

Chapter 13

Economic and financial mechanisms for risk reduction

13.1 Economic mechanisms

Economics is a central issue in disaster reduction because poverty can make people vulnerable to many different hazards, and certain patterns of socio-economic development can expose people to greater risks. It follows that appropriate economic development and the reduction of poverty are essential elements of any risk reduction strategy.

13.1.1 Livelihood diversification

Economic diversification is central to poor people's strategies for reducing their vulnerability to external shocks. They seek to do this primarily by increasing their sources of income, building up a strong and diversified asset base, managing their money well and maintaining access to multiple sources of credit. This increases income overall and reduces dependency on individual sources: such dependency is a major contributor to vulnerability.¹

Many coping strategies are based on this principle. Multi-cropping improves farmers' chances of being able to produce some food for consumption and sale should the rains fail. Male migration from the countryside to towns to seek labouring work during droughts provides an alternative source of income to compensate for falling crop production.

Possession of wealth and assets gives households a wider range of options in times of crisis, and speeds their recovery from disasters (see Case Study 13.1). Many disaster mitigation programmes pay no attention to this, considering it a task for development agencies. The mitigation programmes implemented by members of the Citizens' Disaster Response Network in the Philippines are an exception. They address a wide range of livelihoods issues, focusing on food security and nutrition and including: crop and livelihood diversification, propagation of disaster-resistant crops, supporting seed banks and plant nurseries, improving post-harvest facilities, encouraging better land-use management and sustainable agricultural practices, training community health workers, establishing village pharmacies and medicinal herb gardens, holding literacy classes and improving paths and footbridges.²

Case Study 13.1

Poverty and disaster: a cyclone in India

A wealthy and a poor family live 100 metres apart near the coast of Andhra Pradesh in south-east India. The wealthy family has six members, a brick house, six cattle and three acres of land. The head of the household owns a small grain business and a truck. The poor family – husband, wife and two children – has a thatch-and-pole house, an ox and calf, half an acre of poor land, and sharecropping rights to another quarter of an acre.

When the cyclone strikes, the wealthy farmer has received a warning on his radio and leaves the area with his family and valuables in the truck. The storm surge (flood) brought by the cyclone partly destroys his house and the roof is taken off by the wind. Three of his cattle are drowned and his fields are flooded, destroying the crops. The youngest child of the poor family is

drowned. The family's house is destroyed. Both animals are drowned. The fields are flooded and the crops ruined.

The wealthy family uses its savings to rebuild the house within a week. The lost cattle are replaced, and the fields ploughed and replanted. The poor family does not have savings and has to borrow money for essential shelter from a local money-lender, at exorbitant rates of interest. It manages to buy a calf, but has to hire bullocks to plough the field – which is done late, since many others are in the same position and draught animals are in short supply. As a result, the poor family goes through a hungry period eight months after the cyclone.

P. Blaikie, T. Cannon, I. Davis and B. Wisner, *At Risk: Natural Hazards, People's Vulnerability and Disasters* (London: Routledge, 1995), p. 47.

13.1.2 Protecting assets

'Pro-poor' development is not necessarily synonymous with vulnerability reduction, and greater wealth may not by itself reduce risk.

The Kobe earthquake in 1995 is a good illustration of this point. Although Japan is a prosperous, technologically advanced country, which has invested heavily in mitigation and preparedness, there was a degree of complacency in government and society about the level of preparedness and safety, and disaster planning and management systems were inadequate. Many of the

5,500 deaths and much of the more than \$100bn in economic losses could have been avoided.³

Assets do not protect themselves against hazards: they have to be protected. Any project seeking to build up vulnerable people's livelihoods must take the hazard context into account.

When poor people borrow money to buy livestock, tools or raw materials that can be used for income-generating activities, they are increasing their livelihood assets, which, in the long run, will help them to become more resilient to many external shocks. But drought, floods or other hazards can wipe out these assets before they have been able to generate much return on the initial investment. In such cases, those concerned actually become worse off: not only are they without assets, as before, but they also have a loan to pay back.

Similar scenarios can be drawn for other development interventions – investment in a new house or workshop where there is a risk from severe flooding, for example, or construction of concrete irrigation channels across an unstable hillside. In some cases, poor and vulnerable people may make a conscious decision not to invest too heavily in particular items, choosing those that can be replaced cheaply and easily. This is an important factor in technology choice (see Chapter 10).

Economic development and poverty alleviation programmes need to take the hazard context into account if they are to have a meaningful impact on vulnerability reduction in the long run.

13.2 Financial mechanisms

Two kinds of financial instrument will be discussed in this section: insurance and other forms of micro-finance (especially micro-credit).

13.2.1 Insurance

Insurance is a standard and effective method of sharing risk, especially in developed countries, where it has been in use for over 300 years.

Nature and benefits of insurance

In theory, everyone benefits from insurance. Individuals and organisations buy it so that they can be compensated when hazards lead to death, injury or ill-health, and loss of property or income. Claims are paid quickly and without

conditions attached. This gives policy-holders the promise of some financial stability, and hence the confidence to invest (e.g. in home improvement) or expand (e.g. a business enterprise). Insurance companies protect themselves against major catastrophes by basing insurance premiums on sophisticated calculations, spreading their own exposure across many different areas and types of risk, and buying their own insurance cover (reinsurance).

Although the industry operates in a volatile environment, has suffered severe blows in developed countries – most famously from Hurricane Andrew in Florida in 1992, which forced several US insurers out of business – and is becoming very concerned about the likely impact of climate change, it has until now proved fairly robust, even when faced with major crises. Insurance funds transferred rapidly to the US following the terrorist attacks of 11 September 2001 helped to reduce the country's balance of payments deficit and gave the economy some stability when it was urgently needed.⁴

Insurance is predominantly commercial. Decisions about whether to buy and sell insurance, what kinds of cover to provide and what premiums to set, are determined by market forces. Governments sometimes intervene, either through state schemes (to protect farmers against crop losses, for example) or by making some kinds of insurance cover compulsory (such as employers' liability or motor insurance). Other institutions can also force people to take out insurance: companies making loans to people to buy houses usually insist that they are insured.

Insurance can stimulate other risk reduction measures. Insurers may only provide cover in high-risk areas if governments ensure adequate mitigation measures and emergency management systems. State crop insurance schemes may allow farmers to take the risk of planting different crops, leading to greater diversification and security against individual hazards. In the US, the National Flood Insurance Program is a partnership between public and private sectors that links the premiums paid to the level of protection: once government emergency management specialists have certified that communities and households have put particular mitigation measures in place, they are eligible for lower rates from the commercial insurers involved in the scheme.⁵ In Fiji, houses must be certified by a structural engineer that they have features making them cyclone-resistant before they can secure cyclone insurance cover and mortgages.⁶

Because of the size of the global insurance industry and its obvious value in reducing risk through risk-sharing and stimulating mitigation, disaster agencies have become interested in its potential for protecting the most

vulnerable. However, because the industry is market-driven, its success is based on confining its coverage to places where the risks can be calculated with some accuracy and certain minimum standards such as building codes can be enforced, and to people who can afford to pay. In effect, this means that coverage is limited to developed countries and to wealthy people and larger businesses in developing countries. Commercial insurance is unavailable to the people who arguably need it most: the poorest and most vulnerable in developing countries. Insurance companies have shown hardly any interest in extending their coverage to such groups.

The market impact of major disasters has driven companies to raise premiums substantially, or even withdraw cover in high-risk areas such as the hurricane-prone Caribbean and south-east US. State insurance is available in many developing countries, but premiums tend to be high and policies are aimed at the professional classes in urban areas.

Even in wealthy societies, many people may not take out insurance. Only 3% of homeowners in the areas hit by the 1995 Kobe earthquake in Japan had insurance cover: 147,000 affected homes were uninsured.⁷ In such circumstances, the burden of financing recovery is passed on to governments. Many people eligible for reduced premiums through the US National Flood Insurance Program do not take out insurance cover, believing that in the event of a disaster the national government will be obliged to compensate them for their losses anyway.⁸ All insurance schemes have to face the problem of 'moral hazard', where the sense of security and confidence that insurance cover provides leads to people failing to take steps to reduce risk, or even to take greater risks.

Initiatives to develop more flexible insurance tools to support poor and middle-income countries are at an early stage; many work at national rather than local levels, and they do not necessarily encourage greater emphasis on measures to reduce the impact of future disasters.

Insuring the poor against disasters

There has been little attempt to develop wholly commercial insurance programmes targeted at poor and vulnerable people. Experience so far is not encouraging (e.g. Case Study 13.2). Some experts question if it is even possible to provide insurance cover to the poor on a commercial basis.

Where insurance schemes for poor groups and individuals have been successful, they have generally originated in development programmes that

Case Study 13.2

Developing disaster insurance in Cambodia

In 2000, Cambodia experienced its worst floods for 70 years. More than three million people were affected, mostly poor farmers; half a million were displaced and nearly 400 killed. Direct costs were estimated at \$160m – equivalent to half the government's recurrent budget for that year.

In consultation with the government, international agencies, the private sector and communities, a World Bank team drew up a proposal for a project to investigate how private insurance might be used to provide relief to poor farmers. The project documented current and historic flood data, climatic conditions and rice yields, and looked at ways of collecting and managing premiums, assessing claims and giving out payments. Surveys were also carried out to determine the impact of past floods on the poor, how farmers had coped, their capacity to save and how they used savings. Farmers were prepared to save, albeit only very small amounts, and communities welcomed the idea of insurance.

However, commercial reinsurers were unwilling to take on the risk of insuring poor communities likely to be affected by floods every two or

three years. It was found that damage assessments would be costly and time-consuming, which would delay compensation payments. There was a risk of farmers having no incentive to take measures to protect themselves because they would expect the government or insurers to cover their losses anyway. To make premiums affordable and spread the risk would have required widespread participation by farmers, and it was felt that this might not be possible without some compulsion.

The project therefore looked at alternative ways of spreading the risk. These included government-supported insurance pools, local catastrophe funds, and building on local savings and credit schemes or informal mechanisms for self-insurance.

World Bank, *Cambodia Disaster Insurance (Project 1071): First Interim Progress Report*, 21 September, 2000; *Cambodia Disaster Insurance (Project 1071): Second Interim Progress Report*, 16 February, 2001; *Working to Develop Disaster Insurance in Cambodia, 2001–2002*, www.developmentmarketplace.org/report1071.html, www.worldbank.org/developmentnews/stories/html/010802a.htm.

have aimed at financial sustainability rather than profit. Although there is still a lot to learn about how to make such schemes work effectively, and many of them are fairly new, recent research on the subject has documented some of these experiences in detail and provides valuable lessons.⁹

Such schemes are run mainly by micro-finance institutions but also by NGOs, cooperatives, governments and even companies. Business involvement is often in partnership with non-profit organisations, where the business – usually an insurance company – typically provides technical expertise (e.g. actuarial calculations regarding risks and their likely costs), assistance with marketing, or underwriting. Some schemes have an outreach of a few hundred families, but they can reach large numbers of people – millions, in a few cases. Terms and conditions vary widely, as do the administrative and financial structures used, but life insurance, which is the main form of insurance on offer, tends to be compulsory: people who wish to borrow money or open a savings account with the organisation concerned have to buy an insurance policy. The other main kinds of coverage are health and, to a lesser extent, property insurance.

The evidence available indicates that insurance programmes for poor people, especially life insurance, can be financially viable, though the impact of major disasters on programmes has yet to be studied. In any case, insurance is a risky business. To maintain financial stability, life policies generally exclude high-risk groups such as the elderly, and certain causes of death such as epidemics. Health insurance may exclude health care costs for AIDS-related treatment or injuries arising from involvement in riots or other civil unrest. All-risk coverage for property has largely been abandoned after unsuccessful attempts in the 1970s and 1980s to provide all-risk crop insurance to farmers.

The insurers have to put considerable effort into marketing their schemes to people who are poor and unfamiliar with the concept and workings of insurance. One health insurance programme in Colombia claimed to have enrolled 16,000 members in seven months, but others have encountered considerable resistance.¹⁰ Local-level approaches involving community meetings and regular discussions with field workers appear to be most successful. Once households understand insurance, interest seems to be strong. Where there is already a relationship of trust between the insurer and the community – notably where the insurer is an established micro-finance institution or NGO – a base of policy-holders can be built up quickly.

As this is still a new field, lessons are being learnt all the time. Schemes may have to be amended repeatedly to achieve the right balance between effec-

tive coverage of poor and vulnerable people on the one hand, and financial sustainability on the other. This is particularly true of health insurance services, whose financial performance is much lower than that of life insurance. It may be advisable to take a long-term approach to sustainability.

A major challenge is to find commercial partners who are willing to work with low-income people. This is a particular problem in reinsurance (as in Case Study 13.2 above), although a few non-profit agencies have been able to obtain it. The availability of reinsurance is the main factor affecting market growth throughout the insurance industry.

Another problem is delays in settling claims. This is partly the result of bureaucratic slowness, but partly inevitable where claimants live in remote villages or communications break down because of technical failures, environmental hazards or civil unrest.

There are examples of successful mutual benefit societies, where insurance funds are set up by groups to provide cover for their members. For example, in Mexico there are 200 mutual insurance funds (*fondos*) for farmers, with nearly 70,000 members. Each member pays an annual premium, which provides cover against crop failure due to drought, flooding, pests, disease or other emergencies. Surplus funds at the end of the year are used to provide services to members. The government provides technical support and subsidises the premiums, but the *fondos* have performed well financially and the intention is to raise private finance in due course. However, admission to membership of a *fondo* depends on its perception of a farmer's capacity, and the scheme has been criticised for excluding poorer, more vulnerable farmers.¹¹

Micro-insurance can be used to stimulate mitigation activities. Health insurance is often linked to preventive and primary health care programmes run by the insurer concerned (if an NGO) or a partner organisation, and policy-holders may be expected to use such services. A scheme in Colombia offered regular group meetings for policy-holders to teach them how to protect their property against common hazards.¹² SEWA (see Case Study 13.3) provides fruit and vegetable vendors with umbrellas, having concluded from its life insurance data that spending long hours sitting in the sun might be increasing the risk of illness.¹³

As well as running insurance schemes, NGOs provide technical support to schemes run by other agencies. Médecins sans Frontières, for example, has provided a doctor as part of a rural health insurance scheme in Cambodia.¹⁴

Case Study 13.3

Insuring the vulnerable

In western India, the Self Employed Women's Association (SEWA), with a membership of over 220,000 poor women, provides a range of services including organising members into trade organisations and cooperatives, providing loans, training and technical assistance, legal aid, child care and education.

SEWA's integrated security insurance scheme, which began in 1992, covers 70,000 members. It is run in collaboration with two national insurance companies and the German government's aid agency GTZ, and is administered by SEWA Bank, which manages the Association's extensive savings and credit programme.

An annual premium of Rs75–360 provides different levels of life insurance and coverage for the costs of health care and property losses

arising from floods, fires and communal riots. A small maternity benefit is also available. An alternative payment is by fixed deposit, the annual interest from the deposit being credited as the annual premium.

The two insurance company partners provide the coverage for life, health and asset insurance (life insurance is partly subsidised by the government). Maternity benefits and administrative costs are paid out of a fund established by GTZ. Another GTZ grant supports the programme's training and educational work.

By 2002, the insurance scheme had paid out claims totalling over Rs14m to more than 10,000 women.

S. Sinha, *Strength in Solidarity: Insurance for Women Workers in the Informal Economy* (Ahmedabad: Self Employed Women's Association, 2002).

Non-profit and community organisations could also play a part in lobbying governments and others to establish non-profit insurance schemes or to create the conditions that will encourage the spread of commercial insurance cover – if not for the poor, then at least for lifeline facilities such as hospitals, schools, power plants and bridges.

