

## 5. Recovery and sustainable development

### 5.1 From disasters to development

#### 5.1.1 The transition from relief to recovery

A distinction is usually made between immediate measures taken to support life and sustain morale, and the later activities dedicated to re-establishing the economic, social and cultural life of the people concerned and rebuilding damaged areas. In this book, the first group of activities is called *relief*, while the second is collectively referred to as *recovery*.

There is no clear-cut boundary between the relief and the recovery periods. It is important to emphasize that the disaster-management cycle is an unbroken chain of human actions whose phases overlap (see Chapter 1). Since the disasters change social, political, economic and even demographic realities irreversibly, there can be no return to the predisaster situation. In addition, people begin almost immediately to rehouse themselves and to re-establish their social and economic networks after a disaster (Bates, 1982; Aysan & Oliver, 1987; Oliver-Smith, 1986a, 1991). Certainly, by the time the relief phase is changing into recovery, most people have very clear ideas about what they want to do to rebuild their lives. It is essential to take their views into account when planning for recovery.

An account of recovery and development in Mexico City after the earthquake of 1985 is given in Box 5.1.

#### 5.1.2 Sustainable development

The World Commission on Environment and Development (also known as the “Brundtland Commission”) has defined “sustainable development” in terms of livelihood security. A system is sustainable if it provides all people with secure livelihoods, in ways that do not compromise the ability of future generations to achieve secure livelihoods (World Commission on Environment and Development, 1987a).

*Livelihood* is defined as access to adequate food and cash to meet basic needs. *Security* refers to secure ownership of, or access to, resources and income-earning activities, including reserves and assets to offset risk, ease shocks and meet contingencies. *Sustainable* refers to the maintenance or enhancement of resource productivity on a long-term basis (World Commission on Environment and Development, 1987b).

Throughout this book, three key concepts are continually emphasized:

- organization that is responsive to local needs;
- improvisation;
- incremental improvement.

These three principles can and should be carried over into the period of full repair of infrastructure, economic rehabilitation and physical reconstruction of neighbourhoods and communities, and become a permanent feature of sustainable development.

**Box 5.1 Recovery and development in Mexico City<sup>1</sup>**

Following the earthquake in Mexico City in 1985, an innovative housing reconstruction programme provided almost 50 000 housing units in a way that directly involved neighbourhood associations, tenement groups and church organizations in decision-making. This strengthened the social capacity for mitigating, coping with and recovering from any future disaster.

Furthermore, the programme, called “Renovación Habitacional Popular” (RHP) created 115 000 new jobs in the construction industry that were filled almost exclusively by locally recruited workers. This strengthened the community’s economic base and helped local people to rebuild their livelihoods. The reconstruction plans included space for workshops, commercial spaces and houses, and laid the foundation for sustainable livelihoods.

RHP also strengthened the alliance between the public and private sectors. The RHP task force included experts seconded from private sector organizations, as well as experts from the public sector. The public sector provided institutional support, a timely flow of information and funds, and shortcuts in bureaucratic procedures. The private sector contributed practical experience in finance, design, construction and management.

When construction was complete, RHP was dissolved, preventing the institutionalization and bureaucratization of the recovery process.

<sup>1</sup> Source: Pantelic (1991).

**5.1.3 Increasing individual and institutional capacity**

Increasing the capacity of people to offset risk, absorb shocks and meet contingencies is central to the goal of sustainable recovery. Reconstruction of a damaged area is not limited to the erection of new buildings. An integrated development process is required that should embrace the full redevelopment of the affected area according to the needs of its population.

Long-term recovery from a major disaster is inevitably a slow and difficult process. No society is ever the same after a disaster, nor should it be. Disasters reveal weaknesses and deficiencies in society’s ability to protect itself, especially its more vulnerable members. Those concerned with environmental health should learn the lessons that disasters teach about the health of the population, and the resilience and responsiveness of health facilities, including water supplies and sanitation systems. They can help to draw out the more general lessons that will result in prevention, mitigation and increased preparedness.

