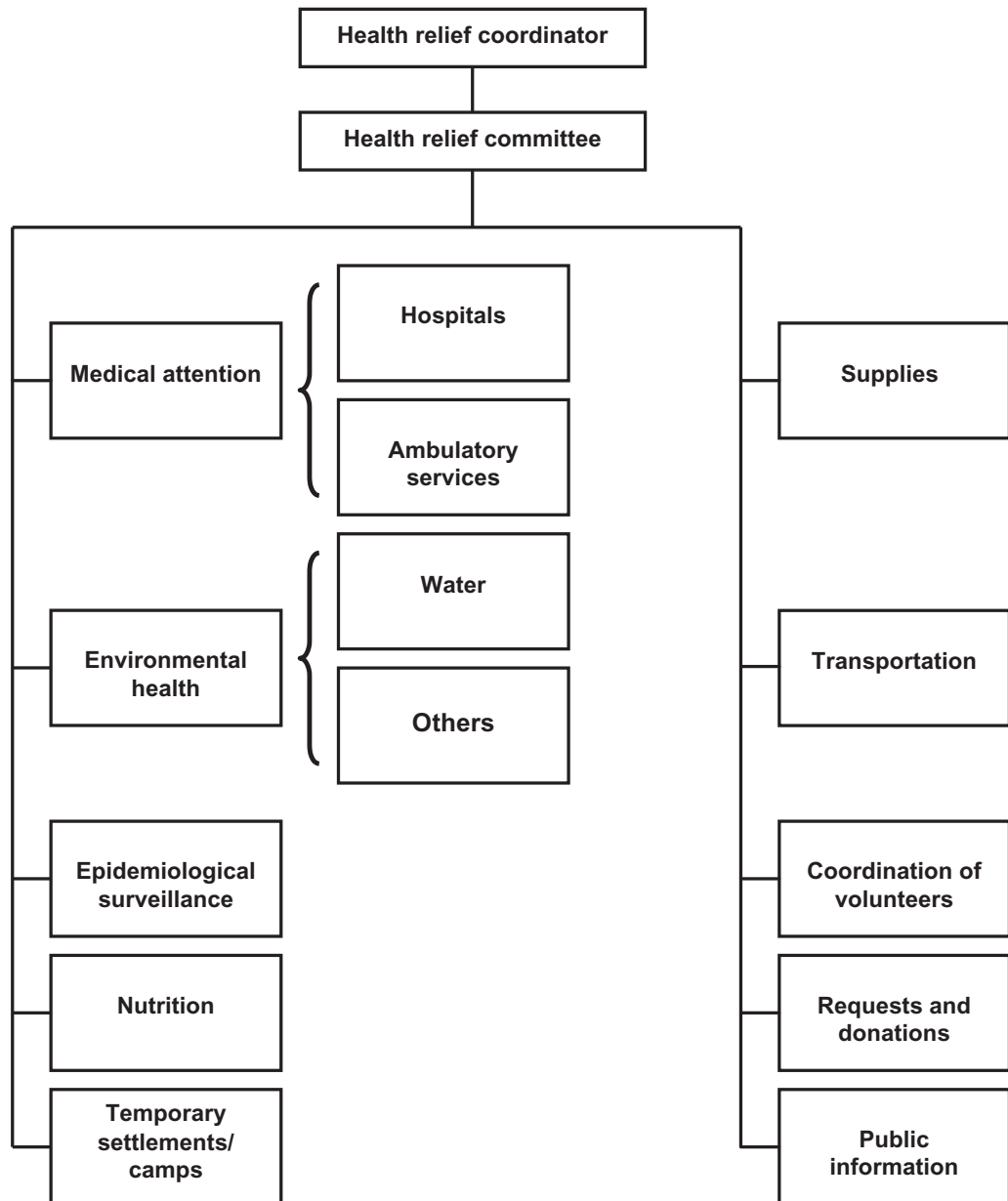


<sup>1</sup> Source: Assar (1971).

Table 4.1 Numbers of environmental health personnel needed in an emergency<sup>1</sup>

Population affected	Number of personnel		
	Sanitary engineers	Sanitarians	Auxiliaries
Less than 1000	—	1	1–2
1000–10 000	—	1	2–5
10 000–50 000	1	2	5–10
50 000–100 000	1–2	2–3	10–15
For each additional 100 000	1	2	10

<sup>1</sup> Source: Assar (1971).

Figure 4.2 Health organization for emergencies and disasters<sup>1</sup>

<sup>1</sup> Source: Pan American Health Organization (1981).

Environmental health personnel will liaise and cooperate in many ways with other health workers, Red Cross/Red Crescent society staff and other community workers. For example, environmental health staff are likely to be stationed in large shelters, reception stations, short-term camps, and longer-term settlements for displaced people and refugees. In addition, they are also likely to be required in hospitals and health centres to repair or manage any water and sanitation installations on site, and advise on measures to maintain environmental health quality when facilities are used by very large numbers of people. This is all the more important because of the tendency for health-care centres to become gathering points for survivors.

#### 4.4.2 Emergency field teams for assessment and initial response

Following a rapid initial assessment that may have identified general environmental health problems, small, mobile emergency teams should be created, coordinated by a field supervisor. These teams should be responsible for assessing environmental health needs; liaising with local health workers; identifying needs for priority water supplies; sanitation; vector control; and surveillance in specific operational areas. Each team should have its own transportation, communications, and supplies for subsistence and professional activities in the disaster-affected area. These resources should be prepared and checked as part of emergency preparedness.

Teams should be in frequent radio or telephone contact with their supervisor for reporting, receiving information and requesting support.

Teams of five to seven people are often most effective, ensuring a sufficient number of people with complementary skills and levels of experience, but small enough to be mobile, reactive, and easy to manage and support. They should be prepared and equipped to deal with all expected environmental health needs.