Informal insurance and social security systems are widespread among the poor in disaster-prone societies, though mostly in rural areas. Borrowing and

sharing are part of the social fabric in good times and bad. They comprise an important coping strategy during crises, when those who are suffering can call on neighbours or kinsfolk for food, materials or other support. Exchanges of food form an important part of famine mitigation strategies in Sub-Saharan Africa. Funeral or burial societies are found throughout the world, their members pooling funds to cover expenses related to the death of another member.

Custom on some of the *chars* (silt islands) in the Jamuna River in Bangladesh allows people who have lost their homes to erosion by the river to rebuild on anyone's land. It is understood that the favour will one day be returned: at some stage during their lifetime, most if not all of the islands' inhabitants will be forced to move as the river changes course.⁴⁵ In Uganda, self-help groups known as *Munno Mukabi* (Friend in Need Associations) save money that can be lent to members whenever a crisis strikes. Members also promise to make their labour available to others during a crisis or for a celebration.⁴⁶

13.2.2 Micro-credit and other forms of micro-finance

Micro-finance programmes are numerous and widespread in many developing countries, with a massive outreach numbering millions of people. Many NGOs run savings and credit schemes, which often form an important element in their development programmes. Such organisations are also developing a wider range of financial services for poor people. Although there are debates on the extent to which micro-finance contributes to poverty reduction and its influence compared to other factors, it is generally acknowledged to play a significant role.

Micro-finance is also important in reducing vulnerability before disasters and supporting post-disaster recovery. Its considerable strategic potential in these areas is only now becoming understood and utilised. Organisations that manage savings and credit programmes for the poor – usually referred to as micro-finance institutions (MFIs) – should be more fully integrated in risk reduction initiatives.

Research shows that loans, which are primarily invested in productive enterprises that generate income, are also often used to cope with present or potential crises that threaten livelihoods – by laying in stocks of food, making improvements to farmland, repairing houses, buying tools or other productive equipment, digging wells and irrigation systems, acquiring new skills, or making gifts to family and friends so that reciprocal favours can be asked later. After a disaster, credit is used by victims to speed recovery by replacing

lost assets and helping them get back to work. Loans are often taken out to deal with household crises – especially those caused by sickness or death in the family (which has both emotional and economic consequences), but also by such shocks as food shortages, sudden price increases, loss of employment or theft.

Until recently, MFIs did not pay much attention to hazards and disasters. This position altered rapidly in 1998, when flooding in Bangladesh and Hurricane Mitch in Central America caused widespread death, injury and loss among members of savings and credit programmes – and, as a result, damaged the programmes themselves. In Bangladesh, more than 30% of MFI clients lost their houses or moved to safe places; 65% suffered losses or damage to business assets; and over 90% had to suspend income-generating activities for more than three weeks. Loan recovery rates fell from 92% to 43%; MFI staff could not locate borrowers or mobilise them for group meetings.¹⁷

Since then, MFIs have begun looking at how to protect themselves and their clients against risk. A number of studies and good practice guidelines are now available.¹⁸ Most interest to date has been in dealing with the consequences of disasters. MFIs use a variety of methods to help those who are affected. Rescheduling loans has become a common practice. Writing off loans is undesirable, because it undermines long-term commitment by clients to repay as well as being a loss to the microfinance scheme itself. The terms of rescheduling have to be varied according to a number of factors including the nature and timing of the disaster, the community's cash flow patterns and the MFI's own financial situation.

Some MFIs provide emergency loan facilities to their clients to meet immediate needs for food, clean water or medicine. These too are made at lower interest rates or even without interest, although it seems that many clients prefer to borrow informally in such circumstances – from friends or relatives if they can, and from money-lenders if they cannot. Even where savings and credit programmes are available, informal borrowing remains important in poor communities, especially if it is to be spent on consumption, rather than invested in productive activity (at times of crisis, families go to great lengths not to use up their savings or sell off their other livelihood assets). They are more likely to take up emergency loans from MFIs if these can be made rapidly and come with few or no restrictions on the purpose for which they can be used.

Some post-disaster loans are made to replace or repair physical assets: equipment for income-generating activities such as cooking utensils or sewing machines; and rebuilding business premises. The objective of such

loans is to help households reconstruct their businesses and livelihoods. They tend to be relatively large amounts and are usually made once the relief period is over, at normal interest rates and with a longer repayment period. Only large MFIs can afford to make a large number of asset replacement and housing loans, and there is some evidence of higher than usual failures to repay. For this reason, few MFIs are prepared to make such loans. Some feel that the standard short-term working capital loan is best suited for disaster recovery.

MFIs need to react quickly in a disaster, in assessing the situation and planning their response. This is not always easy, for communications may break down. During the 1998 floods in Bangladesh, many local branches of MFIs were inaccessible and it was not until the water receded that disaster victims could withdraw savings, take out new loans or renegotiate old ones. Branch staff need training to manage in such circumstances, crisis management plans should be drawn up, and clear guidance is needed on lending policy and practice. MFIs should be linked to early-warning systems, and ensure that their clients are informed about potential disasters.

In the absence of other relief agencies, MFIs often undertake short-term relief work, especially if they are part of NGOs normally involved in other development and humanitarian activities. This can cause problems for staff who are not trained as aid workers. MFIs engaged in relief also need to communicate clearly to their clients that their efforts are temporary and one-off, and do not influence their primary role as providers of finance.

MFIs can prepare for disasters in many ways. In Bangladesh, it is common practice for MFIs to put a percentage of clients' 'compulsory savings' into an emergencies fund, which can be made available quickly to disaster-affected borrowers in the form of emergency loans (compulsory savings are regular deposits made by borrowers to build up collateral against their loans: normally they cannot be withdrawn while loan repayments are still outstanding). The Grameen Bank reported that 95% of its compulsory savings were withdrawn during the 1998 flood, while two-thirds of the clients of another large lending NGO withdrew more than half their compulsory savings. Such rapid, large-scale withdrawals caused problems for smaller Bangladeshi MFIs which had reinvested compulsory savings in their standard loan programmes: some could only release 25–50% of clients' savings.¹⁹ The stricter the conditions attached to the use of compulsory savings, the more likely it is that poor people will turn to other sources of loans, including money-lenders.

MFIs may introduce preparedness and mitigation initiatives for their clients. This is more likely where the micro-finance programme or institution is part of

a larger NGO's portfolio. Some MFIs in Bangladesh have made subsidised loans for emergency preparedness purchases such as food, fuel, water purification tablets and rehydration tablets. Housing loans may be provided in normal times to help clients build in safer locations.

MFIs can encourage their clients to form insurance funds. In India, a federation of self-help groups called Vaigai Vattara Kalangiyam, encouraged by an MFI called PRADHAN, operates its own welfare/disaster insurance fund linked to the insurance scheme operated by the state insurance company and similar to the SEWA scheme described in Case Study 13.3. In Mali and Burkina Faso, MFIs have arranged for their clients to rent space in seed and grain banks to store cereals as a reserve during droughts and famine. Some MFIs insist that their members develop a contingency plan to deal with disasters. In Burkina Faso, this is reported to have been effective in reducing arrears in loan repayment during drought in 1995.²⁰

Evidence of MFI-stimulated disaster mitigation activity is patchy. It seems that such initiatives have not been widely replicated. The potential appears to be considerable, however, which highlights the need for more dialogue between MFIs and other development and disaster management agencies about collaborative efforts to reduce risk.

One important lesson from the 1998 Bangladesh floods was the need to protect the MFIs themselves, which soon found themselves critically short of funds as their disaster-affected borrowers failed to make repayments. The practice of putting money aside into emergency reserves is becoming more widespread in areas with regular disasters such as monsoon floods, but this means that less money is available to lend to the poor on a regular basis, and it is harder to justify in places where disasters are less frequent. An alternative is to make savings and credit groups pay a percentage of their own loans into an emergency fund. In both cases, questions arise over ownership, rights of access, decision-making, and terms and conditions.

Like insurers, MFIs can spread their risk, by making sure that they serve poor clients in areas less likely to be affected by hazards, or by lending to people involved in more than one sector of the economy. For this, they need to undertake their own risk assessments. But even well-prepared MFIs are unlikely to be able to cope with disasters on the scale of those that hit Bangladesh and Central America in 1998. For such events, additional support is needed, which is why MFIs and international donors have begun to experiment with donor-backed reserves that can be released quickly in an emergency.

Case Study 13.4

Adapting micro-finance to disasters

Ashrai (the name means ‘shelter’ in English) was set up in 1991 to improve the social and economic conditions of tribal people in the Barind Tract in north-west Bangladesh. It works with some 1,200 village societies representing 25,000 families. The main activity is establishing and supporting savings and credit groups, mostly women’s groups. It also has its own revolving loan fund, from which established societies can borrow in equal proportion to their savings.

From late 1997, a series of emergencies led Ashrai to establish and build up emergency loan funds. The first was set up in January 1998 to help 5,773 families affected by a severe cold spell to buy clothes and blankets. The Swiss Agency for Development and Cooperation (SDC) made a grant to establish the fund. Loans were to be repaid within 18 months, at an interest rate of 6% per annum.

However, many of the families were subsequently hit by the exceptional floods later that year. The previous emergency loans had to be rescheduled, and 2,794 new

emergency loans were made to repair houses and buy seeds, tools and fertilisers. To do this, a second emergency loan fund was established with a second grant from SDC, again at 6% interest per annum but this time with a two-year repayment period that reflected the severity of the disaster. As in the preceding winter, the local Ashrai savings and credit societies and their umbrella organisations helped to identify the most needy.

In 1999, Ashrai and SDC decided to merge the two emergency loan funds into a single permanent fund for future major events.

Because of the impact of the disasters, people’s capacity to repay the emergency loans was limited. By December 2000, the emergency fund had recovered 91% of the amount disbursed because of extreme cold, and 67% of its loans to flood victims.

Micro-finance in Disasters (London: British Red Cross Society (London: NGO Initiatives in Risk Reduction, Case Study 17, 2001), www.redcross.org.uk/riskreduction).

There is also potential for using non-financial credit – loans of seeds, tools or materials – to help reduce risk. This does not appear to have been explored

widely, other than in the case of grain and seed banks (see Case Study 15.3, page 264).

13.3 Chapter summary

- Economic development and poverty reduction are essential elements in any risk reduction strategy.
- Livelihood diversification is central to poor people's coping strategies, but is generally overlooked in disaster mitigation programmes.
- Greater wealth reduces risk by giving households more options at times of crisis and speeding their recovery from disasters. But livelihood assets do not protect themselves: they must be protected against hazards.
- Insurance is a standard and effective method of spreading risk, but commercial insurance is confined to richer countries and people, and insurers are reluctant to cover poor, high-risk groups.
- Insurance schemes for the poor run by micro-finance institutions and NGOs can be financially viable, but this is a new area of work and there is still much to learn about how to make such schemes effective.
- Micro-finance has the potential to play a significant part in reducing vulnerability before disaster, and supporting recovery.
- Most interest among micro-finance institutions has been in dealing with the consequences of disasters (e.g. through rescheduling loans or making emergency loans), although some work has been done to stimulate pre-disaster measures (e.g. creation of emergency funds, lending for specific disaster preparedness activities).

Notes

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- 3 *World Disasters Report 1996* (Oxford: Oxford University Press/IFRC, 1996), pp. 65–75.
- 4 E. Adamsdale, *Transferring Risk: Potential Partnerships between the Insurance Industry and the Humanitarian Sector* (London: British Red Cross Society, 2002).
- 5 See the NFIP website: www.fema.gov/nfip.
- 6 C. Benson, *The Economic Impact of Natural Disasters in Fiji* (London: ODI (Working Paper 97), 1997), p. 70.
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- 8 D. R. Godschalk et al., *Natural Hazard Mitigation: Recasting Disaster Policy and Planning* (Washington, DC: Island Press, 1999), pp. 68-9.
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- 10 Brown and Churchill, *Insurance Provision in Low-Income Communities, Part II*, p. 49.
- 11 Adamsdale, *Transferring Risk*.
- 12 Brown and Churchill, *Insurance Provision in Low-Income Communities, Part II*, pp. 66, 70.
- 13 *Ibid.*, p. 89.
- 14 Adamsdale, *Transferring Risk*.
- 15 H. Schmuck, *Living with the Floods: Survival Strategies of Char-Dwellers in Bangladesh* (Berlin: ASA-Programm of the Carl-Duisberg-Gesellschaft, 1996), pp. 70–71.
- 16 Sebstad and Cohen, *Microfinance, Risk Management, and Poverty*, p. 58.
- 17 *Rapid-Onset Natural Disaster Technical Briefs*, Brief 1 (Washington DC: Development Alternatives (Microenterprise Best Practices Project), undated), www.mip.org/pubs/mbp_def.htm.
- 18 *Ibid.*, Briefs 1–8; G. Nagarajan, *Microfinance in the Wake of Natural Disasters: Challenges and Opportunities* (Washington DC: Development Alternatives (Microenterprise Best Practices Project), 1998), www.mip.org/pubs/mbp_def.htm; J. Parker and G. Nagarajan, *Can Microfinance Meet the Poor's Financial Needs in Times of Natural Disaster?* (Washington DC: Development Alternatives (Microenterprise Best Practices Project), 2000), www.mip.org/pubs/mbp_def.htm; Sebstad and Cohen, *Microfinance, Risk Management, and Poverty*.
- 19 *Rapid-Onset Natural Disaster Technical Briefs*, Brief 3.
- 20 Nagarajan, *Microfinance in the Wake of Natural Disasters*, pp. 22, 27.

Chapter 14

Managing urban risk

14.1 Hazards, risk and vulnerability in urban areas

Half the world's population lives in towns and cities. Within 30 years, this proportion may rise to two-thirds. The rate of urbanisation is greatest in the South. About two-thirds of the world's current urban population – 1.9bn people – live in low- and middle-income nations in Africa, Asia, Latin America and the Caribbean. At least 600m of these are so poor that their income and other assets are not enough to provide their essential needs.

The causes of urban growth are varied and complex, but among the main ones are economic and environmental pressures driving poor people from the countryside to seek a living in the towns. Poverty and poor urban management mean that many cities in the South are expanding rapidly and in an uncontrolled way. This has led to severe social, economic and environmental problems. It is also putting ever-greater numbers of people at risk from natural and technological hazards.

The themes discussed in this book apply just as much to urban as to other settings. At the same time, managing urban risks presents several distinct challenges. These arise from the specific features of urban hazards and vulnerability, and from the socio-economic and institutional environment in towns and cities, which has a profound influence on the capacity of communities and municipal authorities to address risk effectively.

The following discussion draws heavily on the work of the International Institute for Environment and Development's Human Settlements Programme on urban environmental problems.¹

14.1.1 Urban hazards

Environmental hazards are the main cause of ill-health, injury and premature death in urban areas of the South. People living in towns and cities in developing countries face a large number of environmental hazards. They include:

- *Biological hazards*: diseases caused by unclean water and poor sanitation.
- *Chemical hazards*: polluted water, indoor and outdoor air pollution from fires, chemicals, industrial processes and vehicles, dumped garbage and hazardous wastes.

- *Physical hazards:* fire, floods, housing on slopes at risk of landslides, earthquakes, cyclones, extreme temperatures, accidents due to inadequate infrastructure or facilities (e.g. open drains, missing manhole covers, lack of pavements and places to cross roads).

Many of these hazards are also present in rural locations, but they become particularly threatening in densely-populated urban areas. There is a strong likelihood of major urban disasters in future, especially in mega-cities, many of which are sited in earthquake zones or along coastlines struck by cyclones. Earthquakes in major urban centres were responsible for some of the greatest disasters in the 20th century – Tokyo in 1923, with 143,000 killed, and Tangshan in China in 1976, where the death toll was probably 250,000. The economic effects even of far less severe earthquakes can be colossal: damages resulting from the 1995 Kobe earthquake amounted to over \$100 billion.