Emergencies and disasters often provide an opportunity for new voices to be heard in society: emergent community-based organizations express the needs of disaster-affected people (Anderson & Woodrow, 1989; Berke et al., 1993) and can become a permanent force for change and sustainable development once the emergency is over.

After major disasters, countries have often introduced new legislation and established new institutions and programmes. They have also adopted building codes; regulated land use; controlled dangerous industrial processes and the transportation of toxic chemicals; provided insurance and credit for vulnerability reduction; improved early warning systems; increased preparedness; and improved the coordination of emergency response. All of these initiatives and changes offer environmental health planners and administrators opportunities to promote health and safety, and all are part of the overall recovery process.

**5.2 Assessment for recovery**

Continuing relief efforts, such as the provision of emergency shelter, water, sanitation, etc., will not produce recovery alone. By the very nature of the emergency response,

such activities are often not well integrated into long-term development processes. More importantly, during the relief phase, populations are often supported by outside resources that are not sustainable in the long run. At a certain stage, people in camps must either return home, become integrated with the host population, or settle in a third location. Similarly, the self-sheltering population will need to support itself either in its old neighbourhoods or communities, or elsewhere.

The reconstruction of housing and of water-supply and sanitation systems are priority areas. The information required for long-term planning and policy-making are outlined in the following sections.

### 5.2.1 Reconstruction of housing

Before long-term plans for the reconstruction of housing and other forms of shelter can be drawn up, the following information is required:

- The *number of people concerned*, their geographical distribution, age groups, etc.
- The *number of houses damaged and destroyed* and the standard and pattern of housing before the disaster.
- The *number of families already engaged in repair* or rebuilding; the way in which they are organized; the incorporation of risk-reducing features in rebuilding; the assistance they may require and the possibility of encouraging low-cost risk-reducing techniques.
- The *available resources* (land, labour power, skills, materials, equipment, access to transportation, and financial resources to support self-help).
- *Remaining hazards* that may be faced by people settling on certain sites.
- *Economic data* (previous rent levels, land prices, costs of materials, and the source and amount of funds available for investment in housing).

*Housing policy* should take this information into account and a thorough consultation process should be carried out, with special efforts made to hear the opinions of people who may not normally be heard in the community. The goal is to find answers to the following questions:

- What agencies should provide assistance to self-help rebuilding or engage directly in housing construction, and what partnerships with community organizations and the private sector are possible?
- Should new housing be built on the previous site or elsewhere, bearing in mind that residents may have pre-empted this decision by beginning to rebuild or by occupying vacant land with the intention of building there?
- Should particular groups or families be given special consideration in rehousing?
- Are there ways of encouraging those engaged in self-help rebuilding to incorporate new safety features against earthquakes, wind, flooding, etc., as appropriate?
- Is it necessary to lower building standards that do not affect health or safety in order to build quickly and affordably (Davis, 1978; Hardoy & Satterthwaite, 1981; Aysan & Oliver, 1987; Oliver-Smith, 1991)?
- Is it necessary to introduce new industries and techniques, and start training building workers, etc., especially in low-cost safety improvements? Some nongovernmental organizations have considerable experience of such training (Cuny, 1983; Maskrey, 1989).
- Should changes be made in the laws governing landlord–tenant relations?
- Is it necessary to modify the laws governing land ownership, or access to vacant land for building, as well as zoning regulations? Is compulsory public purchase of hazardous terrain necessary and possible?
- Does legal ownership need to be established to provide security of tenure?