The teams will need assistance if a major health threat arises for which they are unprepared (e.g. a larger than anticipated number of refugees or evacuees, unexpectedly severe industrial contamination requiring specialized chemical treatment, or a serious outbreak of vector-borne disease). A key function of the field teams is to request additional assistance, based on their assessment of local needs and capacities. Personnel and equipment, as well as transportation, should be held in reserve in preparedness for such requests.

Ideally, specialists in engineering and food hygiene should accompany field teams in areas where there are large city water-supply and sanitation systems to be dealt with, or where mass feeding will be required.

#### 4.4.3 Other specialized emergency environmental health functions

“Food and general sanitation” in Figure 4.1 refers to environmental health measures in mass feeding centres, the management of mortuary services, and the monitoring of the general environmental health situation (in collaboration with epidemiological surveillance). A functional link with veterinary services may be required if there are many animal carcasses or large numbers of stray animals.

Staff in a central office should be responsible for collating information on the status of water facilities and environmental health needs as it comes in from field teams and engineering staff. This information can be used to prioritize the allocation of resources and to formulate messages to the public. Specialized equipment for this purpose should be stockpiled and its location identified before it is needed. The means used to identify and record locations can be as rudimentary as file cards, graph paper, base maps, hand calculators and coloured pencils, or as elaborate as GIS (see Section 3.3.5).

#### 4.4.4 Coordination of emergency response activities

Arrangements must be made at every level for collating and sharing essential information, and for taking decisions on resource use. Such arrangements can range from a simple committee meeting of community leaders or local administrators, to a complex, preplanned, purpose-built emergency operations centre. The basic aims are:

- to share and interpret data on existing threats and urgent needs;
- to identify priorities for collective action;
- to identify useful resources that are actually available;
- to allocate resources as effectively as possible in relation to the priorities identified;

- to seek and identify ways of filling resource gaps;
- to prevent duplication of programmes and overlapping roles;
- to minimize gaps in services.

Coordinating groups should include a senior environmental health specialist. He or she must be able to evaluate the public-health implications of data provided by other organizations. The specialist should also be able to collate and present the implications of events in the public-health sector in the wider context of the relief operation, and to explain the reasons for specific strategies.

Coordination may be led by government departments, interdepartmental bodies, provincial or district authorities, or international organizations (such as UNHCR in refugee emergencies). Whatever coordination arrangements are made, they should be understood and respected by all involved, to ensure a rapid and appropriate response to the emergency.

Effective communications are essential in an organized relief response. Staff should always be aware of the possibility that someone else might be able to use a particular item of information; a willingness to share information across organizational boundaries may be as important as specific technical issues.

Coordinating the activities of international organizations may present particular challenges. For more information on this, see Section 4.11.

## 4.5 Personnel management in emergencies

Personnel managers in emergencies and disasters face unusual problems, and special arrangements often need to be made to ensure an effective and rapid emergency response. The staff will generally be working for long hours under difficult and possibly dangerous conditions. Many staff may be absent as a result of death or injury, transportation difficulties, or concern for family needs and survival. Emergency procedures should be designed that can function adequately with reduced staff numbers. Replacement management staff need to be identified and legally empowered in advance to take over in the absence of those originally designated. A flexible approach is needed to allow staff to use their full range of skills, even if that means changing accepted roles and responsibilities.

### 4.5.1 Professional functions

Well-trained people are needed at policy-making levels, for technical services, surveys, and overall planning and supervision. They may include managers, engineers, medical doctors, epidemiologists, or environmental scientists, depending on the availability of personnel and the specific responsibilities concerned. The most important requirement, apart from experience and managerial skills, is the ability to communicate.

Workers from a number of related fields are needed to assist professional environmental health staff in making surveys, and to control water quality, food sanitation and waste disposal. They will also assist in vermin control and with the work of auxiliary personnel. These workers may come from a wide variety of backgrounds, but appropriate training courses and experience should prepare them for their roles in emergencies. They may include medical assistants, nurses, pharmacists, and humanitarian and welfare workers who have been trained in emergency environmental health work.

Auxiliary personnel are needed to monitor the functioning of all sanitary installations; to supervise food hygiene, vermin control, disinfection and volunteers; and to provide health education. The auxiliaries should have received formal education or training in the main aspects of environmental health, since they will have to carry out the bulk of the field work.

#### 4.5.2 Flexibility in the use of human resources

In emergencies, environmental health measures may be carried out by a variety of people. As well as professional environmental health staff, such people may include primary health-care workers, social welfare workers, teachers and other development workers. They may be the only people available to take charge of meeting the immediate needs for water, shelter and sanitation, especially in isolated localities. This should be borne in mind when designing training programmes and when organizing mobile field teams of trained environmental health specialists, to ensure that these other workers are adequately supported and that their capacities are used to best effect.

#### 4.5.3 Cooperation with the private sector

If too few public sector environmental health workers are available, they may be supplemented by private sector workers, including:

- industry-based and consulting civil and sanitary engineers;
- private laboratory personnel;
- dairy workers;
- industrial cleaning staff;
- railway and airline sanitation workers;
- commercial pest-control operators;
- teaching staff at universities and institutes with expertise in environmental health and sanitary engineering.

Water company employees may also be available to supplement environmental health personnel, although in some situations these companies may also be facing the problems of increased work and absenteeism, and might even require assistance from the environmental health agencies.

#### 4.5.4 Working with volunteers

Volunteers will usually come forward in an emergency, often from existing community-based organizations, youth groups and sports clubs, etc. They may be able to provide skilled and unskilled help, and provide a communications channel with the affected community. They may be vital actors in the recovery process.

All volunteers will need to be supervised by qualified environmental health personnel to ensure that they work effectively and that they take no unnecessary risks (particularly with chemical or radiological hazards, such as when using chemicals for vector control).

#### 4.5.5 Facilities for emergency personnel

The facilities required by emergency personnel will vary substantially according to the customary level of basic support, the task involved and the local conditions generated by the emergency. Broadly, however, all facilities will have common requirements, including:

- basic personal needs;
- family support;
- safety and security;
- emotional support and counselling;
- office facilities;
- facilities for maintaining transportation and communications.