Man-made and technological hazards such as fires, pollution, industrial and road accidents assume much greater importance in towns and cities, where there are also particularly acute public health problems arising from pollution and inadequate sanitation in high-density settlements.

Air pollution presents particular problems for the elderly and children. This is a largely urban hazard (apart from indoor cooking fires, which are a hazard anywhere). Large numbers of people and vehicles and concentrations of industrial activities produce considerable volumes of air pollutants. Where these become trapped in the atmosphere, their concentration increases and people are exposed to them for longer. This is a particular problem in high-altitude cities: Mexico City is notorious for its air pollution; in Kathmandu the problem is growing rapidly. Air pollution is normally treated as a public health issue rather than a problem for disaster managers, but its consequences can be severe. An estimated 130,000 premature deaths and 50–70m incidents of respiratory illness occur each year due to episodes of urban air pollution in developing countries.² In Santiago, Chile, a \$911m, 15-year programme to reduce severe air pollution from particulates, carbon monoxide and ground-level ozone was launched in 1998. It aims to prevent 11,000 premature deaths and 65m medical visits resulting from smogs in the city.³

Cities also tend to be much warmer than the surrounding countryside, and night-time cooling is lower than in rural areas. This ‘heat island’ effect is caused by the concentration of large heat-retaining structures, asphalt and concrete landscapes, physical obstruction of cooling breezes by buildings, and heat produced by industrial and domestic activities. In Mexico City, for instance,

temperatures can be 10°C higher than in surrounding areas.⁴ Many cities are not well designed to deal with this problem. Ventilation and heat management are rarely considered seriously in urban planning, or taken into account in emergency planning, even in developed countries (see Case Study 14.1).

Case Study 14.1

Impact of an urban heat wave

Heat waves claim an estimated 1,000 lives each year on average in the US. A severe five-day heat wave in July 1995 caused 525 deaths in Chicago. In this as in other heat waves, older people were the prime victims: 73% of those who died were people aged 65 or more. African-Americans were nearly twice as likely to die from the heat as whites. Most deaths were in the inner city, where temperatures did not fall off much at night, and in homes without air conditioning or where residents did not operate air conditioning or fans because they could not afford to. There were suggestions that older people without air conditioning were afraid to leave doors and windows open at night to cool their homes down because of the perceived threat of crime.

Energy use for air conditioning and other cooling increased rapidly, leading to a power failure affecting over 40,000 people. Highways and railways were damaged by heaving and buckling of joints and rails. Many companies indicated that work efficiency was greatly reduced.

The municipal authorities did not respond well. Officials did not declare a heat emergency – which would have activated the city’s heat emergency plan – until four days into the heat wave. This was a major factor in the high death count. Without advance warning, few inhabitants used Chicago’s five ‘cooling centers’: places with air conditioning and other facilities for people to relax and rest. Thousands of heat-afflicted people had to be taken to hospital during the heat wave, but there were not enough ambulances available and fire engines had to be used. Hospitals could not handle the high number of admissions. In response to sharp public criticism, the city’s mayor was forced to appoint a commission to discover what had gone wrong and what should be done in future. This led to a new, more comprehensive, warning and emergency plan for dealing with heat waves.

S. A. Changnon et al., ‘Impacts and Responses to the 1995 Heat Wave: A Call to Action’, *Bulletin of the American Meteorological Society*, vol. 77, no. 7, 1996, pp. 1497–1506.

Urban food security presents a potentially serious risk, especially in megacities. The level of urban populations' dependence on food brought in from outside and purchased in markets is very high and will remain so, especially in the largest cities. Serious problems can arise where food supplies are cut or prices rise beyond the reach of the poor, and this may happen suddenly as the result of political and socio-economic factors or natural hazards such as droughts and floods.

Little attention has been paid to this risk in disaster management circles, despite the obvious social and political consequences of food insecurity, the difficulty of identifying vulnerable groups in this context and the considerable operational challenge in obtaining large amounts of food and distributing it to the most needy.⁵

14.1.2 Urban vulnerability

Poverty, gender, class, caste and ethnicity are powerful influences on urban vulnerability, as they are in rural areas; but urban life adds new dimensions. Poor and marginalised people are likely to live in poor-quality housing, in neighbourhoods without clean water, drains and paved roads, where sanitation systems, garbage collection and public health services are inadequate. This makes them vulnerable to a variety of environmental hazards.

Poverty forces people to live in the most polluted and dangerous areas: river valleys, flood plains, hillsides, next to roads, waste dumps and hazardous industries. Where they lack legal title to their property – as in many urban settlements – and live in fear of eviction they have little incentive to invest in private or communal mitigation measures, and in any case have little money for doing so. Landlords are often unwilling to invest in their properties, and may raise the rents of those improved by their tenants. Local governments may refuse to provide services to informal settlements on the grounds that this will imply recognition of the inhabitants' right to the land where they have settled.

High housing and population densities magnify the effects of pollution and disease. Domestic fires, which are a significant risk in houses made of materials that burn easily, such as wood, thatch and cardboard, can, where homes are packed tightly together, easily get out of control. Industrial accidents can be devastating. According to official figures, the explosion at a chemical factory in the Indian city of Bhopal in 1984 resulted in nearly 3,000 deaths and 100,000 injuries; more than 200,000 people had to be evacuated.⁶

Case Study 14.2

Overcoming a food crisis in a mega-city

Indonesia's food security structures came under great pressure during the 1997–98 El Niño event, when drought reduced rice production and additional imports were needed. The government had sufficient operational capacity and access to financing to ensure that food was purchased and distributed, while donor agencies also embarked on food assistance programmes in rural areas, and large-scale severe food insecurity was largely avoided.

However, the Indonesian economy began to break down from mid-1998, largely as a result of rapid political change and insecurity. This put large numbers of people out of work, pushed up food and other prices and made it difficult for the government to obtain foreign credit to finance food imports. In the capital, Jakarta, levels of malnutrition increased, and it became clear that a large proportion of the population was suffering from food insecurity.

The Indonesian government's programme to provide food at subsidised prices to those in need

was put under considerable pressure. NGO-managed food distribution was not a realistic alternative, because of the scale of the operation and the fact that the NGOs with relevant experience were working in rural areas.

The alternative supported by one international donor was to use existing commercial channels. Indonesian firms ground imported wheat into flour and used it to produce noodles, which are an important part of the urban diet. These were sold through normal outlets – retailers and pavement stalls and restaurants frequented by the poor – with prices fixed at levels that were affordable but nevertheless commercially viable. Although it took time to get the project going, it was able to reach approximately a million people per month over a period of eight months.

C. Kelly, *Acute Food Insecurity in Mega-Cities: Issues and Assistance Options* (London: Benfield Hazard Research Centre (Working Paper 7), 2003), www.benfieldhrc.org.

Uncontrolled urban development damages the environment and increases risk. Deforestation, land clearance and subsequent construction may expose hill-sides, making them more vulnerable to landslides. Natural drainage is impeded



Urban vulnerability: a hillside urban slum in Lima, Peru

© Intermediate Technology/Colin Palmer

when flood plains are built upon. Unregulated construction leads to unsafe buildings, and here the middle classes are also likely to be vulnerable: many of the fatalities in earthquakes have been in badly-built apartment blocks.

Urban life has a profound impact on livelihoods and coping strategies. Town-dwellers rely on cash income from their labour to a much greater extent than those who live in the countryside. Livelihood strategies are

therefore heavily based on finding paid work. Moreover, the poor are more likely to undertake dangerous work.

Social capital in the form of community organisations and support networks may be weak in new, relatively unstable urban communities, especially those that comprise many different social groups. Newcomers are likely to lack experience and understanding of specifically urban hazards and avoidance strategies.

Dependence on public support systems and structures (power, water supplies, public transport infrastructure and emergency services) and external food supplies is much greater in urban areas. Politicians and officials have to be lobbied to make improvements to services, but the poor tend to have the least political influence. City and municipal authorities often lack the resources and political will to control pollution, provide adequate infrastructure and services, make suitable land available to poor people and implement large-scale mitigation measures.

14.2 Urban risk reduction: constraints and opportunities

14.2.1 Local-level mitigation

The preceding discussion suggests that options for reducing urban risk through local-level initiatives are limited. It is true that only action by municipal authorities can reduce pollution and other sources of risk on a significant

Box 14.1**Physical vulnerability to natural hazards in urban areas**

Buildings and physical infrastructure which may be vulnerable to the effects of natural hazard events include:

- Older residential buildings in densely-populated areas, which have been poorly maintained, altered or extended, or are overcrowded.
- Buildings erected before adequate standards and controls were designed, or that have been built without observing standards and regulations.
- Unplanned, 'informal' settlements in marginal, hazard-prone areas, where houses do not incorporate safety features.
- Modern buildings of poor design or construction quality.
- Communication and control centres concentrated in one area.
- Hospital facilities that are insufficient for treating large numbers of casualties or which may not be accessible in a disaster.
- Schools and other community buildings that have been built to low construction standards or which cannot be used as emergency shelters.
- Poorly designed or badly built roads, railways, bridges and viaducts, embankments and culverts, whose collapse could prevent access by the emergency services, movement of relief supplies and evacuation of casualties.
- Narrow streets that become blocked with debris and stalled traffic, also impeding emergency assistance.
- Water mains that are liable to rupture, resulting in pollution and disease.
- Sewers that flood, spreading disease.
- Electrical supply lines and systems, which are liable to failure.
- Gas mains that rupture, with the risk of fires.
- Industrial facilities that are damaged, leading to leakage of hazardous chemicals or to fires and explosions.

Institution of Civil Engineers, *Megacities: Reducing Vulnerability to Natural Disasters* (London: Thomas Telford, 1995), pp. 17–18.

scale, ensure the resilience of public infrastructure, manage mass evacuations and maintain emergency services, and – with additional support from national governments – reduce the pressure from the many underlying socio-

economic forces that make urban dwellers vulnerable. Nevertheless, it is possible to make a difference at local level, and even relatively small-scale interventions can have a meaningful impact. The kinds of improvement that can be made at this level include the following.

Better water and sanitation

Reliable supplies of clean water and adequate sanitation and sewerage systems are essential to reduce water-related infections. Low-cost technologies for putting up stand-pipes and building latrines and drains have long been available and, with full community participation, extensive water and sanitation systems can be installed (see Case Study 14.3).

The importance of making such facilities disaster-resistant is sometimes overlooked, but this too is relatively simple in technical terms. For example, in areas regularly visited by floods, water pipes and pumps can be raised above anticipated water levels, latrines can be sited where they are less likely to be flooded, drains and sewers can be designed to cope with large volumes of water, and regularly-spaced manholes can give easy access to drains and sewers if they need to be unblocked.

Improved storm and surface water drainage

This reduces flooding and the risk of water-borne diseases, and eliminates breeding sites for mosquitoes and other disease vectors. Blockage of drains by plastic bags and other rubbish is a major cause of urban flooding, but can easily be resolved through community action.

Technical improvements should be planned with careful thought to their consequences. For example, slum dwellers in Indore, India, interviewed in 1994, reported that flood drainage had worsened since the replacement of open drains with closed ones. The open drains were larger and less easily blocked, and rubbish and excreta left on the streets were washed into them to be taken away. Some of the new – blocked – drains ‘backed up’, depositing water and sewage in people’s homes.⁷

Management of solid waste

The main element of this is removal of garbage to reduce the risk of disease and prevent blocked drains. Some activities, such as sorting household waste, can be managed relatively easily at community level.

Case Study 14.3

Community-based sanitation

The Orangi Pilot Project (OPP) in the city of Karachi, Pakistan, is well-known internationally as an example of a large-scale, long-term initiative based on the skills and resources of the urban poor. Established in the 1980s in Orangi, one of Karachi's poorest districts, the OPP's programme of building low-cost underground sewers had, by 2001, benefited over 92,000 families (almost 90% of the settlement) and the community had invested over 82m rupees (approximately £924,000) in the system. With the elimination of the old open sewers, infant mortality rates fell greatly (from 130 per 1,000 live births in 1982 to 37 per 1,000 in 1991), mobility was easier and the cleaner open spaces in front of houses created safer play areas for children and space for social contact and recreation.

Although Orangi's sloping terrain helped drainage and hence made construction of the sewerage system easier and cheaper than it would have been on flatter ground, the main reason for the initiative's success has been OPP's firm

insistence on making community organisations the primary players and refusing external funding, which it believes would make communities dependent on outsiders and make projects less cost-effective. Although OPP provides technical advice and encouragement, community organisations direct the projects, which use local labour and materials. The communities are responsible for raising the funds to pay for the work.

OPP's achievements have attracted considerable interest from aid agencies and led to many attempts to replicate the approach elsewhere, with varying degrees of success. OPP has provided training and advice to municipal government and other projects. It has also achieved some striking successes in lobbying against proposals for donor-funded sewerage schemes and presenting lower-cost alternatives.

A. Zaidi, *From the Lane to the City: The Impact of the Orangi Pilot Project's Low Cost Sanitation Model* (London: WaterAid, 2001), www.wateraid.org.uk/site/in_depth/in_depth_publications.

Flood and landslide defences

A number of appropriate-technology measures can be implemented at local level. For example, many urban households and communities implement small-scale structural improvements, temporary or permanent, to protect against flood water and the pollutants it carries: houses are put on raised plinths, or where this is too costly doorsteps and house fronts are raised; concrete slabs or rubble and other landfill materials are used to create paths through standing water; inside houses, there are shelves and raised platforms to store goods safely, and electricity connections are put at head height.

Flooding can also be curbed by planting trees and other vegetation to absorb rainwater; the creation of open spaces assists this. Landslides have been controlled by building retaining walls out of old car tyres (see Chapter 10.2.2, page 147).

Creating safer living environments

This can take many forms. Within the home, use of alternative household fuels can reduce the risk of indoor air pollution and fires. Better-quality housing provides greater resilience to certain types of hazard. Less crowded settlements minimise risks to large groups of people and provide escape routes and safe places, but this can be difficult to manage where pressure on land is great.

Relocation, and avoiding hazardous areas

These measures are often suggested as a solution to disaster risk, but there are serious problems associated with them. Relocation to less hazardous areas is highly effective in reducing physical risks, but overlooks the centrality of livelihood security to vulnerable people and the intensity of the socio-economic pressures that drive them to occupy hazardous land.

People settle in hazardous locations for a variety of reasons, but the main ones are livelihood-related:

- rents are cheaper;
- they are closer to places of employment and job opportunities;
- there is access to markets (for buying and selling), health services, schools, electricity and water; and
- in central locations, they are more visible to the public, which means that there is a better chance of receiving funds for improvements.

Relocation schemes, on the other hand, tend to involve sites on the edges of cities. Land may be more readily available and affordable here, but jobs and many other facilities are not. For this reason, relocation is often resisted by vulnerable groups, although pressure can be brought to bear on them to move. In some cases, there are suspicions that relocation of communities is a pretext for land to be cleared for more commercial development.⁸ Handled sensitively, and with full community participation, relocation can bring benefits, but it is a complex process (see Case Study 14.4).

Better working environments

Improved health and safety practices reduce the risk of disease and injury from unsafe working conditions and exposure to hazardous materials.

Lobbying for better environmental management

This includes calling for improved water and sanitation, health and safety at work, and curbs on polluting industries and practices. It means targeting private-sector polluters as well as public authorities. This is a necessary task but a difficult one, as the private sector is powerful and resistant to pressure, while public authorities may be unable or unwilling to support community groups to challenge industrial practices that create risk.

