

Flood disasters

Learning from previous relief and recovery operations

January 2008

This briefing paper provides a synthesis of and introduction to key lessons from evaluations¹ of relief and recovery/humanitarian response to flooding in the last 20 years from Africa, Asia and the Americas. The paper is intended for people working in relief and recovery operations for floods – those who have to decide if, when and how to intervene. Selected reading references are mentioned after each of the issues discussed and a listing of key resources and a bibliography of the evaluations used are included at the end of the paper.

The paper covers lessons for the following key topics which may be relevant in various ways and at different times for flood preparedness, relief and recovery:

-
- Lesson 1 – Flood risk reduction (p. 2)*
 - Lesson 2 – Building ownership and engaging with local capacity (p. 5)*
 - Lesson 3 – Needs assessment (p. 5)*
 - Lesson 4 – Targeting and monitoring (p. 7)*
 - Lesson 5 – Livelihoods recovery (p. 7)*
 - Lesson 6 – Local economy and market (p. 9)*
 - Lesson 7 – Water, sanitation and health (p. 9)*
 - Lesson 8 – Shelter and housing (p. 11)*
 - Lesson 9 – Managing nationwide response and coordination (p. 12)*
-

In this paper the term ‘flood(s)’ is used to refer to flood as a hazard or phenomenon. ‘Flooding’ refers to the disastrous impact of the flood. Many of the lessons presented in the paper can reasonably be applied to hazards in general, however others are flood-specific.

While the paper focuses on relief and recovery, it starts with risk reduction and lessons for incorporating flood prevention and preparedness activities to avoid ‘vicious spirals’ in disaster risk and development failure (DFID, 2005).



Adapted from von Kotze and Holloway, 1996.

INTRODUCTION

Normal floods are expected and generally welcomed in many parts of the world as they provide rich soil, water and a means of transport, but flooding at an unexpected scale (damaging flood) and with excessive frequency causes damage to life, livelihoods and the environment. Over the past decades, the pattern of floods across all continents has been changing, becoming more frequent, intense and unpredictable for local communities, particularly as issues of development and poverty have led more people to live in areas vulnerable to flooding. The *Fourth Assessment Report* (2007) of the Intergovernmental Panel on Climate Change (IPCC) predicts that ‘heavy precipitation events, which are very likely to increase in frequency, will augment flood risk’. These floods will affect life and livelihoods in human settlements in all

¹ Almost all of the evaluation reports used in this study are from publicly available, donor-funded riverine flood response operations. Lessons are, therefore, limited to large-scale flooding that generated international response. Very limited lesson-learning documents are available on small-scale floods (which occur on a regular basis producing localised impact), flash floods and urban flooding. Limited literature is also available for government response.

areas, e.g., coastal zones, river deltas and mountains. Flooding is also increasing in urban areas, causing severe problems for poor people.

Floods by nature are complex events caused by a range of human vulnerabilities, inappropriate development planning and climate variability. Floods can be predicted to a reasonable extent, with the exception of flash floods, whose scale and nature are often less certain (ADPC, 2005).

Box 1. Types of floods

Type	Duration	Characteristic impacts
Predictable, regular flooding	Up to 3 months	Blocks access. Damage and displacement of population often relatively low depending on levels of protection.
Increased size of regular flooding	Up to 6 months	Blocks access to many areas. Greater potential for infrastructure damage, livelihoods impacts, and large displacement of population.
Flash flooding	A few days to weeks	Rapid cresting often with little warning. High velocity flood flows can destroy infrastructure. Population displacement often localized.
Urban flooding	A few days to weeks	Can be rapid-onset, often coming from flash floods in urban rivers or from saturation or blockage of urban drainage systems. Potential for infrastructure damage affecting larger service area. Population displacement often localized.
Coastal flooding	A few days	Often combined with wind damage from storms. Damage and displacement along coastline with extent depending on storm size.
Slow-onset from sustained rainfalls	3-6 months	Blocks access. Depending on season, damage to crops may be significant. Population displacement limited and may be dependent on food security.