- To what extent are the people involved able and willing to contribute financially and otherwise to reconstruction?
- Are laws needed during the recovery period to regulate speculation in urban land prices and the prices of building materials (McAuslan, 1985)?
- Are new arrangements needed to provide financial support for house repair and new housing (Alexander, 1993)? The question is particularly relevant to the use of special credit lines, low-interest loans, revolving loan funds, and loan guarantees to encourage the adoption of new safety features or health improvements, e.g. the credit facilities supporting Lesotho's urban and rural sanitation campaign for building ventilated improved pit (VIP) latrines (Blackett, 1990).
- How can the "informal" construction industry that exists in many countries be stimulated to work with residents attempting their own repairs? Hardoy & Satterthwaite (1981) describe how use was made of a large number of artisans and traditional builders rather than giving all the work to established formal-sector contractors. Support could also be given to women's groups attempting to break into the construction industry (see Carr, 1984).

For examples of self-help reconstruction, see Box 5.2. For examples of incorporating safety features during reconstruction, see Box 5.3.

#### Box 5.2 Self-help reconstruction in Guatemala<sup>1</sup>

The 1976 earthquake in Guatemala left thousands of people living in substandard housing in many neighbourhoods of Guatemala City.

Leaders of several working-class neighbourhoods on the outskirts of the city joined local church workers and students from San Carlos University in a land invasion that provided more than 1000 families with new, more stable terrain for rebuilding their homes. Faced with such large-scale, popular action, the National Housing Bank (BANVI) agreed to buy the land and the Emergency Committee of the Calvary Church (CEMEC) agreed to build 1500 houses (26 m<sup>2</sup> each), a health station, a 10-room primary school, a market, a church, a park, a slaughterhouse and a first-aid station. BANVI also agreed to lay out and gravel streets, and help provide electricity, potable water and drainage.

The participating families agreed to engage in decision-making, commit three weeks of labour to house construction, and pay a mortgage of \$US 8–10 per month.

The title to a house was transferred after a year of proper care and use as the owner's family residence.

<sup>1</sup> Source: Oliver-Smith (1991).

#### Box 5.3 Incorporation of safety features during reconstruction

During the recovery period, those engaged in self-help rehousing should be encouraged to incorporate new safety features against earthquakes, wind, flooding, etc.

One example of this is the successful promotion of lightweight aluminium sheeting as a roofing material, instead of the traditional heavy ceramic tiles that proved lethal in the 1976 earthquake in Guatemala (Bates, Farrell & Glittenberg, 1979).

Another, is the use of metal straps to tie down roof rafters against strong winds, a low-cost innovation introduced in many places following cyclone/hurricane disasters in recent years (Davis, 1986).

Other work includes research on strengthening existing adobe (mud brick) construction.

### 5.2.2 Reconstruction of water-supply and sanitation systems

Once damaged systems have been repaired, and services to the disaster-affected population are adequate for protecting life and health, longer term reconstruction should be planned. The following information is required:

- The number of people affected, their geographical distribution, age groups, etc.
- People's access to protected water supplies and sanitation systems and the pattern of water-related diseases before the disaster.
- The data (meteorological, hydrogeological, hydrological, and other relevant data) needed for planning improvements in water supply and sanitation in these areas.
- The results of an evaluation of emergency response and urgent repairs and measures (i.e. whether and how emergency measures have actually improved access to protected water and sanitation, and decreased the amount of water- and sanitation-related disease).
- The activities carried out by the people themselves to improve water supplies and sanitation in the disaster-relief phase (including the predisaster activities of community-based and nongovernmental organizations), and whether these activities incorporate low-cost improvements and health safeguards.
- The availability of labour, skills, materials, equipment and financial resources for assisting the community to continue the improvements, or for extending water-supply and sanitation systems, and the feasibility of collecting basic relevant data if none has been collected.