There are instances of community organisations fighting successfully against pollution and commercial developments that threaten them, but there are many more examples of failure. For example, one-third of industrial enterprises surveyed in the city of Lahore, Pakistan, had received complaints about pollution from local groups and people, but none had made any significant efforts to improve their practices.⁹

Urban agriculture

Towns and cities largely depend on actions at national and even international levels to ensure adequate and affordable supplies of food; NGOs do not have the capacity to manage acute, large-scale urban food crises (see Case Study 14.2). However, local-level agencies can play a role in food monitoring and distribution.

They are also well placed to exploit the potential of urban agriculture, which is surprisingly extensive, especially in Africa and on the edges of towns and cities, and has grown significantly since the late 1970s in response to need. Globally, about 200m urban dwellers are also urban farmers, providing food and income to an estimated 700m people. Evidence from cities across the

Case Study 14.4

Community participation in relocation

The city of Santo André, with 62,500 inhabitants, is part of the metropolitan region of São Paulo, one of Brazil's largest industrial centres. About 15% of the population lives in slums located in flood- and landslide-prone areas.

In 1997, under its slum upgrading programme, the municipality identified the Sacadura Cabral settlement, where 780 families lived, as a priority area. The settlement was prone to flooding every year and was very densely populated (853 people/hectare). To achieve upgrading and reduce flood risk, it was necessary to level the area with earth and relocate some 200 families to nearby areas.

The initial top-down, random-selection method for identifying families to be moved was strongly resisted by local people, so it was dropped and replaced with a series of meetings with communities and their leaders. A new proposal was then developed jointly, which comprised:

- construction of 200 apartments in a housing complex one

kilometre from Sacadura Cabral, and the relocation of 200 families to live in them (at the end of 1998);

- subsidised credit for the families that acquired the apartments;
- demolition of the relocated families' homes and levelling of the land, followed by a process of internal relocation within the settlement and levelling of the rest of the flood-prone area;
- reconstruction of homes by the people concerned, with technical assistance from the local government.

Selection of the families to be moved was undertaken in consultation with the community, on the basis of agreed criteria including income levels and family size. Several planning meetings were held throughout the settlement.

M. G. G. Oliveira and R. Denaldi, 'Community Participation in Relocation Programmes: The Case of the Slum Sacadura Cabral in Santo André – Brazil', *Open House International*, vol. 24, no. 3, 1999, pp. 24–32.

South has shown that urban agriculture can have a considerable impact on local food production and consumption, as well as livelihoods. There is

probably much that can be done to promote and develop it. At the same time, urban agriculture can bring its own hazards, such as creating breeding sites for mosquitoes through irrigation, exposure to pesticides, contamination of crops from the presence of lead and other heavy metals in the soil, and contamination from the use of human excrement as fertiliser.¹⁰ The potential gains and risks of urban agriculture projects should be considered carefully by organisations working at local level.

14.2.2 Community-based approaches

Formal and informal social organisations exist in every part of a town or city where people live and work. But the notion of a ‘community’ may be quite different from rural areas, because in an urban district there is often a complex mix of very different social groups within a small area. The locus of organisation for people may be their neighbourhood – the district where they live – rather than a social community.¹¹ This presents problems to NGOs and other agencies trying to establish locally-based mitigation initiatives. The mutual suspicion that often exists between officials and people living in informal settlements adds to the difficulty.

Nevertheless, many communities are willing to undertake risk-reducing measures collectively where they are able to do so. For example, a survey of households in the Albouystown district of Georgetown, Guyana, found that, even though relatively few people were members of community-based organisations, 63% of those interviewed cleaned drains with their neighbours, and 53% cleaned streets with their neighbours.¹² The Orangi Pilot Project (Case Study 14.3) and other schemes inspired by it in Pakistan demonstrate that community-based action is possible on a relatively large scale.

Participatory initiatives (see Chapters 7.4 and 8) can help to break down barriers between social groups as well as identifying opportunities for local-level action. Community vulnerability analysis and action plans can be used in advocacy, and other stakeholders – city government departments, NGOs, academic institutions – can be brought into urban action planning processes.¹³ There are indications that such approaches have galvanised community action in risk reduction, and stimulated greater cooperation with officials (see Case Study 14.5), but more thorough documentation and analysis are needed to understand how this process works in different contexts.

It is useful to distinguish between ‘private’ and ‘public’ space when implementing community-level risk reduction measures in urban areas. Most

Case Study 14.5

Building bridges in Lima

The Caqueta district in Peru's capital, Lima, grew rapidly in the late 1980s, and by 1999 was estimated to be housing 15,500 people living in buildings ranging from wooden shacks to constructions of adobe and concrete. A 30-foot-deep ravine formed by the Rimac river crosses the district. Landslides at its edge are frequent, damaging and destroying squatter housing.

Several initiatives have been discussed to solve the problem of the ravine. They include covering it with a lightweight structure on which industrial enterprises could be built, and relocating residents and removing all buildings and infrastructure. But none of these essentially large-scale, technological approaches has been implemented, owing to their complexity and cost, lack of political will and administrative coordination, and failure to consult with local people, who do not want to move away from their places of work.

A different approach was attempted by a local NGO, Instituto Para la Democracia Local (IPADEL), with support from external consultants. The project team carried out an evaluation of local hazards, vulnerabilities (physical and social)

and capacities, based on surveys, questionnaires and participatory workshops with market and housing association representatives.

The evaluation's findings fed into a three-day planning workshop attended by representatives of municipalities, traders' and residents' associations, local NGOs and the fire services. Several ideas for reducing risk were put forward. Two were accomplished by the project. The first was to improve the pedestrian bridge across the ravine by installing protective sides high enough to prevent children from falling off.

The second initiative was to reduce fire risk in the local markets. Several planning and training workshops were held involving traders and firemen. One consequence of the work was an improvement in relations between the two groups. Fire-fighters had previously been seen as part of the municipal authority and, given a tradition of tensions between the authority and market traders, as hostile to the traders.

D. Sanderson, 'Implementing Action Planning to Reduce Urban Risk', *Open House International*, vol. 24, no. 3, 1999, pp. 33–39.

people will take steps to protect their own homes, as far as they are able, but the extent of their responsibility for protecting public space may be less clear. Urban residents are likely to feel that it is the municipal authorities' responsibility to take care of streets, drains and other communal facilities. Yet the boundary between private and public space may be drawn differently in different areas. In one community, keeping lanes clear of refuse and debris may be seen as a community responsibility; in another, it may be seen as the authorities' task. A community's willingness to take on responsibility for managing environmental risks also depends on how far it feels government should, and can, do so.

14.2.3 Partnership

Local-level activity must be linked to town- or city-wide measures to improve services and mitigate the impact of hazards. Without this, local initiatives will always be threatened by external pressures. Towns and cities are affected by pressures coming from beyond their boundaries, but local organisations can only address these through advocacy. This makes it particularly important to develop risk management partnerships between communities, grass-roots organisations, NGOs, municipal authorities and others (see Case Study 14.6).

The introduction of Local Agenda 21s – programmes for addressing environmental problems, mandated by the Agenda 21 programme agreed at the Earth Summit in Rio in 1992 – has created space for better partnerships by moving environmental planning into the public arena, providing for more extensive public consultation and partnerships. Local authorities are being encouraged to think less about doing everything themselves, and instead to put greater effort into creating 'enabling frameworks' that facilitate partnerships between groups. Within its comprehensive environmental coverage, Agenda 21 includes problems of human settlement planning and management in disaster-prone areas.¹⁴

A number of other international initiatives address aspects of urban risk reduction, focusing particularly on municipal authorities (see Box 14.2).

Much of the attention being given to disaster risk in urban areas has concentrated on the problems of cities. Here, the scale of the problems makes involvement of municipal and even central governments particularly important. But most of the urban population in developing countries does not live in cities but in smaller market towns and administrative centres. It is in such places that most urban growth is taking place. Here, it can be easier to create the partnerships needed to tackle problems at local level – and it is arguably

Case Study 14.6

Collaborative action planning for earthquakes

The Kathmandu Valley Earthquake Risk Management Project (KVERMP) is one of a number of initiatives in South and South-East Asia under the Asian Urban Disaster Mitigation Programme (see Box 14.2). The Kathmandu Valley, with a population of over a million people, is vulnerable to earthquakes. It has not suffered a major earthquake since 1934, but many experts believe that another is long overdue.

KVERMP has addressed several aspects of risk reduction by developing a scenario and action plan, making schools safer by retrofitting, raising public awareness and building the capacity of local institutions.

The first step was to assess the valley's earthquake risk. The project did not attempt to develop a new, improved assessment of this risk, which would have been a complex, costly exercise. Instead, it chose to present what was already known about that risk in a form that was understandable to officials and the public. This made it easier to involve a range of groups in the subsequent action planning. About 80 different organisations, mostly from government but also including NGOs, academic institutions, businesses and donors, were involved in

creating the action plan. Many different risk reduction measures were proposed, and project staff visited participating organisations to discuss these, and the feasibility of including them in the plan. A draft plan was then distributed to all the stakeholders for comment.

The final draft was presented at a two-day workshop attended by 85 representatives of all the organisations involved, who discussed its approach and contents and helped to set priorities. The agreed action plan was printed and launched by the Prime Minister at an event to mark the country's annual Earthquake Safety Day, and distributed widely. It is used regularly in training and orientation programmes, and has generated considerable debate and feedback among local inhabitants, policy-makers, administrators and scientific and technical specialists.

A. M. Dixit et al., 'Mitigation Planning and Implementation: Experiences of KVERMP', in *Proceedings: Regional Workshop on Best Practices in Disaster Mitigation. Lessons learned from the Asian Urban Disaster Mitigation Program and Other Initiatives, 24–26 September 2002, Bali, Indonesia* (Bangkok: Asian Disaster Preparedness Center, 2002), pp. 181–87.

Box 14.2**International initiatives in urban risk reduction**

The Healthy Cities Programme, run by the World Health Organisation (WHO), attempts to improve public health through better control of environmental and other hazards. It seeks to put health higher on decision-makers' agendas, build up a lobby for better public health and develop popular, participatory approaches to dealing with health problems. At town/city level, it is implemented by local teams drawn from government, NGOs, communities and other organisations, with technical back-up from WHO offices. Several hundred towns and cities have received the 'Healthy City' designation – i.e. they are undertaking or planning new initiatives involving collaboration between government and community organisations. These have included upgrading poor people's housing, improving sanitation in informal settlements, improving drainage to prevent flooding, better waste management, and more integrated planning.¹⁵

The Asian Urban Disaster Mitigation Programme (AUDMP), managed by the Asian Disaster Preparedness Center in Bangkok, is a six-year initiative covering eight countries in South and South-East Asia. It aims to establish sustainable public and private sector mechanisms for

disaster mitigation, and to promote the replication and adaptation of successful approaches. Its activities comprise demonstration projects in each country to assess, design and implement measures to mitigate a number of natural and technological hazards, information-sharing and networking, and training.¹⁶

In 1998–99, the UN ISDR's Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters (RADIUS) project worked in nine cities to develop risk assessment methods, raise public awareness and produce action plans. Post-project evaluations have provided examples of the action plans being used for emergency training, urban development planning and updating official disaster management structures. The assessment tools are also being adopted by other towns and cities.¹⁷

Local Authorities Confronting Disasters and Emergencies (LACDE) is a worldwide network of local authorities and other organisations seeking to increase local government's understanding and capacity to deal with disasters of all kinds. Its main activities are well-attended annual conferences and a newsletter.¹⁸

more vital to do so, in view of the relative neglect of this issue in such towns and the often limited capacity and resources of local government for managing disaster risk.

Environmental deprivation is increasingly being recognised as an important dimension of urban poverty, which means that poverty reduction programmes are considering environmental issues, including hazards. Local Agenda 21s have furthered this process. Opportunities to bring the poverty, environmental and risk management agendas closer together are probably better here than in other contexts.

14.3 Chapter summary

- Rapid and uncontrolled urbanisation is putting ever-greater numbers of people at risk from natural and technological hazards.
- Environmental hazards are the main cause of ill-health, injury and premature death in urban areas in developing countries and there is a significant risk of major urban disasters in future.
- Man-made and technological hazards are particularly important in towns and cities.
- Poor and marginalised people are more likely to live in unsafe areas and housing, and in densely populated districts where the impact of hazards and disease is magnified.
- Urban vulnerability is distinctive in terms of the composition of livelihood and coping strategies, the nature of social capital and the level of dependence on public support systems and structures.
- Only action by municipal authorities can reduce risk on a significant scale, but it is possible to make a difference at local level in, for example, improving water, sanitation and drainage systems, constructing flood and landslide defences and creating safer living environments.
- Avoidance of hazardous areas and relocation to safer ones are often suggested as a solution, but are rarely feasible given the intensity of the socio-economic pressures that force people to live in dangerous locations.
- There are many opportunities for partnerships between communities and other groups.

Notes

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- 16 The AUDMP's website is: www.adpc.ait.ac.th/audmp/aboutaudmp.html.
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Chapter 15

Slow-onset disasters

15.1 Introduction

Writing on disasters usually distinguishes between rapid-onset events and slow-onset events. The critical factor here is said to be the nature of the hazard concerned.

Hazards that arise suddenly, or whose occurrence cannot be predicted far in advance, trigger rapid-onset disasters. Earthquakes, cyclones and other windstorms, landslides and avalanches, wildfires, floods and volcanic eruptions are usually categorised as rapid-onset events. The warning time ranges from seconds or at best a few minutes in the case of earthquakes and many landslides, to several days in the case of most storms and floods. Some volcanic eruptions may be preceded by weeks or months of activity, but predicting volcanoes' behaviour remains very difficult and the warning time for the eruption itself may be only days or hours. Most disasters are rapid-onset events.

Most discussion of slow-onset disasters concentrates on one hazard: drought. It can take months or sometimes years for the results of drought to become disastrous, in the form of severe water and food shortages and, ultimately, famine. Drought is not the only relevant hazard, though. Pollution of the environment can also be considered a slow-onset disaster, particularly in cases of growing concentrations of toxic wastes, which may build up over years. Human activities that degrade the environment and damage ecosystems – deforestation for instance – also contribute to disasters. Their cumulative impact may not be felt for decades, although the hazards that they make more likely, such as flash-floods and landslides, may be sudden-onset events.

To some extent, the distinction between slow- and rapid-onset disasters is artificial. Hazards certainly can be categorised in this way. Disasters, on the other hand, are the product of hazards and human vulnerability to them. The socio-economic forces that make people vulnerable may act quickly or slowly, but in most disasters it is likely that long-term trends will be more influential. When viewed in this light, it could be argued that all disasters are slow-onset. This Good Practice Review argues for a long-term, holistic approach towards managing risk that also breaks down the distinction between slow- and rapid-onset disasters.

Why then have a separate chapter on slow-onset disasters? There are two related reasons. First, because real-life disaster management often does distinguish between rapid- and slow-onset events. The approaches that have been developed for dealing with slow-onset hazards such as drought may differ from those used against other hazards. The documentation of such work is generally much better here than in other disasters, and there is a greater volume of high-quality research and analysis.

The second reason is that, in the management of drought and food security, and in environmental renewal initiatives, development agencies play a much more significant role than they do in sudden-onset disasters. This may offer lessons about how to get the development community more involved in disaster management generally. Mitigation of drought and food security is more advanced than mitigation of many other types of disaster in integrating livelihood issues with disaster management, adopting participatory and community-level approaches, and building upon indigenous knowledge, coping strategies and appropriate technologies.