Adapted from McCluskey, 2001

The magnitude of disaster is not determined by floodwater alone but also by the pattern of vulnerability in which people live. The lives and livelihoods of many poor people are hardest hit by floods. These people, often already vulnerable to other disasters and stresses such as HIV/AIDS, drought, food insecurity, cyclones and ongoing conflict, are forced to live in hazardous places, building their homes and growing their food on floodplains.

Many impacts of floods are similar to those of other disasters although their magnitude, nature and scale may vary and these impacts may be caused in different ways. The impacts of floods on lives and livelihoods and the way agencies have addressed them are similar in most parts of the world. The effectiveness of agency interventions has, however, always been conditioned by factors specific to the context and circumstances. In this paper, care has been taken to synthesise the lessons that are relevant in a variety of contexts. Readers are advised to judge them carefully in relation to their context before applying them.

LESSON 1 – FLOOD RISK REDUCTION

Over the last few decades, there have been many experiments in flood risk management, readiness for response and community preparedness, particularly in South and South-east Asian countries. But they produced effective results only when they were employed in an integrated manner and included vulnerability reduction as an additional but key element. Lessons suggest that structural and non-structural measures for flood risk reduction should be integral parts of both the overall development process and relief and recovery activities in response to floods or other disaster events that occur along the way.

Structural measures for flood control

Structural measures like embankments can provide protection against many types of flooding. Flood control alone, however, often does not provide a robust, long-term solution for addressing flood risk. Such efforts at flood control in both urban and rural contexts have produced limited solutions, sometimes even exacerbating flooding problems, when applied in isolation from overall policy in the floodplains (ADPC, 2005). However, such structures may offer solutions to critical aspects of the flooding problem if they are used in conjunction with other non-structural measures, are planned and implemented with the participation of local people and with an understanding of possible negative consequences, and are integrated in the overall developmental policy.²

Selected key lessons

- ♦ **Integrated flood management activities, not stand-alone approaches, are required.** City development plans should take into account urban drainage in floodplain areas, including control of water sources and non-structural measures from the planning stage (WMO, 2004).
- ♦ **The process of flood management should be participatory and catchment-wide,** with communities being proactively involved.
- ♦ **Development policies and projects that ignore vulnerability** often exacerbate disaster problems or even create disasters.
- ♦ **Technical considerations should not preclude socio-economic considerations** (WMO, 2003). One of the key reasons why projects go wrong is that they are approved on the basis of technical information alone, rather than based on both technical information and local wisdom (ActionAid, 2005).

Strengthening coping mechanisms

Vulnerable people individually and collectively develop their own means, resources and strategies to cope with flooding. All of these mechanisms, however, have financial, social and/or opportunity costs. A review of a preparedness programme in Bangladesh shows that vulnerable people have little or no surplus income to invest in the measures that can protect them from flooding although they know what to do (Alam et al., 2007b). Social capital, e.g., reciprocal support among neighbours, support from immediate family members and wider kinship networks, is a vital safety net for people in coping with recurrent flooding. The destruction of assets, which function as a buffer, can make people more vulnerable to the next flood. Both **flood risk reduction and response are more likely to be effective when they include coping mechanisms in the assessment and programme design.** Programmes that directly support communities and their local organisations have proved to work best for immediate reinforcement of coping and resilience capacities (DipECHO, 2004).

Community preparedness against flood

Creating functional groups, developing organisational capacities and enabling them to link with the national disaster management mechanisms are effective ways of strengthening preparedness at the community level. Small-scale mitigation, teaching lifesaving skills, contingency planning and even upgrading service provision are some key measures undertaken by non-governmental organisations (NGOs) and governments in Asia. In many cases such good work by agencies on an ad-hoc basis is found to be unsustainable and not often scaled up. Longer-term success requires strong engagement with the community. For many smaller NGOs, continuity of funding support is a critical limiting factor in maintaining their disaster preparedness (DP) work. Globally, some funding is available for disaster reduction, but little is left to support concrete action, beyond training and planning (IFRC, 2001). **The best way is therefore to enable the communities to organise themselves and link them with the national disaster response mechanisms.**

² A group of researchers at Middlesex University examined participation in floodplain management in Bangladesh and England and concluded that there are significant merits to building up from local participation to catchment planning and linking floodplain-specific participatory institutions with existing local government, particularly as evidenced in the Bangladesh experience (Sultana et al., 2007).