Questions of water supply and sanitation policy will arise that are similar to those raised by self-help housing, as follows:

- What agencies should provide assistance to those engaged in improving water-supply and sanitation systems?
- Should particular groups be given special consideration?
- To what standards should new and improved water-supply and sanitation systems be constructed? (This is especially relevant in drought-prone areas during the period of recovery, which can be quite prolonged). Should lower standards be accepted temporarily, or should reconstruction be used as an opportunity to provide better water supplies than before the disaster?
- If new industries and techniques are introduced, is it necessary to train water-supply construction workers, such as highly skilled well-digging teams?
- Are any changes required in the laws governing the ownership or control of water resources?
- Are new banking and credit arrangements needed to stimulate community-based improvement of water supplies and sanitation?
- Should a price be set for the water or sanitation services provided by utilities and, if so, how should it be done?

### 5.2.3 Secondary damage assessment

Whereas primary damage assessment involves the rapid appraisal of deaths, injuries and disease, and identification of damage to infrastructure, material resources and services, secondary damage assessment is concerned with the impact of the primary damage on the economic, social and cultural life of survivors. Since sustainable livelihood security is the goal of both recovery and sustainable development, the assessment of such damage should be concerned with the following three kinds of loss or disruption.

*Loss of livelihood, including:*

- loss of capacity through physical disability or emotional disturbance due to the disaster;
- loss of employment if the place of employment fails to reopen, or reopens only after a long delay;
- loss of tools, raw materials, family labour (through death or injury), or other workers, or markets for the self-employed artisan;
- loss of arable land (due to landslides, salt spray, flooding, a river shifting its course, desertification, etc.), livestock, seed or farming equipment;
- loss of boats, nets, other equipment, fishing grounds (due to silting, beach erosion, etc.), or markets for fish;
- loss of access to common resources such as pastures, forests, wetlands used for gathering fuel or fodder, or for obtaining craft materials, etc.;
- loss of access to public resources such as tenancy on an irrigation scheme, a government contract, etc., as a result of physical damage to public installations, bureaucratic disruption, or emergency reallocation of government funds to disaster relief;
- indebtedness as a result of coping with a disaster, attempts to replace any one of the livelihood items mentioned, or attempts to rebuild a house; likelihood that indebtedness will cause a further loss of resources (through distress sale of land or animals, mortgaging of crops, etc.).

*Loss of social cohesion, owing to:*

- multiple deaths in a family;
- separation of family members;
- being a refugee or a displaced person;
- loss of status in the neighbourhood, community, or family as a result of relying on support from outsiders;
- the weakening or destruction of a community-based organization, such as a cooperative, trade union, women's group, or mutual aid group;
- loss of political influence at the municipal, state/regional, or national level because of deaths of party leaders, damage to party property, etc.

*Loss of cultural identity, owing to:*

- the destruction of significant cultural sites, places of worship, or religious objects;
- the death of an important cultural/religious leader in the disaster;
- the disruption of important cultural rites because of the disaster and its aftermath (e.g. the site of celebration has become inaccessible, or it is impossible to gather the necessary number of people to perform the rite);
- the minority status of the culture among refugees or displaced persons;
- the need to violate food taboos or other cultural norms to survive in the aftermath of a disaster;
- dependence on the government or outside donors for long periods of time, with the consequent erosion of self-confidence and initiative.

For information on the rehabilitation of livelihoods in Somalia and on the importance of cultural values in successful resettlement, see Boxes 5.4 and 5.5, respectively.

#### 5.2.4 Secondary vulnerability assessment

The various kinds of losses discussed above under the headings of livelihood, social cohesion and cultural identity can create new vulnerability to future disasters or make exist-

**Box 5.4 Rehabilitation of livelihood in Somalia<sup>1</sup>**

During 1993 there was sufficient stability in Somalia to allow a dramatic improvement in support for sustainable livelihoods. The settled agropastoral people in the interriverine zone in the south of the country were provided with seed and implements to begin farming again. Marketing infrastructure was also re-established. A major veterinary campaign was launched to immunize livestock, and water points were rehabilitated. These economic measures were complemented by the reconstruction of basic health care and education infrastructure and the re-establishment of local government.

<sup>1</sup> Source: Wisner (1993).