15.2 Environmental degradation and pollution

15.2.1 Environmental degradation

There is a strong link between environmental degradation and increased risk from natural hazards. Bad management of natural resources and destruction of the eco-system make disasters more likely. For example, the removal of trees, bushes and other vegetation in the course of building, farming or other commercial activities can create hazardous conditions. In agricultural areas it accelerates the loss of fertile topsoil to wind and water erosion. Water is no longer held in the soil by vegetation and so runs away rapidly, which increases vulnerability to drought. On hillsides, rapid water run-off can cause flash-floods and landslides. In coastal zones, the destruction of mangrove forests removes a natural barrier to the winds and sea surges created by tropical cyclones.

In all these cases, environmental protection or renewal is technically feasible. Natural resources can be managed and replenished through such measures as reforestation and other planting, waste management, environmentally sustainable farming and grazing practices, terracing, and building protective stone and earthworks to prevent rapid water run-off. Countless projects of this kind have been undertaken. Complementary activities include environmental education.

Attempts to protect the environment often challenge powerful interests that stand to gain from its destruction: timber companies from logging; ranchers

from stripping land of woods, hedges and bushes; shrimp farms and hotels from tearing up mangroves. The example of the Afro-Honduran Garifuna communities in Chapter 12 illustrates how difficult and even dangerous it can be to make such challenges. More generally, economic and demographic pressures on poor countries, coupled with entrenched political and cultural attitudes, inhibit an effective response to recognised environmental crises. The failure of the Soviet Union and the post-Soviet Central Asian republics to deal with the drying up of the Aral Sea is a good example of this.¹

15.2.2 Pollution

Major industrial disasters are often rapid-onset: the result of industrial or transport accidents causing explosions and fires of flammable material or the release of oil, chemicals or radioactive material. The chemical leak at Bhopal in India in 1984 and the accident at the Chernobyl reactor in Ukraine in 1986 are the best known recent examples. Although the number of such industrial disasters remains low and there are still relatively few casualties compared to those from natural hazards, their numbers are rising with the spread of industrialisation in developing countries.² However, the impact of pollution may not be felt for decades as volumes of waste accumulate and growing numbers of people are exposed.

Although local-level management of some forms of waste and pollution is feasible, significant reductions in pollution and improvements in waste management require the involvement of the state in setting and enforcing standards and providing adequate public facilities. Communities and their organisations can encourage this through vigorous advocacy (see Chapter 12). In many instances, specialist scientific and engineering expertise will be required, especially in the case of extremely toxic wastes.

Community organisations, NGOs, researchers, governments and other agencies should work together to tackle major problems of this kind collectively – the ‘partnership’ approach to disaster management set out in Chapter 5. The difficulty of creating successful partnerships should not be underestimated, especially in the case of industrial pollution where the demand for better protection may conflict with business aims. Case Study 15.1 shows how agencies have responded to a major crisis resulting from groundwater pollution.

The connections between climate change and hydro-meteorological hazards such as droughts and cyclones are becoming apparent, backed up by a growing body of scientific evidence.³ Although climate change specialists and

Case Study 15.1

Arsenic pollution in Bangladesh

In the early 1990s, high concentrations of arsenic were reported in groundwater in western Bangladesh. Arsenic is a cumulative and potentially fatal poison, and many of the more advanced symptoms of poisoning are incurable. About 25m people have been exposed through drinking water from tube wells, and over 7,000 cases of arsenic poisoning have been confirmed. Fifty-nine of the country's 64 districts have some arsenic-contaminated groundwater.

There has been considerable debate about the source and release mechanisms. It is now widely accepted that the arsenic is of natural, geological, origin, although it is less certain how it gets from sediments into groundwater.

In response to a potentially massive disaster, international agencies, the government of Bangladesh, scientists and local NGOs have put considerable effort into researching the problem and identifying and implementing solutions. The costs of this work run into millions of dollars. Activities undertaken to date have included:

- testing water supplies (using specially developed field test kits) and monitoring cases of arsenic poisoning;
- data collection and analysis based on geochemical surveys and further research on the mechanisms by which arsenic is released;
- promoting methods of removing arsenic from water (e.g. filters) and researching new methods;
- finding arsenic-free sources of water (e.g. digging deep tube wells that go beneath the arsenic-bearing sediments, rainwater harvesting);
- training doctors and health workers to identify and treat arsenic poisoning, and developing patient treatment protocols;
- public education; and
- information dissemination and networking among professionals.

E. Jones, *Arsenic 2000: An Overview of the Arsenic Issue in Bangladesh* (Dhaka: WaterAid Bangladesh, 2000), www.wateraid.org/site/in_depth/research_centre/groundwater/183.asp.

disaster managers have begun talking to each other, the way forward in coping with the threat remains far from clear.

At a global level, advocacy to reduce greenhouse gas emissions is essential, and there is already a substantial alliance of scientists, environmentalists and some businesses (notably insurers) engaged in this. At local levels, disaster managers are unsure what they can do about climate change beyond what they are already doing to minimise risk. How can they calculate the increased risk due to this problem? How far should their existing disaster planning be stepped up to counter the threat from climate change? As yet, there are no answers to these questions, but they are needed urgently.

15.3 Drought, food security and famine

More than 70m people died in famines during the twentieth century.⁴ There have been many major, high-profile food crises over the past 30 years. Most have been in Africa. Many have been triggered by drought, but other hazards including floods, harsh winter weather and diseases that affect crops and livestock can also act as triggers.



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Natural hazards are only one factor in food crises. Political, economic and social factors, including conflict, can be powerful contributors. The macro-economic policies of governments and international agencies have played a considerable role in creating food insecurity and famine (see Case Study 2.2, page 18). In some countries, food aid has become a regular, even continuous, component of government development plans and programmes: Ethiopia and Iraq are prominent examples, though for different reasons. The food crisis in Southern Africa in 2002 revealed the influence of the HIV/AIDS pandemic on food insecurity. Research on the likely consequences of global warming indicates that areas already prone to drought are likely to suffer even more severely in future.

These are massive challenges to overcoming famine and food insecurity. Many argue that the challenges are growing and becoming more complex. However, understanding of the causes of food insecurity

Sudan: harvesting aubergines grown in holes to collect water, reduce evaporation and provide shade

and famine has advanced greatly in the past 30 years or so. Also during that time, numerous advances in practice, from local to international levels, have greatly enhanced the capacity to improve food security and predict and prepare for crises. The adoption of community-based approaches, appropriate technologies and indigenous knowledge is significant, as is the growing integration of food security initiatives with those seeking to support livelihoods more broadly.

Food security is complex, and the literature on the subject is extensive. Experience is widespread among development agencies. There is plenty of good general guidance on issues and operations for project planners, on which much of this overview is based.⁵

15.3.1 Understanding ‘food security’

There is no fixed yardstick for measuring food security. It is not simply a case of people having enough to eat; rather, it is:

when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.⁶

This depends on people being able to buy food or obtain it in other ways, such as in exchange for their services (e.g. labour) or borrowing from members of their extended family or community. This, in turn, depends on them having sufficient income, savings and other material assets, skills or social connections to obtain food. It also depends on external factors such as the price of food in the market.

Control of the supply and distribution of food is another important dimension. Some members of a household have little influence over how food is distributed. Children depend on the food they are given by adults. Male children and adults often get more food than females. Providing adequate food for elderly family members may not be a priority when times are hard. Sometimes decisions about food distribution are made on the basis of economic rationality – for instance, a family member who brings in a regular wage may get priority – but power relationships and cultural practice are also influential.

There can be pockets of food insecurity almost anywhere – within countries, communities and families. Hence, monitoring and analysis of food insecurity should take place at different geographical and social levels, as well as at different times of the year (see Section 15.4, below).

Food security is not a mere question of there being enough food *available* – rather, it reflects the fact that people do not have equal *access* to food because of differences in the resources they possess and other economic, social and political factors. This theory of people’s differing ‘entitlements’ to food, first advanced by the economist Amartya Sen in the 1970s, has transformed the way many aid and development agencies view food insecurity and famine, and has two important implications for any agency seeking to reduce the risk of food insecurity.

First, it shows that there are many different ways of overcoming food insecurity by improving people’s ability to obtain food. These include conventional food production practices (e.g. promoting improved farming techniques), standard drought mitigation practices (e.g. soil and water conservation), and better management of natural resources such as forests and watersheds. They can also include measures to support livelihoods generally, such as projects to create jobs and increase incomes, savings and credit programmes, improving the quality of water supplies and sanitation (poor health is an important contributor to malnutrition), better education for women (known to be an important factor in reducing malnutrition at household level), helping local markets for food and other products (through better access roads and footpaths, or better methods of packaging and preserving perishable products for sale), and encouraging wider community participation in economic and social development initiatives to improve the situation of marginalised groups. This opens the way for development agencies to combat food insecurity – and many are doing so.

The second point is that such initiatives can be undertaken locally, be it to tackle pockets of food insecurity or to contribute to more widespread programmes. There is ample opportunity for local-level organisations to become involved.

15.3.2 Drought and food security

Although the causes of food insecurity include political, social and economic factors, natural hazards, especially drought, remain important.⁷

Scientists and geographers distinguish between three kinds of drought:

1. Meteorological drought is when rainfall drops below a certain level.
2. Hydrological drought involves a reduction in water resources such as rivers, lakes and underground water: this too is the result of lower rainfall, but it may take some time to be felt, and in the case of river systems may be the result of a drop in rainfall far away from the area in question.



Constructing a traditional hand-dug reservoir (*hafir*) in Sudan

©ITDG/Orilando Arnold

3. Agricultural drought is the impact of the other two kinds on crop yields.

Whilst it is obvious that places that receive little rainfall are drought-prone, drought can also occur where rain is normally sufficient – for example, parts of Bangladesh have suffered a number of droughts, some quite severe. A few weeks with little or no rain at a critical time of the year for crop growth can be devastating, even if the rest of the year is not dry. The important point is whether the amount of rainfall is sufficient for agriculture, livestock and other human needs at the time in question.

Drought's impact is felt on different geographical scales. Climatic conditions can vary widely within a country. At local level, changes in land use can have a significant impact on watersheds, and hence

the amount of water available through run-off or from rivers and ponds.

Some of the measures needed to mitigate water shortages and their effects are outlined below. Here, a more general problem should be noted: the difficulty of assessing the relative importance of drought on food insecurity compared to socio-economic factors. It can be hard to disentangle these causes, because they interact with each other. For example, a fall in crop yields may be due to lack of water (i.e. agricultural drought), but may also be the result of such factors as a lack of fertilisers or weeding, pests and crop diseases, labour shortages at critical periods and low prices for crops in the markets.

Drought can trigger other hazards: in Ethiopia in 1984, it contributed to an infestation by army worm that greatly increased crop damage.⁸

15.3.3 Coping with food insecurity and famine

Seasonal food insecurity is normal in many poor households, which suffer from a hungry period shortly before the harvest, as food gathered from the

previous harvest runs out. This problem is known as ‘chronic’ food insecurity, as opposed to one-off food shortages, which are classified as ‘transitory’ food insecurity.

When food insecurity is acute and prolonged, it can lead to starvation and finally to famine (famine is where there is a significant increase in sickness and death rates resulting from starvation and associated factors). The descent into acute food shortage and thence into famine can take weeks, months or even years. Except where conflict is a major contributing factor, famine should not be seen as inevitable because of the range of measures available at all levels to improve food security and strengthen livelihoods in the long term.

Take, for example, the mitigation strategies used by communities to protect themselves against drought and the food insecurity that results from it. These can be divided into two main types: agricultural and non-agricultural.

- Agricultural mitigation strategies are measures to maintain crop and live-stock production. They include sowing again after a crop has been ruined by drought, sowing alternative crops, or moving livestock to other locations.
- Non-agricultural mitigation strategies include seeking off-farm employment in the locality or elsewhere, eating seeds or roots that were saved to be sown in the next growing season, reducing the amount of food consumed, eating wild food such as berries and roots, postponing social functions such as weddings, using up savings and selling assets (such as livestock, household goods and personal possessions), buying on credit, borrowing money or calling in favours from communities and kin.

Families only sell their livelihood assets when they have to, which is when other methods such as growing alternative crops or finding alternative employment are insufficient. Sale of assets is a good indicator of how severe the consequences of drought are. Poor families, those with small landholdings and the landless, are the first to resort to such methods. Only when all else has failed will whole families and communities migrate in search of food (e.g. Case Study 9.2, page 137).

The severity of a food crisis can therefore be judged by looking at food and livelihood coping strategies as well as at food supplies. Food insecurity among a particular population is likely to be acute if:

- People experience a large reduction in their major source of food and are unable to make up the difference through new strategies.
- The prevalence of malnutrition is abnormally high for the time of year, and this cannot be accounted for by health or care factors.

- A large proportion of the group is using marginal or unsustainable coping strategies.
- People are using coping strategies that are damaging their livelihoods in the longer term or incur some other unacceptable cost such as acting illegally or immorally – stealing, for instance.⁹

The most effective way to protect communities against food insecurity and famine resulting from drought is to strengthen these diverse mitigation strategies well in advance, especially those that enable them to preserve their productive assets, such as animals, seeds and tools.

Despite this, most external intervention is still in *response* to drought, not in helping to create more drought-resistant communities. Moreover, it often comes at a late stage, when communities are in crisis and may already be destitute, having been forced to dispose of productive assets. Typical interventions in such circumstances are to provide food, seeds, fertiliser, animals and agricultural equipment to replace that which has been used or sold, and to lend money. Where a crisis has become acute, with widespread starvation and migration, aid agencies' interventions focus on emergency response, especially feeding and health care. Food-for-work and cash-for-work schemes are also common responses.

The boundary between disaster preparedness and response is blurred in food crises, because they can develop over such a long period. Some would argue that an emergency begins when hungry people are forced to dispose of their livelihood assets; others put it at the point where destitute, starving people leave their homes to beg for food, or even where large numbers begin to die of starvation. In this chapter, emphasis is placed on longer-term mitigation measures to maintain food production and incomes.

15.3.4 An integrated approach

The ideal approach to drought-related food insecurity addresses the different dimensions of the problem, using a range of methods.

An example of this range is given in Table 15.1, which highlights the main interventions in a joint UNICEF/WHO project that covered 600 villages in Iringa, Tanzania, in the 1980s. The project was a response to persistent food insecurity and malnutrition rather than to an individual disaster, and specifically nutritional aspects are emphasised in the interventions, but the basic approach is risk management, seeking to limit the likelihood of future disaster. Measures to combat chronic food insecurity are an important element of anti-famine initiatives.

Table 15.1 Interventions against malnutrition in Tanzania

<i>Problem</i>	<i>Possible causes</i>	<i>Programme interventions</i>
1. <i>Inadequate food in households (most severe a few months before the harvest)</i>	<ul style="list-style-type: none"> • lack of household planning • choice of wrong crops • failure of rains • poor crop management • storage losses • shortage of agricultural inputs • lack of income to buy food 	<ul style="list-style-type: none"> • training of trainers in household food planning • promotion of drought-resistant crops • improved storage
2. <i>Inadequate nutrient intake (especially in children)</i>	<ul style="list-style-type: none"> • poor economic resources • nutritionally poor diet • shortage of fuelwood • shortage of fruits and vegetables • scarcity of meat • scarcity of beans and other legumes • too much workload for mothers 	<ul style="list-style-type: none"> • promotion of income-generating activities • nutrition education, especially to mothers, through health workers • training and other inputs for village forestation and home gardening • training and inputs for small animal keeping • promotion of grain milling and appropriate technology
3. <i>Lack of awareness of good weaning practices</i>	<ul style="list-style-type: none"> • lack of awareness of children's nutrient needs • inadequate feeding frequency • scarcity of energy-dense foods (e.g. groundnuts, cooking oil) • dietary bulk 	<ul style="list-style-type: none"> • provide weaning recipes based on local foods • mobilise communities to provide extra food at child care posts • campaign on use of <i>kimea</i> (flour with high nutritional value)

M. Hubbard, *Improving Food Security: A Guide for Rural Development Managers* (London: IT Publications, 1995), pp. 30–31.