#### 4.5.6 Support for specialist activities

In addition, some emergencies will require specialist facilities and support, including specific safety services; storage for special equipment and supplies; repair facilities for equipment; computer equipment; and specialized laboratory services. These requirements will, in most places, be fairly limited and concerned mainly with carrying out assessments, investigating disease outbreaks, vector control and monitoring a limited number of chemical and radiological hazards.

Personnel who carry out assessments and investigate outbreaks of disease should have good access to communications and be given priority for transportation. Special arrangements should be made for samples to be sent back to laboratories.

Environmental health agencies in a disaster-affected region will generally bring in specialist staff from elsewhere in the country. In large operations, personnel from various other departments and organizations may also be attached to the operation, possibly in addition to international staff. If volunteers are recruited in large numbers, basic local facilities for registration, introduction and briefing will be needed.

#### 4.5.7 Subsistence needs of personnel

Emergency personnel will need to be supported while they give support to others. Work may involve long hours in isolated situations without power supplies, safe drinking-water and waste disposal. Workers also run a relatively high risk of exposure to unfamiliar diseases. A relief worker who falls sick becomes part of the problem, rather than part of the solution.

To maintain morale and efficiency, emergency workers will need access to clean water and food, and facilities for sleeping, washing and cooking. Cash for personal and official expenses is also required.

Tents, stoves, cooking utensils, lamps, water containers, blankets, sleeping bags, chairs and tables, packaged rations, and other camping equipment may be needed, and should therefore be included in the supplies stored for emergencies. Environmental health services must provide for their own personnel. To depend on relief agencies for food and shelter is unwise and unfair; these agencies will already have more than enough to do to provide for victims.

#### 4.5.8 Security and safety needs of personnel

In many areas, security is likely to be a major problem, particularly for female emergency workers and those in charge of valuable equipment. In all post-disaster situations, and particularly during times of conflict, agencies should provide all necessary security arrangements for their staff. These include an assessment of the security situation; appropriate guidelines for staff, depending on the level of insecurity and the nature of the risks; appropriate transportation and communications equipment; safe places to sleep; secure places to store equipment and vehicles; permits and photo-identification; up-to-date security briefings and information on current risks; and evacuation arrangements and procedures for staff in case of need. For further information on security, see: International Federation of Red Cross and Red Crescent Societies (1997a); United Nations (1998); United Nations High Commissioner for Refugees (1999); and van Brabant (2000).

In post-disaster situations there are many other threats to the health and safety of staff. The working environment tends to be unsafe, as a result of damage to buildings and roads, infectious diseases, or lack of appropriate equipment for reconstruction. In addition, the need to act fast, the great risks faced by the affected population, and the lack of close monitoring all discourage staff from applying health and safety procedures

strictly. Managers need to encourage staff to apply correct health and safety procedures, and ensure that they have the means to do so. Adequate selection, briefing and supervision of volunteers are necessary to ensure their health and safety during relief activities.

Buildings used by staff must be safe and should be inspected by a qualified structural engineer after any emergency that causes structural damage. Where toxic substances, such as insecticides, are used, safe and lockable storage must be provided in buildings, together with arrangements for washing and showering. Even under the best conditions, simple but strict safety precautions should be observed.

Provision should also be made for the general health care of emergency workers. They may be injured or fall ill, especially under the stress of long hours and working under difficult conditions. A suitable medical centre should be identified early on, and arrangements should be made for medical evacuation, if necessary.

#### **4.5.9 Psychological needs of personnel**

Some environmental health personnel may need welfare support and counselling when dealing with death and disruption on a large scale, following the death or injury of family members or friends, or because of loss of housing and personal effects. Support can be provided by other team members and friends but, wherever possible, professional help should also be available.

To remain effective, emergency workers need to know that their families are alive and are provided with basic security and personal support. It is particularly important to provide all available information about the fate of family members and close friends. Staff will need to be reassured that support is being provided to any injured family member and to young children or other dependants in the family. When extended families or neighbours are unable to help, providing official support may be the best way to ensure that essential staff are able to concentrate on their jobs.

To reduce stress during long and intensive operations, particularly those in insecure situations, recreational and rest periods need to be planned, preferably away from the operational area.

#### **4.5.10 Administrative support for personnel**

Basic administrative support will be needed. The organization responsible for environmental health will need to update and safely store details of staff addresses and present places of deployment. There should also be a system for recording the number of hours worked in the field, any injuries sustained on the job, and any emergency payments made.

Relief and monitoring operations generate substantial amounts of information, and details of projects and proposals for repair and reconstruction have to be submitted to the appropriate authority. Basic emergency sets of office equipment, including storage for files, card indexes and computers/printers will be required, especially where additional field offices have to be set up.

Portable office units or containers make it easier to set up lockable and relatively weatherproof storage in remote or damaged areas. A support team, including an individual fully responsible for finding accommodation and making the necessary arrangements, should also be considered. Requirements for communications equipment, photocopying and file storage usually increase in an emergency. Lockable storage will be needed for more expensive equipment.

Newly-assigned staff and teams from outside the region will need information on the extent of any damage, the location of damaged facilities, the organization of the emergency operation, and a security and safety briefing. Newly-assigned staff should also be



briefed on any traditional, religious, or cultural customs of the affected community that they should be aware of.

## **4.6 Equipment and supplies**

### **4.6.1 Types of equipment needed**

Lists of equipment and supplies for environmental health will generally need to be drawn up locally, taking account of local practices and conditions, and can be at almost any level of sophistication. The needs to be met may range from those of the rural village to those of a major urban conurbation. This book is primarily concerned with the more basic requirements. Even basic needs, however, may include specific requirements for more complex items, such as computers and communications equipment.

Standardized equipment, including forms for reporting and for requesting supplies, that is developed and held as a preparedness measure, makes operations faster and more consistent, and makes response training easier and more effective.