**Box 5.5 Importance of cultural values in successful resettlement**

Oliver-Smith (1991) reviewed a series of post-earthquake resettlement attempts in Guatemala, the Islamic Republic of Iran, Peru and Turkey. He found that site, layout, housing type and popular input were significant variables in explaining success or failure of the scheme. Besides the physical properties of the site, cultural values that differed from group to group were important in defining acceptable layout, housing and the mode of community participation.

Resettlement can dramatically change a way of life. For example, Skopje, Yugoslavia, was a closely-knit city with a strong mediaeval Ottoman heritage before the 1963 earthquake. Reconstruction converted it into a low-density, linear city, 24 km long, changing the lifestyle of its citizens for ever (Davis, 1975). In other cases, efforts have been made to preserve the identity of settlements during post-disaster reconstruction (Alexander, 1993).

ing vulnerability worse. Failure to recover, or partial recovery, makes it more likely that people will be more vulnerable to the next stressful situation. Recovery planning must therefore identify such people (or groups) and meet their needs for rehabilitation and reconstruction.

**5.3 Recovery planning**

The answers to the questions raised in the previous section do not constitute a restoration “plan” by themselves. They relate to only a few of a very large number of subsectors of critical importance for restoration and sustainable development. Even complete answers to all possible policy questions would not constitute a plan, although that is precisely what many published restoration “plans” actually look like.

A thorough evaluation of the relief response up to the point at which recovery planning begins may reveal that secondary damage to livelihoods, social cohesion, or cultural integrity have been left unaddressed or even unintentionally made worse. In addition, a survey of peoples’ responses to such secondary damage may reveal coping mechanisms that can be reinforced or encouraged during recovery.

In many countries, a specific governmental body is created for the purposes of coordinating and directing rehabilitation and reconstruction. Elsewhere, an ad hoc task force consisting of officials from a number of ministries takes this responsibility. In yet others, it is the national counter-disaster agency that also coordinates recovery. Whatever the organizational form adopted, it is essential to ensure close liaison between the body responsible for recovery and that concerned with disaster management (hazard assessment, preparedness, warning, relief, etc.). Decisions taken in the course of recovery (e.g. the decision to resettle a large number of people in a new site) could themselves create



serious hazards. As noted above, observed patterns of community self-help during the relief phase are highly relevant to the design of recovery programmes.

It is also necessary to guarantee that the body responsible for recovery is represented and has a strong voice in all routine economic planning and can review all major economic decisions and comment on their possible effects on hazard vulnerability. For example, it makes little sense for the recovery agency to provide loans to farmers to produce grain for the national market if, with no prior consultation, a different planning commission decides to import a large quantity of grain.

Finally, post-disaster recovery requires true community involvement in planning and implementation, based on close consultation between planners, policy-makers and the communities concerned. For example, the affected population must be strongly represented on the body that directs recovery. People will have begun their own individual family and community “programmes” for recovery long before the officially designated body meets for the first time. Such local initiatives are healthy signs of adjustment and coping with the post-disaster situation. They should be incorporated, coordinated, and extended as part of the recovery planning process. As a minimum, these self-help activities should be the starting point for a dialogue between planners and the people concerned. However, it should not be assumed that such activities, carried out under severe resource constraints, represent all that people could do to satisfy their desires or commitments for the future. The people affected by recovery plans must be equals in the planning process. The process of participatory planning was discussed in Section 3.5.

## 5.4 Recovery in different contexts

Recovery commonly takes place in two very different situations. The first is that of self-sheltering populations (i.e. those that have sought short-term public shelter, but have remained in or near their original homes and sites of livelihood activity no matter how severely damaged these may be). The second is that of populations living in longer-term camps for displaced persons or refugees.

### 5.4.1 Self-sheltering or short-term evacuees

In this situation, livelihood options may be severely affected, but social cohesion and cultural identity are probably less so. Short-term evacuees will quite probably be far advanced in self-help activities, and there are also likely to be a variety of pre-existing community-based organizations and emerging self-help organizations active among them. Close consultation with representatives of the affected people is vital; they will often take the lead, making requests—sometimes quite detailed and professional—through their community organizations.