Interventions should be linked as far as possible to the coping strategies that households use. As affected people are likely to employ a variety of strategies, and may alter the type and mix of coping methods in use quite rapidly, agencies need to be flexible in their approach.

Some of the components that might make up an integrated approach are outlined in the following sections.

15.3.5 Protecting food production

Drought mitigation and food security projects often used to focus on irrigation or soil and water conservation techniques. Nowadays it is usual to attempt a broader mix of activities that support all aspects of agricultural production, but irrigation and soil and water conservation remain important elements of such work.

There are many different methods of protecting the soil against erosion from wind or water and preventing water run-off. These include terracing, digging furrows and ridges, planting grasses, bushes and trees, building walls of stone or earth, planting in holes and pits, and mulching. The most appropriate method for each location depends upon its physical features (the nature of the soil, the terrain and climatic conditions) and local capacities (the materials, skills and other resources available).

Intercropping (mixing different crops in the same plot) is a traditional coping strategy that has been undermined in some places by the advance of monoculture. Where the crops chosen differ in their resilience to drought, diseases or pests, intercropping is a way of spreading risk, since it increases the probability that some crops will survive. It can also be beneficial to growth: some plants give shelter or shade to others, or provide nutrients to the soil. Other agricultural practices that can be encouraged include alternative systems of crop rotation, manuring and composting. Integrated pest management, based on intercropping and the use of insect-repelling plants and crops or pesticides (including those made from traditional recipes using local plants), is another feature of many successful food security initiatives.

Farming should be considered as a process. In real life, agricultural methods are not fixed; the type and mix of crops vary. Farmers do experiment, if the risks of doing so are not too great. Supporting organisations should therefore aim to give food-insecure communities more livelihood options and greater flexibility. Initiatives that begin as narrow technical interventions often find that they have to widen their scope in order to become more effective, as well as sustainable.

Government agricultural extension services and some NGOs have promoted new, hybrid versions of staple food crops at the expense of traditional varieties. The newer varieties give higher yields, but usually only in favourable conditions with ample water and fertilisers. Traditional varieties tend to be more resilient to environmental stresses such as drought. This alone should

be a sufficient caution against using newer crops in drought-prone areas, but their heavy – in some cases, coercive – promotion has also threatened biodiversity and undermined traditional knowledge of alternative varieties.

Research in the past 10–15 years has uncovered extensive indigenous knowledge of agricultural plants and how to grow them.¹⁰ Many food security projects have found that, by protecting and sharing such knowledge, and the traditional seed varieties concerned, they widen the options open to communities and increase their resilience to hazards such as drought. Seed banks, fairs and demonstration plots are effective methods of preserving, promoting and sharing (e.g. Case Study 15.2).

Case Study 15.2

Improving food security in a drought-prone area

Chivi District, in Zimbabwe's Masvingo Province, is an area of poor soils and low rainfall. In 1990, the Intermediate Technology Development Group (ITDG) began to explore methods of working with communities and local organisations in the district's Ward 21 to improve food security among the 1,300 households there. This coincided with a period of drought that killed many cattle in Chivi.

ITDG intended a strongly participatory approach from the start, but still had to overcome considerable local cynicism about the value of outside agencies, while many villagers were puzzled that it had not come with a pre-formulated programme and was not offering financial or material support.

An extensive assessment process carried out with the community

identified a wide range of problems in producing food and sustaining livelihoods. Only after this period of consultation, which took six months, did the project begin to set priorities and make plans – again involving the community, many of whom had never gone through a participatory process of this kind. The project worked with two main local institutions, farmers' clubs and women's garden groups, as these were most directly involved in food production.

The first phase of implementation, from 1992–95, addressed three needs: water for fields and gardens, pest and disease control, and fencing to protect gardens from animals. At the same time, over 1,800 community members took part in training to improve their capacity to identify problems and solutions, communicate, and manage their own organisations.

(continued)

Case Study 15.2 (continued)

During the first two years, a range of technologies were tried out by the farmers and gardeners through experimentation in their own fields. Those found to be most effective were quickly taken up by other community members. They included sub-surface irrigation using clay pipes, pots and bottles; terracing, rock catchments, 'tied' ridges, infiltration pits, mulching and the use of underground plastic sheeting to increase water retention; digging and improving wells; winter ploughing, intercropping, and the use of termite soil as a fertilizer and moisture retainer; growing 'live' fences of sisal and introducing two machines to make wire fencing at half the price of ready-made products.

Indigenous knowledge, often disregarded by outside experts, was used wherever possible. Seed fairs were held to revive local crop varieties, share information on them and demonstrate their value. Surveys and discussions showed that many farmers knew of local plants that could be used to make effective pesticides, but were reluctant to tell others because they feared their knowledge would be thought old-fashioned in an age of modern chemical pesticides. The project made sure that their knowledge was recorded and shared.

All of these methods were widely adopted and effective in boosting production. However, as the project progressed it was clear that it needed to pay more attention to marketing. Women gardeners carried out surveys of demand and prices for various vegetables, and as a result the groups began diversifying their production to meet these opportunities.

As the project took off, with widespread adoption of the various techniques and growing numbers of local people taking part, it also expanded into other wards. Reviews and evaluations over the years have found increased and more reliable crop yields and a steady growth in the variety of crops being grown. Buyers began bringing trucks into the area to buy up surpluses, and women began sending their husbands to neighbouring areas to sell the produce from their vegetable gardens. Some garden groups set up a revolving loan fund, and community organisations were seen to be far more confident not only in managing their own affairs, but also in their relationships with outside agencies and government agricultural extension workers.

K. Murwira et al., *Beating Hunger: The Chivi Experience. A Community-based Approach to Food Security in Zimbabwe* (London: IT Publications, 2000).

Food production is inseparable from issues of access to land and land ownership. Many of the problems faced by poor communities in drought-prone areas arise from unequal distribution of land and natural resources, which is the product of historical, political and socio-economic forces. Some developing-country governments have attempted land redistribution, but this approach has fallen by the wayside with the current dominance of market-led economic policy. On the other hand, the protection of common property resources such as forests and grazing lands is definitely a 'live' issue, for which determined advocacy may be needed.

15.3.6 Preserving food: crop and seed stores and banks

Many drought mitigation projects include crop and seed storage among their interventions, and there is now plenty of guidance on this subject.¹¹

Storage falls into two main categories: household stores and community grain and seed banks. Where people are poor and agricultural output is low or highly vulnerable to climatic variations, it is important to maximise crop preservation. Inadequate storage can lead to crops rotting, becoming diseased or contaminated, or being eaten by pests. The amount of grain and seed lost because of this varies greatly according to location, but in many cases may be as much as a third of the crop.

Crop stores and seed banks help to ensure that there is food to eat during the lean season, and that there are seeds to plant. They offer security against rising food prices during the hungry period. By storing a wide variety of local seeds, they maintain biodiversity. They can also protect crops and seeds against other natural hazards such as floods.

Appropriate technologies come to the fore here. Low-cost techniques and materials can often be used to make stores, while in some instances traditional knowledge and methods can be adopted, or adapted. Examples of appropriate technologies include sealed clay pots, baskets lined with clay or plaster, plastic sheeting, sacks, metal bins and some forms of underground storage such as lined and covered pits. Stores can be raised above the ground on wooden poles to protect them against rats and mice (with guards made of old tin cans on the poles to prevent the animals from climbing up). Certain varieties of crop and seed may be more resistant to pests and disease than others, and it is useful to explore traditional knowledge of this. Traditional pesticides such as ash, some types of edible oil, and certain local plants may preserve crops against insect attack. Some crops can be

preserved for longer by drying or smoking them. In other cases crop processing – into flour, oil, jams or pickles, for instance – is an effective preservative, as well as creating a product for sale. Exchange visits enable farmers to see different storage and preserving practices and discuss their effectiveness.

A few words of caution are needed, nevertheless. First, it is important to identify whether crop losses in storage result from poor storage itself, or from harvesting and post-harvest preservation practices. If the latter are inadequate and introduce disease or contamination into the crops, good storage systems will make little difference.

Second, community seed or grain banks present storage and management challenges that are quite different from domestic stores. The storage challenges are technical, arising from the scale on which produce has to be stored, but in many cases similar technologies to those employed by households can be used. The real challenge is management. A seed or grain bank is a *bank*, not merely a store. These banks can be run in different ways but the principles are standard: usually they buy grain from their members and sell it back at below market rates, or they run as savings and credit schemes. Procedures governing how households deposit seeds or grain with the stores, how to sell or lend seeds and grain back to them, and how to deal with defaulters must be worked out carefully, and they must be transparent.

Grain/seed banks must be planned with communities, built by them and managed by them – crucially, they must be run on behalf of the whole community. This may require training in organisational development, literacy and accounting procedures. Projects dominated by outside agencies are prone to failure. However, start-up funding may be needed to build stores and purchase initial grain stocks, and top-up funds or grain may be necessary if a drought hits before the scheme is securely established or at times of severe crisis. Any outside organisation attempting to introduce such schemes needs a high level of skill and experience in community development, in the broadest sense, and if it lacks this should bring in the relevant expertise. Moreover, there has to be a high level of trust between the community and the development or disaster organisation that is helping it, which may take years to build.

A further important point is that community seed or grain banks should be part of an integrated food security or rural development programme. On their own, they cannot provide complete food security. Other factors affecting success are outlined in Case Study 15.3.

Case Study 15.3

Cereal banks in Burkina Faso

Cereal banks were introduced to Burkina Faso in the mid-1970s. By 1986, there were an estimated 1,177 banks supported by government and NGO programmes. They had three basic elements in common: a storage facility; a 'rotating fund' in grain or cash that allowed the bank to buy, sell or lend grain; and a managing committee chosen by villagers.

In a 1987 study of nine banks supported by three NGOs, villagers were asked to identify their achievements and weaknesses. Among the benefits were: a measure of food security even during prolonged drought; reducing drought-induced emigration; savings in time because villagers no longer had to go to market to buy grain; enabling farmers to escape the high prices imposed by grain merchants; improved management skills that could be applied to other local projects and stimulating mobilisation of community members for such initiatives; facilitating emergency relief assistance; and generating funds for other community activities. The bank meetings often served as a forum to discuss other village matters.

Difficulties included: maintaining high rates of reimbursement (in several locations the pressure of a severe

drought in the mid-1980s greatly reduced farmers' ability to repay the bank for borrowed grain); the amount of time and effort needed to manage schemes; finding adequate ways of compensating the banks' managers for their time; and tension when people were refused credit. The need to constantly remind villagers about how credit works was noted.

The study concluded that the cereal banks were best suited to dealing with yearly grain shortfalls during the planting and growing periods, and highlighted the increased organisational capacity of villages resulting from the initiatives. There were more questions about the banks' ability to respond to prolonged drought and famine. They were able to blunt the impact of drought and mitigate or even prevent famine. However, they risked their long-term financial stability by doing so since farmers were often unable to reimburse them adequately after the crisis had passed. To protect them against this risk, special donations of grain or funds were needed to provide emergency supplies or replenish stocks.

M. B. Anderson and P. J. Woodrow, *Rising from the Ashes: Development Strategies in Times of Disaster* (London: IT Publications, 1998), pp. 185–205.

15.3.7 Preserving water supplies

Water shortages affect crops, livestock and people. Town-dwellers rely on large-scale water infrastructure. In the countryside, communities may have access to a variety of sources: rivers, ponds, wells and small dams. The extent of access depends on distance, ownership of the water resource, and the cost and technical difficulty of collecting or extracting water.

During a drought, rural communities rely on local water sources, or move out of the area altogether. In some emergencies, governments and aid agencies may use tankers, but these are a costly, short-term response to the problem and are unlikely to reach the most remote communities.

There are two main options for improving water supplies. The first is to improve access to underground water sources, for instance by deepening wells or digging new boreholes. Such measures may be beyond the financial resources of many poor communities. If the water is fed into irrigation schemes, then the cost of installing and maintaining irrigation pipes and channels must be added, although in many locations these may be able to connect to traditional irrigation networks.

The second method is 'rainwater harvesting'. There are many different ways of harvesting rainwater for agricultural and domestic use. They include:

- building water-storing dams and percolation dams (dams that slow the rate of rainwater run-off and so increase absorption into the soil, thereby recharging local groundwater);
- building community or domestic storage tanks;
- lining ponds with plastic to improve water retention; and
- putting up stone or earth bunds to improve absorption and reduce soil loss (brushwood and strips of grass or other plants can also be used).

Many of these methods are traditional, and hence the knowledge and skills needed to build and maintain them are present in the community. In other cases, the relevant technical expertise is easily acquired (see Case Study 10.6, page 160).¹²

Most rainwater harvesting methods are cheap compared to digging wells and pumping water from more remote sources. Communities can provide labour and in some cases building materials – bunds and some dams use just stones and earth. Many readily available materials can be used to catch, channel and store rainwater. A recent inventory of materials employed in Sri Lanka for

domestic rainwater harvesting listed tin sheets, palm leaves, plastic sheets, the stems of plants such as bananas and bamboos, tree trunks and rock cavities, as well as more conventional gutter pipes and tanks.¹³ Nevertheless, the cost to poor people is not always small (see Case Study 10.3, page 152). Even where freely available materials are used and labour is voluntary, the task of constructing larger-scale structures such as tanks and dams is substantial. Collective action is needed in such cases.

Rainwater harvesting can be highly effective. India, where there has been a considerable revival of traditional methods in the past decade, appears to have had considerable success. The expansion of rainwater harvesting there was assisted by the existence of centuries-old traditions and techniques, coupled with technical support and vigorous advocacy from Indian NGOs. It was further stimulated by prolonged drought. Case Study 15.4 illustrates the potential of rainwater harvesting, and the challenges to implementing successful schemes.

The choice of approach to water provision varies according to location, and may vary over even a small area according to such factors as the topography, the level of dependence on irrigation compared to rainfall, and the moisture-retaining capacity of different soils.

In some cases, the problem may be one of access to water, not its physical availability. Equitable water distribution is the goal. Communities in drought-prone areas often have sophisticated systems for this. Local management structures should be reinforced where necessary.

15.3.8 Preserving livestock

In many remote areas, poor people's livelihoods depend on livestock. This is most obviously true in the case of nomadic pastoralists. However, farmers may also rely heavily on livestock if they work arid or hilly land that does not support intensive crop farming. Livestock are a valuable asset, providing food, income and agricultural inputs (manure, pulling ploughs and carts). Herds grow as new animals are born. They can be moved easily and looked after by children.

Some livestock, such as goats and camels, are good at withstanding water shortages. A one-year drought may have little effect on the size of a herd since the animals can be moved. But when the drought is prolonged, poor people are often forced to sell animals to raise money for food (usually, breeding animals are kept and others sold). If this happens on any scale, it drives livestock prices down, generally at the same time as grain prices are

Case Study 15.4**Rainwater harvesting in Kenya**

A severe famine in 1979–80 in Turkana District in north-west Kenya led to a number of long-term development initiatives. Several agencies became interested in rainwater harvesting as a way of supporting the Turkana people, who, though essentially pastoralists, had traditionally grown crops, principally sorghum, during the wet season.

Many of the early schemes did not work well, for both technical and operational reasons, and in 1985 a group of NGOs began collaborating on a project in Lokitaung Division to test alternative approaches, based on simple construction and surveying technologies.

Local people were soon able to survey sites, and design and build water-retaining bunds of earth without assistance, but it took time to overcome other technical challenges. For example, although many rainwater harvesting methods were known, there was no consensus about the most appropriate techniques in particular geographical and socio-economic contexts. It was difficult to build structures that would hold enough water to flood a garden site in a year of poor rains, but that would also not be swept away by the pressure of

floodwater when rains were heavy.