The categories of equipment to be considered include:

- equipment for personnel;
- equipment for emergency water supplies;
- equipment for emergency sanitation;
- materials, tools and consumables needed to repair and operate damaged urban water and sanitation networks;
- equipment for vector control;
- items used in monitoring and surveillance;
- laboratory equipment and materials;
- maps, reports and other materials that provide information on the area and the disaster, and allow information to be updated and communicated;
- administrative and office items.

A selection of items needed is given in Annex 2.

### **4.6.2 Procurement**

There is no need for environmental health agencies to stock all the items that they need, as long as they can be purchased locally, or brought into the area rapidly when needed.

In many countries, the procedures for requisitioning supplies are complicated and lengthy, and some supplies may need to be brought in from another country. To avoid delaying the response, emergency personnel should not delay the requisitioning and purchasing of urgently needed equipment in a disaster.

Heavy equipment is usually very expensive and need not be stored by environmental health services. It is usually available from the army or from the highway or public works departments. Certain supplies, such as kitchen utensils, temporary shelters, etc., may be the concern of relief agencies. The environmental health requirements for these supplies can be discussed with other agencies involved in relief work.

Lists of essential chemical supplies, pipes, fittings and jointing materials, tools for a mobile repair unit, spare pumps and power units, trucks, tanks, etc. can be prepared, in collaboration with the officials in charge of water- and sewage-treatment works. Follow-up is necessary to ensure that the equipment and supplies for the emergency operation of water and sewage systems are purchased and then stocked in such a way as to facilitate their speedy delivery and use.

### 4.6.3 Specifications

It is important that the equipment and supplies stored for emergency use conform to standard specifications, so that they are robust, appropriate to emergency conditions and reliable. The United Nations system, the IFRC and several international NGOs, such as Oxfam and Médecins Sans Frontières, have developed detailed specifications for relief items, based on many years of research and field-testing.

Field staff should use standard equipment lists, or give detailed specifications when ordering equipment and supplies, to avoid procurement and logistics staff supplying the wrong items, or items that cannot be used efficiently. Ministries of works or ministries of water supply will often be able to provide standard specifications for approved water supply and sanitation equipment.

### 4.6.4 Storage and distribution

There are various storage options. Planners should designate sites for storage in advance, if possible. Suitable sites may include commercial warehouses, or water supply and sanitation service depots, where suitable buildings and stores management procedures already exist. If necessary, items can be transported in lockable containers that can be left on or near the site of operations. The supplies required for most environmental health activities in emergencies are generally simple to store and handle. However, secure storage and handling arrangements and staff training may be needed for water-treatment and vector-control chemicals, and large storage spaces and mechanical handling equipment may be needed for heavy or bulky pipes, pumps, valves, etc.

Inventories should be regularly reviewed by environmental health staff and updated. Periodic tests must be carried out to ensure that the equipment is always in working condition. The same equipment should be used for training purposes, but should always be repacked carefully after each training exercise, and any lost or damaged items noted on the inventory.

Some equipment may be used in routine environmental sanitation operations and will not need to be stockpiled specifically for emergencies, but there should always be an adequate reserve. Supply of these items should be planned within the overall local emergency planning framework. There may be competing demands for this kind of equipment, in which case priorities for its use, and mechanisms for coordinating its use, need to be established.

To ensure that essential items are always available, supplies in, supplies out and stock levels should be closely monitored and coordinated with field staff. It is important to record the end destination for items in the stock records, to monitor that they are being used appropriately and to provide reliable reports.

## 4.7 Transportation and logistics

Transportation is needed for a range of environmental health operations during emergencies, including:

- moving assessment and operational teams;
- road clearance;
- moving people affected by disaster;
- moving equipment and supplies;
- trucking water;
- moving human bodies;
- moving solid waste;
- moving animal corpses (especially after floods and cyclones);
- repair and reconstruction.

The organization of transportation should be planned in advance. Vehicles and their supporting services are expensive and it is difficult to assemble reliable fleets at short notice. An organization should estimate what and how much it will need to move, and arrange for its existing resources to be increased during an emergency, if necessary. Any organization responsible for environmental health may eventually find itself using a wide variety of different vehicles, all of which will need maintenance and spare parts at some stage.

#### 4.7.1 Types of vehicle required

It is essential to select the right vehicles for the specific tasks envisaged. For example, in damaged urban areas, a major problem may be debris that can damage tyres and suspension systems. In such cases, tractors with clearance equipment, and personnel vehicles with robust tyres and suspension systems, would be appropriate vehicles. High ground-clearance light trucks with diesel engines will be useful in all regions affected by tropical storms where there is extensive flooding of roads. In earthquakes and some floods and storms, roads may be severely damaged or blocked by landslides, so that trucks and four-wheel drive vehicles for personnel may initially be required.

Environmental health agencies may need:

- ordinary cars to use for office administration;
- four-wheel drive personnel vehicles;
- minibuses to collect and transport staff;
- trucks;
- rubbish collectors and vacuum (sewage) trucks;
- fuel and water tankers;
- bulldozers and other road-clearance equipment;
- graders;
- compacters;
- cranes;
- cargo-handling equipment (e.g. forklift trucks);
- boats.

#### 4.7.2 Sources and numbers of vehicles required

Although possible sources of vehicles can be designated at the planning stage, information may be needed quickly in an emergency on what vehicles are actually available and from what sources. It may be possible obtain vehicles from:

- the environmental health organization;
- government agencies, including public works departments and the armed forces;
- contractors;
- vehicle hire companies;
- other partners, e.g. nongovernmental organizations.

The numbers of vehicles required will depend on local conditions and on the size of the population and area concerned.

Each team should have its own vehicle. Transportation requirements increase substantially when dealing with visitors, including international aid staff and the press. The use of vehicles for administrative tasks is often substantial and usually underestimated. Vehicles may spend long periods waiting at liaison meetings and banks, queuing to collect goods held at customs, etc., or moving between shops and factories in a search for local supplies.