Selected key lessons

- ♦ Community-level disaster preparedness planning that begins immediately after the relief phase reduces post-disaster anxiety (SCF, 2005).
- ♦ The most important precondition to ensure that DP activities are sustainable is to improve linkages between the activities and local government planning processes (DipECHO, 2004).
- ♦ Support for mitigation activities is required but the focus should be broadened to include non-structural measures, for example, supporting livelihood-related endeavours as a means of mitigating future disasters.
- ♦ Even the best performing communities will require a minimum level of follow-up support and guidance.

Early warning

Flood early warning and forecasting in most parts of the world can produce information with longer lead times. They are useful for both contingency planning and defining immediate actions in responding to a flood (World Bank, 2006; ADB, 2006). Poor people need early warning most, but many of them do not understand weather forecasting or the language of early warning. **Early warning has little relevance if people do not have the ability to respond to warnings in terms of taking decisions on preventive actions and evacuation.** Needs for warning also vary by livelihood group. For example, pastoralists in Kenya (World Bank, 2006) do not need the same information as farmers.

Suggested further reading:

- ♦ Government of Bangladesh Flood Forecasting and Warning Centre. www.ffwc.gov.bd
- ♦ Mekong River Commission. www.mrcmekong.org
- ♦ 'Reducing impacts of floods through early warning and preparedness: a pilot study for Kenya'. *Natural disaster hotspots: case studies*. World Bank. 2006. www.worldbank.org

Search and rescue

Initial search and rescue measures depend largely on the local community and authorities, so **strengthening local capacities is an effective disaster mitigation measure.** Search and rescue is more rapid and effective where DP activities have already been implemented in vulnerable communities and where it is included as a priority in local contingency planning (DEC, 2000a; IFRC, 2004). While search and rescue has proven effective in saving lives, successful efforts to train communities often rest on mobilising resources for search and rescue logistics and equipment and on careful attention to long-term sustainability of the programmes (Alam et al., 2007a; INGC, 2001; World Bank, 2005b; IFRC, 2002; Viet Nam Red Cross, 2002).

Living with floods

Key policy-makers frequently discuss living with floods and adapting to their impacts, especially as large-scale floods are becoming common. Some general principles are emerging. **The core idea is to address people's critical vulnerabilities to floods and to ensure that the gap between demand and supply of key services (i.e., clean water, sanitation, early warning, food and health) is met through sustained preparedness and contingency planning.** Localised solutions such as flood proofing have shown good results (World Bank, 2002) and have also been integrated into flood response through cash-for-work schemes (DEC, 2000a). In South and South-east Asia, such flood-proofing measures include raising the plinths or foundations for homesteads, flood shelters and schools (DEC, 2000a; Kent et al., 2004). Protecting livelihood assets is also important. In Bangladesh, for example, one measure that has proved effective is keeping space for livestock in flood shelters (DEC, 2000a).

Suggested further reading:

- ♦ ADPC and UNDP (2005). *Integrated flood risk management in Asia*. A comprehensive review of various approaches to flood risk reduction.

LESSON 2 – BUILDING OWNERSHIP AND ENGAGING WITH LOCAL CAPACITY

Effective flood responses are those that build on people’s existing ways of dealing with floods and complement their coping mechanisms, resources and social capital. In areas where flooding occurs regularly, the community will probably be better prepared than people living in places where floods are rare. Many flood-prone communities have local and traditional institutions dealing with disasters. As the flood season approaches in Sudan, for example, local community leaders on Tuti island, at the confluence of the White and Blue Nile, set up a flood control committee which is in charge of contingency planning, coordinating emergency operations and providing material assistance (IFRC, 2004).

Participation

Unless **affected people are involved** – and not merely consulted – **in determining their needs and in participating in project design and management**, the impact of emergency or long-term interventions is likely to be limited. According to an ActionAid impact review, the agency’s normal principles, such as participation and gender analysis, were considered difficult to integrate in an emergency in countries with less emergency experience (ActionAid, 2002). Following the Mozambique flood in 2000, the World Bank highlighted that consultation improved the nature of the interventions, but participation leading to empowerment was rare, mainly due to the lack of transparency and equity between negotiating bodies (World Bank, 2005b).