Digging water-retaining earthworks is time-consuming and labour-intensive. The project promoted the use of animals (especially donkeys and oxen) to help move earth, but had to develop suitable scoops and harnesses, and overcome resistance from herders who refused to let their own animals be used. Later, less labour-intensive methods such as stone lines and grass strips were introduced.

At the same time, understanding of the role of the sorghum gardens deepened. It was realised that, although rainwater harvesting could improve sorghum yields in some years, it could not provide the whole livelihood for any group of local people, even if they wished to give up their nomadic way of life. Improved gardens were now viewed not as a means of support for people made destitute by the earlier famine, but as a means of complementing existing pastoral livelihoods.

The project was handed over to local management in 1988, and a sister project in Kakuma Division was set up in 1989. The two projects support garden improvement through provision of local technicians

(continued)

Case Study 15.4 (continued)

(fundis) to design structures, the sale or loan of tools, seed and grain storage facilities, and technical assistance for repairs.

In 1997, an evaluation of the Lokitaung and Kakuma initiatives observed that more than 2,000 people were involved in rainwater harvesting in the two projects, with 340 gardens covering 170 acres. There was a gradual increase in the number of gardens in most locations, even though food-for-work had long since ceased to be available for labour on construction. In years of medium and poor rainfall, the improved gardens increased sorghum yields by up to four times more than traditional plots. The reliability of crops was also much greater.

Most of the work on the gardens was carried out by women, but they had relatively tight control over the use of the harvest. The sorghum grown was used mostly to boost household food supplies, to buy goats and as an investment in social networks (i.e. through giving or lending to other members of the community).

A. Cullis and A. Pacey, *A Development Dialogue: Rainwater Harvesting in Turkana* (London: IT Publications, 1992); C. Watson and B. Ndung'u, 'Rainwater Harvesting in Turkana: An Evaluation of Impact and Sustainability', unpublished report (Nairobi: Intermediate Technology Development Group Kenya, 1997).

rising with scarcity. This can result in the severe depletion of herds, from which it may take many years to recover.

Agency interventions to protect livestock-dependent communities during drought crises are generally of the following main kinds:¹⁴

- Increasing grain and fodder supplies to the area (the former to help keep grain prices down, the latter to keep animals fed).
- Removing surplus animals (e.g. by buying, slaughtering and processing them).
- Giving broader support to communities' livelihoods, so that they do not have to sell their breeding animals.
- Where herds are severely depleted and their owners destitute, restocking with new animals.

Case Study 15.5

Pastoralists' coping strategies

The Gabra are a pastoralist tribe herding camels and goats over arid lands in northern Kenya and southern Ethiopia. Their economy depends on animal products. Like many other pastoral groups in the region, the Gabra were badly hit by drought and animal disease in 1991. Many animals died.

Owing to the severity of the crisis, community meetings were held to agree collective coping strategies. Rich families agreed to give goats to the poorest and to send them milk daily; meat from slaughtered camels was also distributed periodically. Traditional reciprocal relationships with another pastoral group, the

Borana, were invoked because of the emergency: the Borana were asked to give cattle.

In some cases, rich relatives and friends from other districts loaned animals to replace those lost to disease, until the herd could be built up again. In other cases, herders travelled far to meet relatives and friends and offer services in exchange for animals. Some children were sent to live with distant relations who were less badly hit.

B. J. Linquist, 'Caring for the Poor, Gabra-style: Indigenous Relief and Development Strategies', *Appropriate Technology*, vol. 21, no. 4, 1995, pp. 6–8.

Most of these interventions are closer to the emergency response end of the disaster management spectrum than to disaster preparedness. Long-term livelihood support is needed to give greater security.

Pastoralists in particular have long-established methods of coping with drought, based largely on moving animals to other areas and partly on live-stock sales (see Case Study 15.5). But with traditional grazing lands increasingly under threat from privatisation for ranching or other forms of development, coupled with conflict in African countries in particular, it is becoming harder for them to put these coping strategies into practice.

Where communities are heavily dependent on livestock that cannot easily be herded elsewhere (e.g. dairy cows), collective schemes might be established to maintain fodder supplies during droughts through bulk purchase and

Case Study 15.6

Supplying food to remote villages

In the dry rural district of Banaskantha in Gujarat, SEWA and the Disaster Mitigation Institute (DMI) set up a programme in 1993 to purchase basic foods wholesale in local markets. The food was given to the poorest members of SEWA's local groups, who paid for it then or later out of the money they earned from their involvement in other income-generating activities supported by SEWA.

The scheme, known as Shakti Packet, was targeted at remote villages where government distribution systems were absent or ineffective. One of its aims was to reduce women's indebtedness to shopkeepers. Another was to give them greater choice of foods. SEWA's local women's groups chose the products to be purchased. These included millet, rice, pulses, sugar, edible oil, spices, tea, salt, sugar and green vegetables, as well as non-food items such as soap and even contraceptives.

Early results from five villages where the Shakti Packet scheme was piloted showed that it was reducing women's indebtedness and allowing children to eat green vegetables more regularly. The initiative was seen as complementary to SEWA's wider development programme for poor women in the district, which included savings groups, dairy cooperatives and other income-generating activities. Challenges to expanding the scheme were the rising price of food in the markets, limited working capital at village level, and difficulties in linking it with the government's public distribution system.

M. R. Bhatt, 'Shakti Packet: Increasing Food Security and Nutrition of Rural Women', paper presented to the conference 'Gender Approaches to Health in Emergency Situations', San Marino, 8–9 December 1995.

community-managed plantations. This has worked effectively in parts of India, but is likely to need strong institutional support.¹⁵

15.3.9 Food aid

Food aid is generally regarded as a matter for governments and international agencies, because only they have the capacity to purchase and distribute

large volumes. It is possible to set up more local schemes, as Case Study 15.6 shows, but the challenges are considerable.

15.3.10 Nutrition

Being able to monitor and combat malnutrition is an important component of all food security work, including early warning. Assessment of nutritional deficiencies requires specialist expertise and is beyond the scope of this book, but several major agencies have produced technical guidelines for the management of nutrition in crises.¹⁶

Advances in nutritional assessment methods have increased agencies' ability to monitor and manage crises as they enter the acute stage. Since the early 1990s, nutritionists have widened the focus of their work from malnourished individuals to larger populations, and from a narrow set of technical interventions to combat malnutrition to a broader range of strategies, policies and programmes that take account of related causal factors, such as water, sanitation, health and social care.

Multi-sectoral approaches are ideal in theory, but their complexity causes problems. In practice, nutrition initiatives often have to make the difficult choice between concentrating their resources on the direct alleviation of malnutrition – usually through feeding programmes – or addressing some of its underlying causes.

15.3.11 Protecting livelihoods

Where support to livelihoods is concerned, many of the steps that organisations will need to take in drought-prone communities can be regarded as general development interventions just as much as disaster mitigation.

A broad range of interventions will be needed to stimulate local economies so that poor people are no longer so dependent on agriculture for their food and income. Economic diversification is the key to success, through on- and off-farm enterprises. Where a family's income relies on a range of different economic activities, there is a greater degree of protection against the failure of any one of them (e.g. harvest failure due to drought).

Diversifying agricultural production is part of this. Many food security projects encourage farmers to grow a wider range of crops, establish kitchen gardens and orchards, keep poultry or set up fish ponds. This has the twin objectives of improving food supplies and generating produce that can be sold. Technical

assistance, if needed, must be supplemented by training in business skills, marketing and organising production to meet market demands.

Many drought mitigation projects, in Africa particularly, support household gardens in addition to farms. Gardens are typically used to grow vegetables that will give a more varied diet and can be sold. In many communities they are managed by women, who thereby gain more control over household food supplies and income.

Another common approach to enhancing livelihoods is by processing agricultural products – for example grain milling, oil processing, making jam and peanut butter, or fruit and vegetable drying. Processing preserves crops, and often adds value.

Off-farm employment may be regarded as more secure against drought than agriculture, but this impression can be misleading. Local industries that depend on water or agricultural products are also vulnerable: for instance, a grain mill stops working when there is no more grain to mill. In such cases, the impact of the drought may be delayed until some time after crops have failed, but this is only a delay. It is therefore common for people to migrate well away from their communities in search of work during a drought. In western India, for example, village men head for brickworks and building sites in the cities during prolonged droughts. The collapse of the agricultural economy also affects rural people's purchasing power, and so has a knock-on effect on shopkeepers and traders supplying goods.

Plans for local economic diversification must take hazards into account and, where possible, find productive activities that are unlikely to be directly affected. Artisanal crafts may be suitable, as the supply of raw materials may not be hit by a drought or other hazard and the markets may be some distance from the affected area. Creating alternative enterprises is a complex task, and likely to require support in technical and business skills, credit and market access. Specialist assistance should be sought to carry out such work.

The degree of complexity involved is illustrated by one aspect of economic diversification: the need for well-functioning local markets. These make it easier for vulnerable people to buy and sell at times of need and, by distributing efficiently and moderating shortages, help to keep down the prices of essential items such as food. Development and disaster planners will probably need to act in several ways to strengthen local markets and improve poor producers' access to them, by improving local transport infrastructure, helping to disseminate information about prices, lobbying against damaging

Case Study 15.7

From food security to community empowerment

The Kebkabiya district in Darfur, western Sudan, was badly affected by the drought and famine of 1984–85. In 1985, Oxfam began a post-disaster initiative to improve food security. In the first phase of the project, 12 community seed banks were established to serve a community of 30,000. The second phase, which began in 1989, introduced other measures to improve food production: animal health care, the use of animals for ploughing, pest control, soil and water conservation and community development.

The project embodied community participation from the beginning, but its nature changed over the years. In the first phase, the seed banks were managed by local committees, almost exclusively male, nominated by existing village authorities. There was, however, extensive consultation with communities in planning and establishing the seed bank scheme. As the seed bank committees gained in confidence, they took more decisions on their own, and when the second phase of work was prepared in 1989 there was no need for Oxfam to be involved in day-to-day management. The committees also began taking on extra tasks, such as organising training for farmers and supervising revolving funds for buying seeds.

For the second phase, new structures were needed to manage this wider range of activities. These were far more democratic, with each village in a group of 5–12 electing one man and one woman to represent it on a Village Centre Committee. In turn, each of the 16 Village Centre Committees elected one man and one woman to represent it on the Project Management Committee which oversaw the whole project. In 1990, the Project Management Committee registered as a separate NGO, the Kebkabiya Smallholders' Charitable Society, to take over the project from Oxfam. This is a membership organisation, with each household paying a small fee. Members elect representative committees at different levels.

The project was always staffed almost entirely by Sudanese, but a handover to the communities had been envisaged from the beginning. The approach was gradual, transferring authority over several years, and Oxfam continued to provide technical back-up when required.

P. Strachan and C. Peters, *Empowering Communities: A Casebook from West Sudan* (Oxford: Oxfam, 1997).

market restrictions, promoting more efficient methods of storing, preserving and transporting perishable goods such as food products, supporting small-scale decentralised processing facilities (e.g. grain milling), and providing credit and training in small enterprise management.¹⁷

While communities with high incomes generally suffer less from malnutrition, the link between wealth and nutrition is not clear-cut: there can be considerable differences within communities and households. Other factors play an important role. For example, the level of education among women has a great influence on dietary, hygiene and health practices. The benefits of increased income also depend on who earns and controls the money.

Maintaining natural resources such as forests, grazing land and sources of water is important to food security, especially where these are held in common. More intensive use of common property – for grazing, collecting wild food and roots, or fishing – is an important coping strategy when there is a drought. Preserving these resources against encroachment by private interests or their destruction by alternative forms of commercial or state-sponsored development, such as farming, logging and the construction of dams, is usually difficult. Local voices are unlikely to be heard unless their campaigns are supported by organisations with resources and lobbying skills.

Reforestation to mitigate drought or other hazards presents significant challenges. Communities need to be convinced of the need for it, and must have strong incentives for investing in trees that may not produce anything of economic value for many years. Expertise in forest management is essential, and should be brought in from outside where necessary. There are many anecdotal accounts of tree-planting initiatives as part of disaster mitigation programmes (protecting land erosion or providing wood for disaster-resistant housing) that failed because project managers lacked experience of this kind of work.

15.4 Monitoring and warning systems

There are now many kinds of system warning of food shortage. The first major one was the FAO's Global Information and Early Warning System (GIEWS), developed after the Sahel famines of the early 1970s to monitor food production and supplies at national level and assess emergency food needs in areas facing critical shortages. The African famines of the mid-1980s showed the need for improved warning systems, and several more were established in the Sahel and the Horn of Africa between 1985 and 1990. These usually combined hazard/meteorological monitoring (see Box 15.1) and assessments of food production levels after the harvest season.

Box 15.1**Drought monitoring**

Drought monitoring systems look at two main indicators: rainfall and vegetation. The former is monitored by extensive networks of rain gauges, the latter mostly through remote sensing by satellites. In both cases, large amounts of high-quality data can be generated. These can be supplemented by other meteorological information (such as rainfall forecasts) and hydrological data (such as monitoring of groundwater supplies and the level of water tables).

Although rain gauges are relatively simple technologically, and collecting data often depends on local staff or volunteers, rainfall monitoring needs to take place on a large scale if it is to be of value in assessing overall needs and particular priorities. Management of such systems is generally taken on by government meteorological services, and feeds into the well-established and effective national and international meteorological information systems. Moreover, there is growing use of rain gauges that transmit data

automatically to distant monitoring stations, using radio signals or other electronic means of communication (this is called telemetry). In the case of remote sensing of vegetation, which is the only really effective way of compiling information covering a wide area, the cost of procuring and analysing satellite data is so high that this task too is generally left to international and government services.

Monitoring of rainfall and vegetation does not indicate how much food people have, or need. Remote sensing does not distinguish between different kinds of vegetation, so does not show how well crops are growing. Since different food crops vary in their levels of tolerance to drought, rainfall monitoring is of limited value as an indicator of the availability of food. It is for this reason that food security or famine information and warning systems have become an increasingly important tool for disaster managers during the past 20 years.

Because they operate on national and regional scales, such systems are best managed by governments and international organisations. They are also geared to large-scale disasters requiring international aid.

However, local early-warning systems have an important role to play, and many have been established since the mid-1980s, often by NGOs. Many researchers and practitioners consider them to be particularly successful in monitoring impending food crises. They tend to draw on a wider range of indicators of food and livelihood insecurity than the larger systems. They also rely far more on qualitative data, and involve higher levels of community participation. They are better able to take account of local variations in food security, and are more sensitive to local coping strategies and vulnerability. They can recommend appropriate interventions to local decision-makers, who will have a better understanding of conditions on the ground and a greater sense of urgency in responding to problems. They are easier to manage than large-scale, centralised systems, but they tend to suffer from a lack of skilled personnel (see below) and are open to manipulation by powerful local interests.

Systems of all kinds have shifted their emphasis from the simple availability of food to considering which groups do not have access to food: this takes them logically into vulnerability and livelihoods analysis. As a result of these developments, the targeting of food aid has improved considerably.

The effectiveness of early-warning systems varies in practice. There are four main reasons for this:

1. The nature of the system itself and the information provided – the range of indicators used, accuracy of the data, the timeliness of warnings.
2. The institutional context within which the system is located, and institutional links to decision-makers.
3. The broader political environment. Decisions about when and how to intervene are political, and therefore influenced by many other factors.
4. Logistical obstacles to launching a timely and adequate response.