Disruption of public transportation may make it necessary to set up a temporary shuttle service to bring staff to and from work. Vehicle allocation should also allow for liaison with volunteer groups and local self-help groups.

#### 4.7.3 Repairs and maintenance

In some countries, up to 40% of public vehicles may be out of action because of breakdowns, and shortages of fuel or spare parts. There may not be much time for repairs in emergencies. Extra vehicles should be made available to replace those that have broken down or have been damaged in accidents.

When operating a vehicle fleet, even on a short-term emergency basis, it is essential to consider the availability of fuel, tyres, spare parts and trained mechanics; how to provide support for drivers; and how to supervise vehicle movements and security. Trained drivers and competent vehicle mechanics can substantially increase the efficiency of a vehicle fleet by keeping more vehicles on the road for longer periods.

Other requirements include:

- safe storage of fuel, equipment and supplies;
- stocks of tyres (widespread debris generally increases wear and tear);
- transportation planning and control staff to establish policies and supervise operations;
- ensuring that all vehicles, including hired vehicles, have the proper documentation;
- arrangements for cash payments for fuel, drivers' salaries and living allowances, or hire of vehicles.

#### 4.7.4 Road operations: transportation logistics in field operations

It is important to plan for transportation operations beforehand, since there will rarely be time to do so at the height of an emergency. For road operations, efforts should be made early on to determine road conditions and operating constraints. Information should be coordinated and shared among organizations involved in the emergency response.

Information may be needed on:

- breaks in road networks;
- road capacity (including bridge loading limits, and any restrictions on height and width);
- the potential effects of any adverse weather conditions;
- the availability of fuel;
- security conditions;
- round-trip times;
- the possibility of staying in radio or telephone contact.

#### 4.7.5 Air operations

When air transportation is to be used, specialist advice should be sought on airport capacity and aircraft landing requirements. Account should also be taken of equipment (including lifts and lighting) and labour requirements for unloading, and arrangements for safe refuelling and for restarting engines. Staff should liaise closely with the personnel of national airlines and private air transportation companies. Access to some routes and airfields may be controlled, and staff may need clearance and permits, even in emergencies. For further information on air operations, see United States Agency for International Development (1988).

#### 4.7.6 Other modes of transportation

Depending on local geography, the state of the infrastructure, and other factors, alternative modes of transportation may be used to supplement air and road transportation. In emergencies, railway systems (which are often state-owned) can be mobilized to transport supplies and people quickly at relatively low cost. In countries with navigable rivers, it may be possible to transport less-urgently needed fuel, building materials and water by boat. Early in the relief operation, managers and logistics staff should plan to deliver high-volume supplies by cheaper, often slower routes. This will mean estimating consumption and creating the necessary stocks to allow for a longer delivery time.

#### 4.7.7 Pooling of transportation services

Organizations sometimes collaborate by providing transportation services to each other. For example, an additional pool of heavy vehicles may be available from government sources and can be used to augment existing departmental transportation resources. There may also be large public or private workshops that can provide services to the operation as a whole. However, policies on allocation and scheduling will need to be agreed.

The public works department or the armed forces may be able to provide transportation for environmental health personnel to travel to isolated areas to gather health data, or to move heavy equipment needed to repair water supplies.

In countries where there is an existing refugee or food-relief operation, a large, specialized, relief transportation organization may have been developed over several months or years. Such an organization can be of considerable value in any disaster, provided that a reliable system for the receipt, clearance, transportation and storage of valuable shipments has been established. If necessary, environmental health planners should establish working relationships with any such organizations before an emergency occurs.

For large-scale operations, or those involving the handling of valuable items, it is important to designate an internal or shared transportation/logistics support group, with staff responsible for:

- port and airport clearance;
- commodity tracking and scheduling;
- vehicle allocation, management and maintenance;
- driver support and payment;
- storage.

#### 4.7.8 Vehicle priorities

It is necessary to prioritize vehicle allocation, and essential tasks should be given the highest priority. In particular, some vehicles should be reserved for prompt survey and investigation, and for relocating personnel in emergencies.

Emergency operations centres may be responsible for vehicle allocation and may establish a joint scheduling unit. In practice, however effective the coordination arrangements may be, it is important for field teams to be relatively self-sufficient in fuel, replacement tyres, spare parts and other essential requirements during the emergency period.

#### 4.7.9 Field logistics systems

Whatever the mode of transportation chosen, a system for tracking and receiving valuable items is required. Staff should be assigned to clearly identified tasks for receiving such goods. It is important to establish as quickly as possible written procedures for handing over valuable items. This will involve establishing a commodity-control chain,

with documentary controls such as supplies request forms, waybills, bin cards and stock reports. Signatures and identification should be required for all receipts.

Vehicles and their cargo are highly valuable. Staff should be briefed on the importance of providing lockable storage for tools and equipment, and on arranging for overnight security when parking vehicles containing valuable goods and equipment.

## 4.8 Telecommunications

Telecommunications are the foundation of an effective emergency response on any scale. If installed from the start, they will ensure that the information on the situation is adequately transmitted, facilitating rapid reaction and personnel security.

Use of standardized equipment allows an efficient telecommunications service to be provided with good user support and at a lower cost in the long run. The system used must be based on experience and field feedback. Training, advice and maintenance must be arranged, and in a large-scale emergency response, one or more telecommunications technicians may be required to carry out these tasks. Nonstandard telecommunications systems should be used *only* after consultation with the local authorities responsible for telecommunications and/or with relief agencies operating in the area.

It is essential that personnel are trained in the use of telecommunications equipment, basic communications procedures and radio discipline, to avoid miscommunications and blocked communications channels.