The right to information

Information is a right that enables people to claim other rights. **Access to information allows a community’s own recovery plan to drive the recovery process. It is essential, therefore, that an affected population can receive useful information** (IFRC, 2005). Awareness about both flood risks and rights to humanitarian assistance in the Mozambique flood in 2000, a community survey found that beneficiaries were often poorly informed about recovery plans and activities (World Bank, 2005b). Communities were rarely informed about the amount of money or other support they could expect to receive.

Suggested further reading

- ♦ ALNAP (2003). *Guide to Participation by Crisis-Affected Populations in Humanitarian Action: A Handbook for Practitioners*. www.alnap.org/publications/gs_handbook/index.htm

LESSON 3 – NEEDS ASSESSMENT FOR RELIEF AND REHABILITATION

Conditions on the ground, not artificial programme cycles, should inform programme phases. In the midst of an ongoing flood response operation, for example, further flooding may call for a renewed relief phase. This highlights the importance of analysing flood forecasts and their implication for how people cope.

Flood response generally better meets requirements where assessment is an ongoing process and is responsive to changing conditions. Following devastating floods in Mozambique in 2000, the DEC noted that while interventions in all phases were generally appropriate, those that took place in the latter stages of the emergency response tended to be less appropriate than those at the beginning. The reasons for this are as follows:

- ♦ All agencies underestimated the resilience of the Mozambican population and their coping mechanisms.
- ♦ Beneficiary needs and capacities grew in range and complexity over time, making the typical ‘one size fits all’ solution of standard kits less appropriate.

Selected key lessons

- ♦ In a flood response situation, it is often difficult to ensure that vulnerable people can access assistance and take part in the decision-making process, because communications infrastructure and road networks are inundated and other effective means of transport are lacking. Agencies may also face logistical problems in reaching affected people.
- ♦ **People's needs and the flood's impact are not linked solely to the level of water, and the conditions of their lives and livelihoods do not necessarily improve when the water recedes.** Often, real misery starts when floodwaters recede and displaced people start going home, which is unfortunately when many agencies declare an end to assistance.
- ♦ **The situation may also change as a result of collective impact and/or the response policies of other agencies.** Two months after the start of the flood in Mozambique in 2000, the number of people in accommodation centres rose considerably with the arrival of villagers from outlying areas who were running out of food. They came because food was distributed only to people in the centres (INGC 2001). An agency's new intervention or the phasing-out of an existing one may also affect the work of others. **An overall understanding (through better coordination) of other agencies' plans contributes to a more positive impact.**
- ♦ Organisational priorities, assumptions and beliefs, rather than findings from an assessment, often shape the strategy and content of flood response. **It is important to allow vulnerable people's own choices, concerns and priorities to influence agencies' response strategy. Holistic assessment and participatory planning can facilitate this process.** Commenting on the debate on whether rehabilitation disbursement should be a grant or a loan after the 1998 flood in Bangladesh, DEC noted that 'these debates seem more an issue with an organization's own mandate and choice rather than a function of people's vulnerability' (DEC, 2000a).
- ♦ Though assessment is primarily done to define an operation, it can also be used for wider influence over key policy and decisions on flood response. **Good research during a flood often provides good analysis to help redefine programme approaches and phases.** For example, a nutritional assessment conducted during 1998 flooding in Bangladesh provided accurate and timely information enabling other agencies to design an appropriate food package and target recipients (DEC, 2000a).
- ♦ Affected communities are not a homogeneous group but have diverse livelihood options, conflicting interests and priorities, and varying levels of power and ability to express their needs. While they have specific rights and needs, they also have capabilities and strengths to offer. **Identifying such needs and capabilities in the assessment phase strengthens all phases of the response, whether search and rescue, relief, rehabilitation or preparedness for future disasters.**
- ♦ **Assessment should go beyond current needs to assess structural causes of vulnerability.** After the Bangladesh flood in 1998, DEC noted that the immediate impact may be better where emergency assistance targeted women, but structural needs are not met as most gender-based analysis tends to be women-focused, rather than looking at the roles of all groups and both sexes (DEC, 2000a). Examples of long-term thinking by agencies in the implementation of activities that influence gender relations include joint land titles; houses registered in the name of the couple or the woman in female-headed households; women's membership and leadership in existing or newly formed local disaster management committees (often fixing quota); and investment in capacity building for women (DEC, 2000a; World Bank, 2005b).