Financial credit and technical assistance are probably the most important things that an official recovery agency can provide. Means of ensuring financial accountability on the part of such organizations are a legitimate concern of the government, and they must be taken seriously and dealt with in good faith. Some legal assistance may be needed to control speculation and hoarding at a time when high land prices or monopoly pricing of building materials, replacement livestock, well-digging equipment, etc., could be a serious obstacle to self-help efforts. Likewise, assistance with questions of land tenure may be an appropriate role for the recovery agency.

### 5.4.2 Resettlement

Under many circumstances the worst possible plan is to resettle (i.e. permanently relocate) the people affected by a disaster. First, they are likely to resist such attempts; this has happened repeatedly in a variety of countries (see Box 5.6). Second, such resettle-



**Box 5.6 People's resistance to resettlement**

Resistance to resettlement is often mentioned in the literature. Cases come from many countries: Guatemala, Indonesia, Turkey, the United Republic of Tanzania and Yugoslavia. When people reluctantly move to a new site, they often drift back to the old one over a period of years (Oliver-Smith, 1991; Pantelic, 1991). The town of Yungay, Peru, was totally destroyed in 1970 by a mudslide triggered by an earthquake. Some 4500 people died. However, there was a potent sense of solidarity among the 500 survivors, who demonstrated a strong will to rebuild their town despite government efforts to get them to settle elsewhere (Oliver-Smith, 1986b).

**Box 5.7 Meeting the challenges of Mount Pinatubo: successful resettlement in the Philippines<sup>1</sup>**

In 1991, Mount Pinatubo erupted, killing more than 900 people, destroying or damaging more than 100 000 houses, and displacing some 1.2 million people. A typhoon occurred during the eruption and torrential rains turned the *lahar* sand spewed from the volcano into massive mud flows.

The Philippine National Red Cross (PNRC) engaged in a huge relief effort, beginning with evacuations a few months before the major eruption.

During the recovery period, PNRC also undertook the resettlement of some of the displaced families in permanent new villages, placing the emphasis on sustainable livelihoods, assisted self-help housing, and infrastructure.

Livelihood opportunities included fish, pig, goat and poultry farming; vegetable, mushroom and orchid production; and garment making. Housing is being improved gradually by residents with basic building material provided by PNRC. For instance, in New Maligaya Red Cross Village, forest officials allowed settlers to cut trees killed by heavy ash fall from the volcano. These became the frames for their new houses. Infrastructure in the new villages included protected water supplies, health centres and schools. A variety of non-profit general stores, multipurpose cooperative societies and other economic institutions were also created.

These resettlement efforts were carried out in cooperation with various Philippine government ministries, local government, and private industry. One private company, the Zambales Electric Company, cooperated in extending electricity supplies to New Maligaya Village at the request of the local mayor and PNRC.

<sup>1</sup> Source: Belen (1992).

ment programmes are complex and costly. Their complexity means that a long time is needed to study and prepare them, after which the people are even less inclined to move. If people are moved without adequate planning and preparation, a great deal of economic hardship, disease and even loss of life can occur.

Resettlement has sometimes been strikingly successful, as in the Philippines in 1991, when people forced from homes on the slopes of Mount Pinatubo were helped to establish new livelihoods in a new location (see Box 5.7). However, failures generally outnumber the successes and there are always dangers and high costs. The population concerned may sometimes remain in place, but require income support and vocational training because the disaster has destroyed the livelihoods that previously supported them. Affected populations are sometimes able to use their political power to persuade governments to invest quite large sums in restoration or resettlement schemes.

### 5.4.3 Rehabilitation and reconstruction for long-term camp residents

Permanent options for residents of a camp are: to become economically independent and integrated with the host population; to return home; or to leave for some other destination (possibly a third country in the case of refugees).