### 4.8.1 Types of telecommunications equipment

The most basic communications equipment available worldwide include the following:

- *Telephone.* Traditional telephone communications tend to be seriously disrupted in sudden emergencies, as a result of damage to switching equipment, network disruption, or loss of electrical power. If telephone lines of different quality are available, the possibility of obtaining better lines should be investigated. Certain companies or United Nations agencies can sometimes provide good satellite lines. The standard satellite communications system used by IFRC is the Inmarsat system. Satellite communications systems are becoming cheaper to purchase and run. Associated equipment for voice, fax, email, telex and data is available. Mobile telephones are increasingly affordable and more widely used in emergency situations.
- *Fax.* A fax machine should be purchased locally if the supplier can install and maintain it. A dedicated, good-quality telephone line is highly recommended. The fax and telephone should not normally share the same line.
- *Email* and other internet services. These may be accessed through fixed telephone connections, mobile telephones, satellite links, or high-frequency (HF) radio. Email communication is increasingly replacing telephone and fax communications in emergencies.
- *Telex.* This is used less and less, but where it is available, it still provides a reliable and cheap method of communicating text.

Radio technology is widely used in emergency operations. Its two great advantages for emergency situations are that it is independent of damage caused to fixed communications systems, and that it has the capacity to transmit to a number of different users at the same time. This is very important for rapidly transmitting security information and instructions. All staff who are to use radios should be trained in their use. A number of different systems are available, including the following (International Federation of Red Cross and Red Crescent Societies (1997a):

- *HF radio.* HF and short-wave radios (operating at 3–30 MHz) are suitable for short-, medium- or long-range contacts (up to several hundred kilometres), depending on the frequency chosen. HF radio can be used for voice (single side band, SSB) or written messages (PACKet TOR or PACTOR technology; see below). The quality of the HF radio link depends on wave propagation; this may vary, depending on many parameters such as the time of the day, the distance to be covered, solar activity, etc. HF radios need a heavy battery or mains power supply, and radio sets are usually fitted in vehicles and buildings.
- *TOR system.* Telex Over Radio (TOR) is used for transmitting text over HF. However, this system is rapidly being replaced by PACTOR technology (see below), that offers error-free links, as well as full ASCII data transmission.
- *PACTOR system.* This system provides text and data transmission on HF radio. A PACTOR modem is connected to the radio and to a personal computer running a specific software application called GLPLUS. It can also be used for text transmission contact with normal TOR stations.
- *Very high-frequency (VHF) radio.* This is generally used for local voice communications, e.g. in a city or a camp. The quality of the communication is generally good, as FM (frequency modulation) is used. Small portable radio sets are available, but these have a short range. A good VHF network needs a fixed base, plus mobile and even repeater stations. Typical VHF radio ranges are (Davis & Lambert 2002):
  - handheld to handheld: about 5 km, depending on terrain;
  - vehicle to vehicle: about 20 km, depending on terrain;
  - vehicle to base: about 30 km, depending on terrain;
  - base to base: about 30 km, depending on terrain.
- *Repeater set.* A repeater set receives and then retransmits VHF radio signals on another frequency at a higher power. Placed high, a repeater set will give far better range than point-to-point radio communications systems. However, the breakdown of a repeater may disable the entire radio network. Installation of a repeater is recommended only if a telecommunications professional is permanently available in the area.

#### 4.8.2 Sources of radio communications

Alternatives may include:

- pre-established emergency radio networks;
- groups of amateur radio operators;
- armed forces or police radio;
- couriers (to supplement radio, or for when radio is not available).

Where radio equipment is widely used, it is essential to ensure that frequency allocations match the traffic likely to be carried.

Local regulations for the use of radio and telephone communications should, if possible, include provision for emergency use by accredited international teams that bring their own equipment with them.

#### 4.8.3 Developments in telecommunications

This is a complex and fast changing area, and continues to be a subject of discussion by national governments, telecommunications coordinating groups, and international relief agencies, but a consensus on basic communications frameworks for international humanitarian relief is emerging. Details of current international conventions, and the options available for telecommunications support and coordination within a United

Nations framework during emergencies, are available from the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) in New York.

Low-cost, satellite-linked mobile telephones are becoming more widely available and will revolutionize field communications in remote areas.

#### 4.9 Financial procedures

Contingency planning must cover access to sufficient cash for essential local purchases and for emergency spending on repairs and other urgent work. Rapid procedures for approving contracted services (or standing arrangements) are also necessary.

Transparent and simple methods should also be established for accounting for these financial decisions. In general, more elaborate rules for the purchase of materials and contracting of services may have to be suspended in disasters to give environmental health personnel the flexibility to overcome deficiencies and replenish any stocks that have run low, are damaged or are inaccessible. Streamlined and precise procedures for granting authority for such transactions, and authorization limits for different staff levels therefore need to be established in advance.

Well-designed budgets that accurately reflect the activities to be carried out are an essential tool for financial management, allowing transparency in financial decision-making and a realistic basis for financial planning and management. In emergency situations, budgets may need to be revised from time to time as the situation changes, or as new information on needs and resources becomes available. It is important for managers to stay in close contact with funders, to facilitate the process of renegotiation.

Provision for audits and for exchange of financial information between field staff and programme administrators is necessary to ensure that systems for financial control are established and operated correctly. It is usual for very large amounts of money to be spent rapidly in emergencies and extra care is needed to ensure that money is not wasted or diverted.

Field staff may be given the responsibility for managing the budgets for the work they carry out. In such cases, it is essential that up-to-date and reliable financial information is provided to them so that they can monitor and control spending.

Senior staff need to carry out financial forecasting to ensure that current and future needs for funds are met. Cash planning is necessary to avoid field staff running out of cash for urgent local expenditures. If large amounts of cash are used for local purchases and paying casual labourers, then special cash-handling procedures may be needed, to enable field staff and office staff to work safely and avoid losses.

Field staff should be aware of the need to provide information for writing financial reports. Their job is made much easier if they are provided with standard financial reporting forms. The increasing use of portable computers for field work means that financial information can be recorded electronically by field staff, reducing the number of calculation errors and the need for data entry in a central office.