Suggested further reading

- ♦ ProVention's Community Risk Assessment (CRA) toolkit. www.proventionconsortium.org/CRA_toolkit
- ♦ IFRC. *Guidelines for Emergency Assessment*. www.proventionconsortium.org/themes/default/pdfs/71600-Guidelines-for-emergency-en.pdf
- ♦ ActionAid. *Participatory vulnerability analysis: step by step guidelines*. www.actionaid.org
- ♦ Tsunami Evaluation Coalition. *The role of needs assessment in the tsunami response: Executive summary*. www.tsunami-evaluation.org/The+TEC+Synthesis+Report/
- ♦ UN High Commissioner for Refugees (UNHCR) and World Food Programme. *Joint Assessment Guidelines*. Available from the WFP Emergency Needs Assessment Unit, e-mail: oen.info@wfp.org

LESSON 4 – TARGETING AND MONITORING

A targeting strategy that is flexible enough to adapt to different phases and interventions is the most effective way to reach the most vulnerable people. Ensuring such flexibility requires a **monitoring process that uses data categorised by gender, age and vulnerability** (DEC, 2001a), **reviews changes in need and can manage the emergence of new categories of people needing assistance.**

People whose houses are not inundated may be left out of flood response interventions, even though the flood may adversely disrupt their livelihoods. The targeting strategy should, therefore, not only examine current conditions of people already targeted but also assess developing trends to determine whether they affect people not included in the plan. After the 2000 Mozambique flood a lesson-learning workshop noted that many households lived on higher ground but farmed in the valley bottoms, suggesting that people in need of agricultural support should be targeted as beneficiaries (UN, 2001).

Targeting can be influenced by conscious and unconscious biases. Agencies with regular programmes often prioritise their regular beneficiaries over non-beneficiaries. **Targeting criteria for development programmes may not be appropriate in relation to vulnerabilities to disaster.** After the Bangladesh flood in 2000, an evaluation noted that the micro-credit project, while effective in reaching small farmers and traders, was not the best mechanism for targeting very poor and vulnerable people (DFID, 2001a).

Lessons from the Bangladesh flood in 1998

- ◆ Agencies that had previously worked on disaster preparedness were best able to define the criteria and method to select the most vulnerable people and implement and monitor the selection.
- ◆ Agencies that had taken up lessons identified from the 1998 flood developed flood vulnerability concepts and maps, based on major river basins and flood plains.
- ◆ Agencies with pre-selected partner NGOs for disaster-based relief and rehabilitation usually provided them with up-to-date training and guidelines in beneficiary selection.

LESSON 5 – LIVELIHOODS RECOVERY

Quick and effective recovery from the impact of floods depends significantly on how quickly livelihoods are restored. There is no single way to protect livelihoods in the post-flood context. Often it is feasible and desirable to combine relief and recovery in a flood context because recovery can start as soon as floodwaters recede (WFP, 2000). However, adopting a livelihoods approach (in the operation) is harder to implement where agencies have a limited presence in the affected areas (Oxfam, 1999).

Box 2. Livelihood assistance in floods

Adapted appropriately, these approaches might serve as models to strengthen livelihood resilience:

Agriculture:

- ◆ Methods for drying and preserving seed stocks can facilitate the continuation of farming (ITDG).
- ◆ Promotion of flood-resistant crop varieties and cultivation practices and provision of seed stock can strengthen resilience.
- ◆ Crop insurance systems can enable farmers to spread their risk (Hellmouth, 2007).
- ◆ Provision of fodder, vaccinations and de-worming can ensure livestock survival (ITDG).

Fish culture:

- ◆ Pens and trap ponds can help to retain fish during floods (ITDG).