UNHCR has often successfully provided refugees with land, tools, seeds, livestock, etc., and enabled them to establish local livelihoods. However, this is very difficult to achieve. Success depends on local culture, economic feasibility and political commitment. Recovery planners can probably be of most assistance in the economic sphere.

Refugees with essential skills may find well-paid employment locally, but many have little to offer but their labour power. Some become caught in a vicious circle of landlessness and low income. This can erode their already limited capacity for coping with future emergencies and increase their vulnerability.

Where there is much vacant land, arrangements can be made locally for its use by camp residents. If, throughout its history, the camp has shared facilities with the host population, such as a school, a health centre, or a water supply, it is more likely that such arrangements can be made.

The repatriation and resettlement of refugees at home is the second possibility. This requires assurances of security. Returnees may find that their property has been confiscated, or their claims to land and property disputed. They will certainly need considerable support to finance farms or small businesses. Even when international movements are the result of large-scale disasters, such as drought and desertification, return may still be sought by some refugees. A large investment in land restoration may then be required and recovery planning must be coordinated with overall economic plans in the country concerned (Scott, 1987).

Rehabilitation and reconstruction can also be applied to camp sites following the return of residents to their home communities. The water supplies, drainage and electrical distribution systems may sometimes be of value to nearby communities, and long-term sustainable development of the camp sites for agricultural, industrial, recreational, or educational purposes may be possible.

In Macedonia, following the return of Kosovar refugees to Kosovo in mid-1999, UNHCR was responsible for cleaning up and rehabilitating eight camp sites that had at one time held over 100 000 refugees. Most of the sites were either within or near villages and small towns. Following the return of the refugees, UNHCR held a series of meetings with local municipalities, national communities and international donors to encourage further development of the sites, using the infrastructure that remained. By the end of 1999, good progress had been made and development plans and funding commitments were available for at least one-half of the sites.

For further information on economic development by refugees, see: Christensen (1985); Kibreab (1985, 1987); and Harrell-Bond (1986).

Information on the linkage between resettlement and development in Mozambique is given in Box 5.8.

### 5.4.4 Chronic conflict situations

In situations of chronic disruption to livelihoods and to environmental health services because of conflict, there is no possibility of recovery and long-term sustainable development. In these situations, the affected communities remain vulnerable to the direct and indirect impacts of violence, including destruction of water-supply and sanitation infrastructure, or repeated displacement, both of which may make installation of permanent infrastructure inappropriate. The challenges facing environmental health agencies in these situations are great, but they may learn useful lessons from the affected communities themselves about strategies for operations that do not rely heavily on fixed

**Box 5.8 Linking relief and development in Mozambique<sup>1</sup>**

Following the 1992 peace accord, the focus of most aid programmes in Mozambique shifted from emergency relief to rehabilitation. Approximately 3 million internally displaced persons and 1.5 million refugees were assisted in returning to their home areas. Although many households rapidly restarted crop production, they remained vulnerable because basic services had not been rebuilt. Distributing cash was more appropriate in some cases than distributing a standard bundle of food, seeds, tools and selected household items. Cash allowances gave the returnees the ability to choose what they needed most and helped to revitalize the local economy.

<sup>1</sup> Source: Whiteside, 1996.

material resources for their success. For instance, hygiene promotion activities; or community health-worker training that enables communities to make informed choices about selecting temporary water sources; or practicing simple diarrhoea management all maintain their value even when people are displaced or their settlements are damaged. However, sustainable improvements in environmental health can only be achieved in situations of peace and relative stability.

## **5.5 Post-disaster environmental health activities and sustainable development**

### **5.5.1 Vulnerability reduction**

A sustainable livelihoods approach to recovery focuses on encouraging the development of people's capacity through their access to food, cash and other basic resources and a corresponding reduction in their vulnerability to disasters. Sustainable livelihood security provides the resources that people will eventually use to improve their standards of housing, water supply, sanitation, food safety, dietary security and personal hygiene. Exposure to disease vectors and pests will also be expected to decline correspondingly. Improved nutrition will increase resistance to disease.