Most analysis of systems concentrates on the first and fourth of these factors, but research into responses to the African droughts of 1990–93 has shown that reasons 2 and 3 are most important in explaining if early-warning information is used, and variations in performance between different warning systems. Early-warning systems did sound the alarm about impending food crises, but the response systems failed to act early enough.¹⁸ Conventional systems are also much less effective in conflict-induced famine.

Early-warning systems take many forms in their institutional set-up and location, the resources available to run them, and the information that they collect and process. However, all are designed to stimulate *action* by

informing decision-makers about food security conditions and people's needs. As information systems, their functioning is theoretically straightforward (see Figure 15.1), but in practice there are many obstacles.

An efficient, effective early-warning system for drought-related famine should have the following three characteristics:¹⁹

1. It should be capable not only of warning of large-scale famine, but also should be sensitive to changes in food-security status before famine threatens, and able to detect localised pockets of acute food stress.
2. It should generate a response that provides assistance early in the 'famine spiral', before families and communities are reduced to destitution.
3. It should stimulate interventions that protect livelihoods before lives are threatened. This implies providing a wider range of relief than food aid, as well as a more developmental approach.

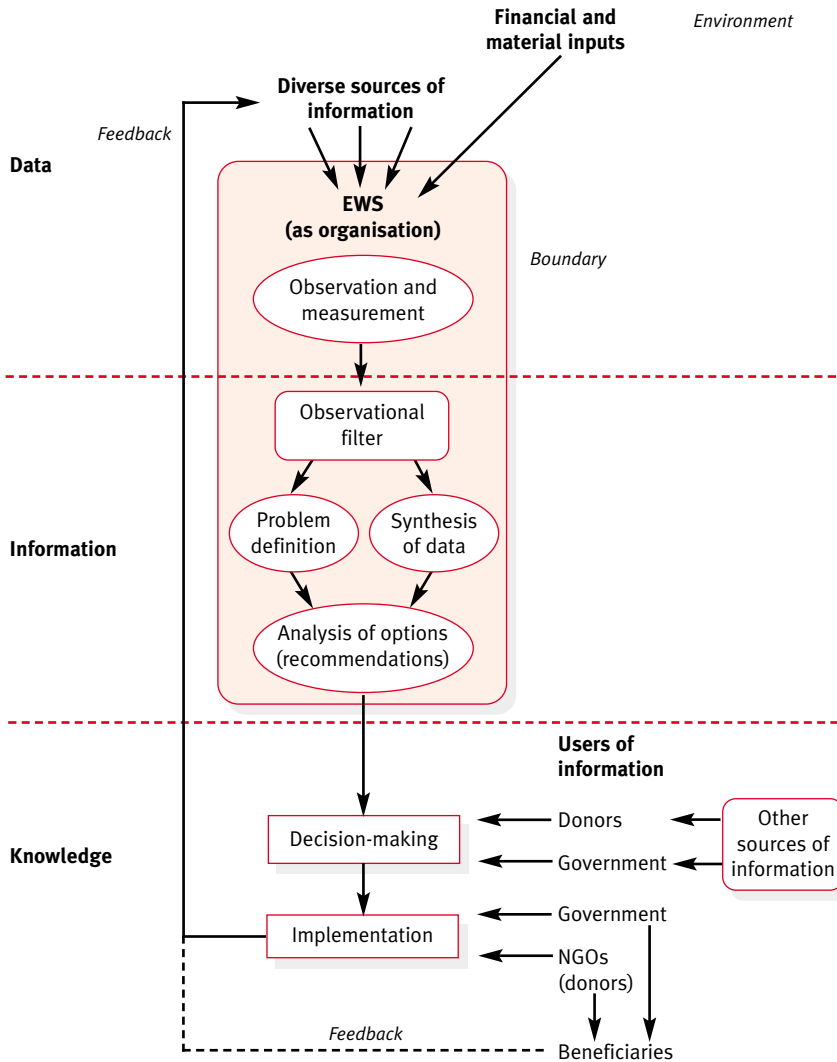
The rest of this section focuses on two aspects of warning systems for food insecurity and famine: the selection and collection of indicators, and the management of local-level systems. The discussion is necessarily brief, as this is a complex technical subject on which a great deal has been written elsewhere.²⁰

15.4.1 Data and indicators

Under the influence of Sen's 'entitlement' theory, food security information and famine early-warning systems have increasingly incorporated a wider range of indicators of the availability of food and the ability to procure it. This includes data on the market price of food and other essential goods, family and community behaviour (the adoption of particular coping strategies) and the availability of employment opportunities in the area, as well as more conventional data on rainfall and levels of groundwater, crop production (surveys before and after the harvest), nutritional status and food supplies.

However, many early-warning systems still have too narrow a focus. They rely largely on indicators of food production and supply, instead of indicators of access to food. These are easier to collect and are often believed to be more accurate, though this may not be true in many cases. Socio-economic indicators, which tend to be harder to collect and draw more on qualitative data, are less influential in overall decision-making. They are more likely to be used in identifying those most in need of food aid. Coping strategies, which are difficult to monitor and interpret accurately, are rarely incorporated systemat-

Figure 15.1
An early-warning system as information system



M. Buchanan-Smith and S. Davies, *Famine Early Warning and Response – The Missing Link* (London: IT Publications, 1995), p. 14.

ically into early-warning systems. Officials are more likely to be impressed by conventional quantitative monitoring than community-based systems and local knowledge.

Multi-indicator systems are sensitive to the complexity of famine processes, and are therefore more likely to detect worsening food security early enough for agencies to intervene to protect livelihood assets and prevent starvation. However, information does not speak for itself. Data have to be interpreted. Options for intervention must be assessed. This presents many challenges where multiple sources of information are used.

The different types of data are not easily compared. For example, how does one weigh up the relative significance of data on grain prices in local markets compared to levels of rainfall or farm crop production, or sales of livelihood assets? To add to the problem, most systems depend to some extent on proxy indicators of food stress (e.g. the timing and extent of adoption of particular coping strategies).

Different methods are needed to collect different kinds of information, each requiring its own skills. Formal measuring systems can be used for some aspects of food security, such as crop production and food prices, that are quantifiable. Monitoring of nutritional status has its own methods. Assessing wider household food security status requires expertise in interviewing and participatory appraisal. These skills can be learnt and transferred, but this takes time, and specialist assistance will be needed as it is unlikely that any one local organisation or project team will have all of the relevant expertise in-house. Rapid staff turnover often prevents skills from becoming fixed within an organisation.

Some relevant information may have been collected by other people and for other purposes (e.g. a Ministry of Agriculture will collect agricultural production data). It will have to be obtained from those users. This may not be easy, especially in countries with very bureaucratic administrations. Information from other sources may have been collected or aggregated on a different basis from that of the local monitoring system. For example, government data sets may gather information at village or even district level, rather than household level. Government officials prefer to use administrative areas as their units of analysis, and may not take account of geographical or social differentiation within an administrative area. Disaggregation of data by age, sex or occupation is likely to vary between different data sets, as will the timing and frequency of data collection.

Over-emphasis on data collection is a common failing. Information is often gathered for its own sake, without sufficient thought being given to what field agencies need to know. Local-level systems in particular are likely to find themselves unable to process all the information they collect. This can be a particular problem for those that use a wide range of data sources and indicators. There are several instances of projects having to scale down their data-gathering operations, or bring them more into line with operational needs.

At the end of this process, information has to be packaged in a way that is intelligible to decision-makers and that helps to guide them towards appropriate action. This link to action must be kept firmly in mind when planning and running early-warning systems. The system may have to supply information to a wide variety of users, ranging from government policy-makers to field managers. Each group may want different kinds of data, which may have to be presented in different ways.

Case Study 15.8 illustrates one agency's approach to collecting and analysing food security information.

15.4.2 Maintaining local systems

Food security information systems are complex and difficult to manage. They can also be costly because of the considerable staff time required in collecting and interpreting data. This is true even with participatory data-gathering methods that involve community members, because the information still has to be drawn together from different sources, analysed and then packaged for decision-makers and field workers. As data often have to be gathered from communities dispersed over a wide geographical area, transport and subsistence costs can also be high.

Owing to these factors, the sustainability of warning systems is a major challenge. Systems need to be maintained continuously to give reliable data of patterns of food supply and demand over time. A secure funding stream is therefore needed. Lack of resources has damaged a number of government and NGO-run warning systems. The project-based approach that NGOs are generally obliged to adopt is an insecure foundation for such work because of its fixed time spans and the difficulty of obtaining repeat funding from donor agencies.

Both national and local warning systems must be integrated into the institutions that manage them. Many systems are purpose-built and tend to stand alone. Those who set up early-warning systems should plan their external linkages as carefully as their internal mechanisms. Local-level systems often

Case Study 15.8**Monitoring household food security**

In the early 1990s, Save the Children Fund (UK) adopted a ‘food economy’ approach to analysing household food security. Food economy is defined as the sum of ways families obtain food. The food economy approach is most commonly used to estimate food aid needs, but it can also be used to inform other kinds of intervention to support food production or livelihoods.

Central to this approach is understanding rural households’ everyday circumstances. Knowing how people normally obtain food is an essential part of predicting how they will react in a crisis, be it a major disaster or a seasonal food shortage. Building up a ‘normal year’ or baseline picture helps determine key indicators of food security that can then be monitored. Baseline pictures contain information on how households normally obtain food and cash income, their connections with the market and social or kinship networks, their assets (land, food stocks, livestock, cash, goods, tools) and their expenditure patterns. Data collection is mostly based on fieldwork using RRA or PRA techniques and, particularly, semi-structured interviews with community members, individually and in groups.

The next steps are to identify potential problems – changes in agricultural, economic or security conditions – that could affect access to food, and to develop scenarios showing what the impact of such changes would be. For example, the impact of reduced crop production, milk yields, and income from livestock sales or wage labour can be translated into an estimate of the likely impact on food availability. Similarly, the potential role of various coping strategies can be estimated. A computer software program, RiskMap, has been developed for this scenario analysis, which can be complex, although for smaller data sets it can be done using a spreadsheet or even manually.

Data sets are grouped geographically into ‘food economy zones’: areas in which the same food and cash income options are available and relied upon to varying degrees by families with different levels of wealth. This makes it possible to identify particular groups in need, but data collected on the basis of food economy zones are often incompatible with other data sets gathered on the basis of administrative districts.

Owing to the methods used, much of the information collected in the field

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Case Study 15.8 (continued)

is, inevitably, quantitatively imprecise. However, data analysis is designed to point out inconsistencies in data and ensure that the overall picture adds up. Field information of one kind is checked against other kinds and compared to secondary sources. Analysis takes place in the field, so that contradictions or odd findings can be dealt with on the spot.

A major problem with this approach is the need for skilled staff and ongoing training. Well-educated and committed field staff are not always easy to find, and turnover can be considerable.

Another problem is over-reliance on standard reporting formats and guidelines, leading to standardisation of the information-gathering process and hence to poor results. Field staff need to be sensitive to local circumstances and interviewees'

needs, and ready to adapt their data-collection techniques accordingly. However, there is an ongoing tension between this need for flexibility, and the need for consistent data.

The food economy approach has been used widely by Save the Children Fund (UK) in Africa and Asia, and both it and the RiskMap programme have undergone considerable development during the past ten years. A manual has been produced and field training courses are held.

T. Boudreau, *The Food Economy Approach: A Framework for Understanding Rural Livelihoods* (London: Humanitarian Practice Network, Network Paper 26, 1998); J. Seaman, 'Making Exchange Entitlements Operational: The Food Economy Approach to Famine Prediction and the RiskMap Computer Program', *Disasters*, vol. 24, no. 2, 2000, pp. 133–52.

feed into national-level ones. But unless decentralised data are available for all the areas at risk, this can distort decision-making by giving undue prominence to particular districts.

Other problems include the lack of integration between different agencies' early-warning systems, which hinders collective analysis and action. Failure to standardise data across systems is a major issue. Agencies fail to learn lessons from each other's experiences, and even from their own similar programmes elsewhere.

Case Study 15.9**Sustaining food security information systems**

In 1987, Save the Children (UK) established a local food security monitoring programme, *Suivi Alimentaire du Delta Seno (SADS)*, in Mopti, Mali, in collaboration with Oxfam (UK) and the International Union for Conservation of Nature.

The system was designed to monitor local food entitlements. Data were collected using PRA methods. This included information on agricultural production, fish production, livestock conditions, levels of on-farm stocks, off-farm employment, household consumption and migration. Food prices were also monitored, together with the marketing strategies of producers and traders. Secondary data sets containing statistical information were incorporated: these covered rainfall and flood levels and national and regional food production estimates. Several one-off surveys were carried out to improve knowledge of particular subjects, such as the use of wild foods. The system developed indicators of the food security of different groups at different times of year.

The system's focus on coping strategies greatly improved understanding of the complexity of local food strategies, and challenged

the misconception that food supply alone determines the state of food security. But coping strategies were difficult to monitor because households change their strategies frequently, and good baseline information was needed.

SADS produced quarterly food security assessments for local, national and regional decision-makers in government and international agencies. It also intervened to support livelihood strategies, principally through a credit scheme introduced in 1991 that made loans for productive activities such as the purchase of seeds or fishing equipment, to establish cereal banks and for economic diversification.

The sustainability of the information system and its institutional linkages were not considered in depth at the start of the project because the main aim was to explore the nature of vulnerability. It was difficult for an NGO to maintain such a system, owing to the cost of field staff and data collection, and the need to train people to gather and analyse information. The information SADS produced was timely in alerting decision-makers to pockets of food insecurity that had sometimes been

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Case Study 15.9 (continued)

overlooked by national systems, but its influence on decision-making was limited, largely for institutional reasons: it did not have direct links with government.

For these and other reasons, the information system was closed down in 1993. It was felt that it would be more appropriate to establish such a

scheme within local or regional government structures; there was already a national early-warning system in Mali.

R. J. Lambert, 'Monitoring Food Security and Coping Strategies: Lessons from Information Collection and Analysis in Mopti, Mali', *Disasters*, vol. 18, no. 4, 1994, pp. 332–43.

15.5 Chapter summary

- There is a close link between environmental degradation and increased risk from natural hazards. Environmental protection and renewal is feasible, but may challenge vested interests.
- Industrial and domestic waste can present a serious threat to public health, whose impact may not be felt until some time in the future.
- Significant reductions in pollution and improvements in waste management require the involvement of the state, but partnerships between government and other actors are desirable.
- Global warming threatens to undermine society's resilience to environmental stress. The best ways of coping with the resulting increase in disaster risk are still unclear.
- Natural hazards such as drought are only one factor in food crises and famines. Political, social and economic factors can be influential.
- Food security is not merely a question of food availability. People do not have equal access to food because of differences in the resources they possess and other economic, social and political factors.
- There are many ways of overcoming food insecurity by improving people's ability to obtain food. Such initiatives can be undertaken locally.
- The most effective way to protect communities against drought-induced food insecurity and famine is to strengthen existing coping and livelihood strategies well in advance. Yet most external interventions are still in response to drought and crisis.

- The ideal approach is an integrated one that uses a range of methods to tackle different aspects of food and related livelihood insecurity. This is likely to include methods of protecting and increasing food production, better preservation of food crops, water conservation, preserving livestock and broader livelihood support.
- Local food insecurity/famine early-warning systems are valuable, especially where they are based on a wide range of indicators and community participation.
- Early-warning systems of all kinds need to stimulate appropriate action early enough to prevent destitution and starvation. In practice, they may fail to do so because of obstacles in the institutional and political environments in which they operate.
- The selection of food insecurity indicators and analysis of data need to be planned and managed carefully to ensure the collection of appropriate types and amounts of information.
- Food security information and early-warning systems are often costly, complex and difficult to manage. Sustaining such systems can be a major challenge.
- More harmonisation and integration of systems is needed.

Notes

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