Small business and alternative livelihoods:

- ◆ Repair of roads and other infrastructure, improved access to credit and support for re-skilling can provide a base for developing marketing opportunities or alternative income sources less prone to flooding (World Bank, 2005b).

Suggested further reading

- ◆ The ProVention CRA toolkit includes livelihoods tools. www.proventionconsortium.org/CRA_toolkit
- ◆ Young, H. et al. (2001). *Food Security Assessments in Emergencies: A Livelihoods Approach*. www.forcedmigration.org/sphere/pdf/food/odi/food-security-and-livelihoods.pdf

Asset protection

Helping people to protect their assets during and after a flood not only makes it easier for them to recover quickly but also reduces future vulnerability and poverty. However, according to evaluation reports, people are often forced to sell their productive and household assets to cope, as post-flood support is frequently overlooked.

Floods also destroy productive or livelihood assets. A study by the International Food Policy Research Institute (2001) after the 1998 Bangladesh flood found that 55 per cent of households lost assets, equivalent to 16 per cent of their pre-flood total value of assets. In Mozambique the World Bank noted that 'during the recovery period these assets were, in general, not replaced, leaving the households more vulnerable to subsequent disaster episodes' (World Bank, 2005b). Nevertheless, good practices do exist. Many agencies practise 'asset protection' as a key part of their flood response in Asia and Africa. This includes supplying livestock fodder, restocking livestock, reconstructing community and household assets and distributing agricultural/business tools (ActionAid, 2002; DEC, 2000a; DFID 2001a; WFP, 2000; Oxfam, 1999; World Bank, 2005b).

Household food security

How floods affect food security is a complex matter to which there is no straightforward response. Floods destroy standing crops. Prolonged flooding often limits people's ability to earn money and replant quickly after floodwaters recede because either the cropping season is over or agricultural support is not available. **Vulnerable people should be given various financial and material options, so that they can choose what works best for them.** The decision to provide food, cash, a combination of both or something else should be based on an objective problem analysis and clear aims and not on what resources are available, what the agency has the capacity to distribute or the donor's preferences (ALNAP and ProVention, 2007).

Selected key lessons

- ♦ **Mozambique flood 2000.** The greater use of cash, distributed directly as either grants or part of kits, or in payment for work, would have allowed beneficiaries to respond better to their own needs (DEC, 2000a; World Bank, 2005b).
- ♦ **Ethiopia food security crisis 1996.** Food aid can save lives and support livelihoods, particularly when used early and long enough to protect the livelihood assets that people rely on (DFID, 2006).
- ♦ **Kenya flood 1996–1997.** Cash schemes allowed households to avoid taking exploitative loans from moneylenders and to clear their debts, to buy essential items and to invest in small-scale income-generating activities. This provided economic benefits for individual households and local businesses in addition to benefits for the whole community (Oxfam, 1999).
- ♦ **Bangladesh flood 1998.** More than half of poorer flood-affected households resorted to buying food on credit. This maintained the value of household expenditures vis-à-vis pre-flood levels but, because of higher prices, poor households consumed fewer calories per capita per day than households not exposed to floods, suggesting that targeted cash transfers and credit programmes could have been an effective complement to direct food distribution (IFPRI, 2001).

Agricultural rehabilitation

Many flood-prone areas are also rich agricultural lands. **Assistance in the form of tools, seeds, fertiliser, capital and training, for example, can help people to restore their agriculture.**

Flood trends are changing and more frequent flooding impacts on cropping seasons, making people food and livelihood insecure. In such cases, a possible response is to distribute alternative, nutritious varieties of seeds (DEC, 2000b; Oxfam, 2003).

Selected key lessons

- ♦ **Central America and Caribbean.** After Hurricane Mitch, some people decided to move away from affected areas permanently or send a family member away to find work. They dismantled their new

houses and sold the valuable parts (ECHO, 2001). The provision of seeds, agricultural inputs and, in some cases, cash, helped farming families remain in their communities, despite massive harvest, soil, housing and livelihood losses (DEC, 2000b).