People with livelihood security will be less likely to live on a grossly hazardous site (steep, unconsolidated slope; frequently flooded area; low-lying, unprotected coastal areas prone to frequent storms, etc.). They will also have time to attend meetings and to become involved in community-based organizations that will represent their interests politically.

### **5.5.2 Specific implications of sustainable development in environmental health planning**

This section is based on two premises about sustainable development. The first is that sustainable development is linked with economic growth (although the two are certainly not identical). If this is true, then where sustainable development occurs, average household disposable income should rise, allowing spending on improvements in water supply, sanitation and food safety. The pricing of such items and services is crucial. They cannot usually be fully subsidized, since the cost is difficult for governments to bear for a large population, but a sliding scale of subsidies may be considered, so that the lowest income earners are also able to make improvements. There may be substantial local or national economic activity generated by households' spending on sanitary improvements.

The second premise is that sustainable development stabilizes or even improves the ecological basis of livelihoods. If this is true, environmental health planners should be able to count on a number of direct and indirect positive effects of low-cost, "green" design and redesign of technology in rural and urban areas. For example, they will be

able to count on more accessible water sources because the afforestation and protection of watersheds will raise groundwater levels and reduce sediment streams. Soil conservation should have a similar effect. The same activities reduce the risk of landslides, floods and strong winds (Pryor, 1982). Use of highly toxic agricultural pesticides and other agrochemicals should decline as farmers turn to integrated pest management and nitrogen fixation, composting and mixed farming for nutrient cycling. Thus, pesticide resistance in disease vectors would be expected to decline, as well as poisoning from the misuse of pesticides. These effects would be additional to the environmental improvement provided by design and engineering approaches to vector control.

The development of local renewable energy sources (solar, wind power, small-scale hydroelectric power plants) should make water pumping possible and have other indirect environmental health benefits, such as reduction of in-house air pollution. The production of methane (bio-gas) from animal manure as an energy source can have secondary sanitation benefits, in addition to providing cleaner and healthier cooking facilities.

Affordable and accessible rural energy supplies can also make possible a variety of food processing and preserving industries that can increase income, food security, and food safety. Rural energy supplies also make possible the lighting of houses at night, thus increasing the numbers attending continuing education, including adult literacy and health-education classes.

The combined effect of rising income and ecological improvement can jointly stimulate improvements in environmental health. Such improvement, in turn, could reinforce improvement in other sectors. The sum of all these improvements can be a residential and livelihood environment in which the frequency and impact of disasters decrease.

## 5.6 Further information

For further information on:

- the links between relief, recovery, and development, see: Fernandez (1979), Rubin & Barbee (1985), Anderson & Woodrow (1989), Quarantelli (1989), Pantelic (1991), Oliver-Smith (1992), Berke, Kartez & Wenger (1993), Voluntary Health Association of India (1993), International Federation of Red Cross and Red Crescent Societies (2001);
- the psychosocial aspects of disaster management, see: Quarantelli (1980), Lima (1986), Dynes, DeMarchi & Pelanda (1987), Butcher et al. (1988), Lystad (1988), World Health Organization (1989a), Austin (1992), Ignacio & Perlas (1994), World Health Organization (1996a), International Federation of Red Cross and Red Crescent Societies (1998);
- self-help reconstruction, see: Haas, Kates & Bowden (1977), Davis (1978), Kreimer (1979), Hardoy & Satterthwaite (1981), Turner (1982), United Nations Office of the Disaster Relief Co-ordinator (1982a), Cuny (1983), Skinner & Rodell (1983), Maskrey (1989), de M. Monzon (1990);
- the dangers of resettlement, see: Hansen & Oliver-Smith (1982), Harrell-Bond (1986), Cernea (1988), Clay et al. (1988).