#### 4.10 Rules, standards and guidelines in disaster response

There is an inevitable tendency in areas affected by disasters to relax the application of day-to-day administrative procedures and to reduce the scope of, or abandon, many regular monitoring tasks. Staff will be under intense pressure as they assist in re-establishing a basic framework of public health. However, basic rules for the application of professional standards are needed to ensure an effective emergency response and accountability for the considerable resources mobilized.

International guidelines, such as the *World Health Organization Guidelines for Drinking Water Quality, Volumes I and II*, and national guidelines concerning environmental health



provide a framework within which field staff should make local judgments about appropriate emergency actions. Where existing international and national guidelines and standards are not considered to be applicable, then the reasons for this need to be explained at some stage.

In addition to existing public-health and safety rules in a given country or locality, and regulations governing the work of environmental health workers, the other agencies involved in relief operations will have their own rules and standards; see for example, International Federation of Red Cross and Red Crescent Societies (1997a); United Nations High Commissioner for Refugees (1999), and Section 4.10.5.

#### 4.10.1 Importance of rules and guidelines in emergencies

The very conditions in which rules and regulations are widely perceived to be least appropriate may in fact be those in which clear standards and guidelines are most needed. An essential element of environmental health management is the identification and reduction or mitigation of risks. In disasters, and during post-disaster recovery, every kind of improvisation may be attempted, often by people unaware of the direct risks involved or the wider effects. Examples include:

- the patching and reconnection of parts of water-supply systems using improvised and leaky joints;
- connecting to unsafe drinking-water sources, and improvising plumbing in mass-care centres, resulting in back-siphonage;
- indiscriminate use of toxic agricultural insecticides in attempts to control insect vectors;
- mass feeding operations in which critical aspects of food hygiene are neglected;
- inappropriate clean-up after industrial accidents that may give rise to new risks, such as the introduction of hazardous chemicals into watercourses.

Rules and guidelines, when applied in an appropriate way, ensure that rapid and innovative action can be taken in emergencies, without creating new risks and damage to infrastructure.

#### 4.10.2 Basic principles for creating rules for emergencies

First, it is essential to ensure that rules and regulations for emergencies are as straightforward as possible, are appropriate for situations where there is a clear risk to large numbers of people, and make minimal demands on staff time and resources. A balance must be struck between attempting to avoid catastrophic breakdowns in public safety, and encouraging initiative and creative contributions to recovery. Responsibilities for specific tasks should be assigned to designated individuals in an organization; replacements should be nominated to take over if these individuals become casualties or are unable to make contact.

Second, written authorizations or permits to carry out specific measures and to take specific decisions should be provided, and this fact should be made known as widely as possible both before and after an emergency. Certain relief and recovery tasks, such as the recommissioning of parts of water-supply systems, vector-control activities and the emergency disposal of hazardous wastes, should be “signed off” by a responsible individual.

Finally, the risk of inappropriate and dangerous decisions and actions should be reduced by controlling access to the most important resources and facilities, and by screening and briefing any new staff or volunteers. When possible, essential safety measures should be summarized, using pictures as well as words, if necessary, in a single, robust and easily carried document (e.g. a coloured, laminated card, or simply a

clearly duplicated sheet of paper, that can be stockpiled alongside operational supplies).

#### 4.10.3 Special rules in areas of high potential public-health risk

The following major risk areas must be subject to detailed control and regulation, even under extreme emergency conditions:

- the continued operation or recommissioning of large water-supply systems that have been damaged;
- the selection of sources for emergency water supply;
- the emergency disposal of toxic materials, especially soluble industrial waste;
- large-scale feeding.

Specific guidelines on the selection and application of pesticides for disease vector and nuisance pest control will also need to be widely publicized. In some circumstances, special rules will be necessary for handling the dead. See Chapter 14 for further details.

#### 4.10.4 Rules concerning foreign relief workers

In disasters with an international dimension, where relief workers from many countries may be involved, certain legal and administrative difficulties are almost inevitable in some form or other.

Foreign professional staff, including medical personnel, engineers and other technicians, will generally not be licensed to practice in the affected country, and special regulations may be needed to allow them to do so. Increasingly, arrangements for employing international specialists are becoming formalized by agreements between governments and with international agencies and nongovernmental organizations. Examples include UNHCR's arrangements with specialist agencies and technical consultants, and IFRC's Emergency Response Units and Field Assessment and Coordination Teams. Associations of specialists have been formed, with specific operating rules and requirements for the prior screening and accreditation of personnel. Under these conditions, problems of licensing are very much easier.

#### 4.10.5 International standards and codes of conduct for humanitarian response

For many years, international nongovernmental humanitarian agencies have been developing and using guidelines and professional approaches to humanitarian work. Examples include technical manuals, training courses, financial procedures and equipment kits. Since the early 1990s, there has been considerable collaborative work to create and apply codes of conduct and standards, to improve their performance and accountability. Some of the more important initiatives are described below.

*The Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief.* This code of conduct, published in 1994, sets out ten principles that govern the work of subscribing agencies, and makes important recommendations to the governments of disaster-affected countries, donor governments and intergovernmental organizations to facilitate application of the code of conduct.

*The Sphere Project Humanitarian Charter and Minimum Standards in Disaster Response.* This builds on the humanitarian principles described in the Red Cross/NGO Code of Conduct, and provisions of international human rights law, international humanitarian law, and refugee law to describe the core principles that govern humanitarian action and asserts the right of populations to protection and assistance. Minimum standards are set out for humanitarian action in the fields of water supply and sanitation, nutrition, food aid, shelter and site planning, and health services. These standards are based, as far as possible, on existing guidelines and standards, and are accompanied by key indicators

and guidance notes to help staff translate the standards into practical actions in the field. Sphere Project minimum standards are referred to in the technical chapters in Part II, where relevant.

*The Humanitarian Accountability Project.* This project aims to establish the means for people affected by disaster to comment on the performance of international and local systems of humanitarian assistance, so that performance and accountability in humanitarian action can be improved at all levels. To this end, a staff member should be “in-post”, whose role is to listen to people involved in disasters and emergencies, such as agency staff, affected communities, donors and others, and to help make an assessment of the humanitarian response, and encourage improvements where necessary.

Staff who are likely to be involved in an emergency response should be aware of these and other initiatives governing the work of international agencies, as part of preparedness planning.

## 4.11 International assistance

Primary responsibility for disaster relief almost always rests with the government of the affected country. Prior planning is needed both for requesting international health assistance and for handling such assistance. As far as possible, requests should be based on the field assessment of conditions. It may be appropriate to discuss major requests with local WHO offices and with the staff of major international relief agencies in the country, many of whom may have extensive previous experience.

### 4.11.1 In-country coordination

All requests for assistance should be made by a single government body and all offers of assistance should be received by this body for onward transmission to those concerned. This will usually be the responsibility of the national disaster council or ministry of internal affairs. Health staff linked to the council should be the final authority; they should be informed of all proposed medical and environmental health inputs, and should be able to regulate and control any shipments.

United Nations organizations and specialized agencies such as WHO, UNICEF, UNHCR, and the World Food Programme (WFP) are responsible for providing advice and assistance to the government, in accordance with their mandates, and are often represented in the national disaster council. They will also provide technical assistance and material support. IFRC is normally represented in-country by the National Red Cross or Red Crescent Society.

Under certain conditions, joint coordinating arrangements for specialist support may be appropriate. In some emergency operations, medical advisers (pharmacists, laboratory specialists) may already be attached to the national health ministry. If a major additional requirement for supplies suddenly develops, coordination can often be improved by appointing representatives of the department of medical supplies, and advisers on medical supplies and pharmaceutical matters, as joint coordinating secretaries for international relief supplies.

Within the health sector, a senior health official coordinating the environmental health response should act as a liaison and contact point for international agencies and organizations. He or she should be able to communicate with the staff responsible for coordination at the regional and district levels, and should thus be in a position to provide information on needs and resources in the affected area.

The multitude of inputs from international, multilateral and bilateral sources of assistance following a major emergency or disaster have frequently overwhelmed capacities

for coordination in recipient countries. In the last few years, OCHA has been responsible for the coordination of humanitarian assistance in complex emergencies.

#### 4.11.2 Forms and functions of international assistance

In the environmental health sector, the international assistance that can be provided may include:

- expertise and assistance with planning and implementing activities;
- components for emergency repairs to damaged water-supply systems;
- tanks, pumps, piping components and tools for emergency water supplies for large concentrations of people;
- resources (funding for vehicles, fuel and spare parts) to support the emergency delivery of water by road tanker;
- laboratory and water-testing equipment.

#### 4.11.3 Integrating international staff and local specialists

Well-qualified international staff can make a substantial contribution to relief work. In particular:

- They show people that, despite the overwhelming problems, there are ways of imposing order on the situation.
- They recognize that what people can do in a short time is limited and help local officials focus on what they can actually cope with. They encourage local staff to seek out those problems where intervention is likely to be both feasible and effective.
- They encourage staff to use information as a management tool, and to use appropriate methods to ensure that the information that they use is accurate and representative.

Experience suggests the importance of integrating international staff and local specialists. The latter are more likely to be aware, for instance, of local practices in the use of water sources and other local resources, and be better able to assess the feasibility of adaptations for emergency use. They will also be more aware of seasonal variations and local organizational constraints, and be better able to communicate directly with survivors.

#### 4.11.4 Guidelines on employment of international assistance teams

Ideally, countries should establish guidelines on the employment of international assistance teams. The guidelines should cover the following areas:

- ability to meet internationally recognized standards for qualifications and proficiency;
- self-sufficiency in personal needs and equipment;
- commitment to remain in country for a certain length of time, or until certain activities have been completed;
- ability to react sufficiently quickly and with sufficient staff and other resources;
- knowledge of the country, or experience in the technical area concerned;
- recognition by, and support from, the United Nations agency concerned (e.g. UNHCR in refugee emergencies);
- capacity and commitment to enable members of the local population to participate in their operations.

It is important to avoid situations in which teams arrive with high-technology equipment, remain for only short periods of time, and then withdraw without stabilizing the situation in the longer term.

Sophisticated equipment for water-supply systems or vector control is useless in the longer term if supplies of spare parts are not continued, qualified repair and maintenance staff are not available locally, and local people are not properly trained to operate the equipment. Similar problems have occurred in refugee operations, where international specialists have built sophisticated, electronically operated water-treatment and pumping systems and then departed, leaving no blueprints and making no arrangements for the supply of spare parts or planned maintenance. Such arrangements are expensive and often fail more catastrophically than those they replace.

#### 4.12 Further information

For further information on:

- assessment techniques, see: Scrimshaw & Gleason (1992), Beaglehole, Bonita & Kjellström (1993), Good (1996a), International Federation of Red Cross and Red Crescent Societies (1997b), Médecins sans Frontières (1997a), Baker et al. (1999), World Health Organization (1999b), Davis & Lambert (2002);
- public health in disasters and emergencies, see: Goma Epidemiology Group (1995), Perrin (1996), Médecins sans Frontières (1997a), International Federation of Red Cross and Red Crescent Societies (2000), International Federation of Red Cross and Red Crescent Societies, Johns Hopkins University (2000);
- human resources, see: International Committee of the Red Cross (2001), People in Aid (1997);
- equipment, transportation and logistics, see: de Ville de Goyet (1993), United Nations Development Programme, Inter-Agency Procurement Services Office (1995), Adams (1999), United Nations High Commissioner for Refugees (1999), Davis & Lambert (2002);
- telecommunications, see: International Federation of Red Cross and Red Crescent Societies (1997a), United Nations High Commissioner for Refugees (1999), Davis & Lambert (2002);
- international humanitarian codes of conduct and standards, see: International Federation of Red Cross and Red Crescent Societies, International Committee of the Red Cross (1994), Sphere Project (2000);
- coordination, see: Dufresne & Thompson (1996).