- ♦ **Nicaragua.** After Tropical Storm Michelle, the distribution of new varieties of seeds allowed women to sow and improved the quality of seeds used in the area. The crops the women produced enabled them to store part of the harvest, for both their families' consumption and the next sowing cycle (Oxfam, 2003).
- ♦ **Mozambique.** Agencies carried out extensive consultation and follow-up before introducing new crops. For example, as part of its food security and nutrition initiative, the national agricultural research institute distributed a variety of sweet potato in flood-affected areas. Agency activities, such as training in planting techniques and preparation of the potato, were aimed mainly at women, as the crop had a high potential for improving infant feeding (World Bank, 2005b).
- ♦ **Zimbabwe.** Mapping out a strategy for the development of local partnerships facilitates the shift to longer-term programming when an agency leaves. Government services on agricultural extension continued technical advice on vegetable and fruit production, provision of seeds and basic tools after CARE phased out (C-Safe, 2005).

LESSON 6 – LOCAL ECONOMY AND MARKET

Floods affect not only household livelihoods, but also the local economy, within which household livelihoods operate. Household livelihood recovery and sustainability are largely conditioned by the local economy. Agencies, however, often overlook the impact of their flood response on the local economy and market. If planned well, assessment and monitoring processes should provide better understanding of the local economy to determine how different interventions may affect it. An evaluation in Wajir, Kenya after the drought and flood in 1996-1997 noted that relief distribution had stabilised food prices, thus shoring up pastoralists' purchasing power. But, for example, excessive cash distributions over a period of time may also affect the local economy negatively by causing inflation (ActionAid, 2001).

Box 3. Economic approaches in flood response

Support to local market activity can broaden the base of livelihoods programmes and tap community resources for flood response, although such measures must be carefully designed. For example,

- ♦ Markets are dynamic and must be monitored over time and space. The livelihood of the local makers of clay roofing tile was severely affected when agencies distributed metal sheeting in the 2000 flood response in Bangladesh (ActionAid, 2002).
- ♦ Some agencies have responded by including economists and market analysts on their staff (WFP, 2006).
- ♦ Livelihood work in urban contexts poses distinctly complex challenges. Natural resources are far less available in urban areas. Many urban dwellers are dependent on single sources of income and on the market; therefore safeguarding measures can vary widely from household to household (IFRC, 2004).

LESSON 7 – WATER, SANITATION AND HEALTH

The potential for disease outbreaks is always present after a disaster (McCluskey, 2001). **Good understanding of water and sanitation conditions, disease surveillance, speedy response to warning and above all, preparedness of health agencies are the preconditions to reduce the spread of diseases and preserve the quality of the environment during and after flooding.** Studies show the risks of disease are greatest where there is overcrowding and where standards of water and sanitation have declined (PAHO, 1981). This often happens in situations of massive population displacement away from the flooded area and prolonged stay in flood shelters without adequate water

supply. People themselves, national authorities and relief agencies in many flood-prone areas have had to develop mechanisms and technologies in order to sustain populations living in flooded environments. **Initiatives to improve water supply or water systems should incorporate long-term sustainability.**

Box 4. Floodproofing water and sanitation services

Past relief and recovery operations have identified a range of approaches, which include:

General:

- ◆ Incorporating mitigation measures during the rehabilitation of water, sanitation and health systems for future protection (ECHO, 2001).
- ◆ Strengthening health volunteer networks to enhance their effectiveness in emergency preparedness and response (WHO, 2000).

Water:

- ◆ Raising tube-wells and boreholes above flood water level to prevent contamination (ACF, forthcoming).
- ◆ Including buckets and water containers in relief packages to reduce secondary contamination.

Sanitation

- ◆ Planning sanitation and shelter together to ensure completion (World Bank 2005b).
- ◆ Attention to placement and arrangement of sanitary facilities to limit impact on groundwater and ensure safety for community members.
- ◆ Innovative approaches to sanitation in flooded areas, such as raised latrines, pit liners or rings, sealed pits or tanks, or contained leach fields (WEDC, 2007).
- ◆ Extending hygiene education to schools and to community groups (ECHO, 2001).

Suggested further reading

- ◆ Oxfam (1999). *Managing Water Supply and Sanitation in Emergencies*. Oxfam guidelines for water treatment. Oxford: Oxfam Publishing. Available at publications.oxfam.org.uk.
- ◆ WEDC (2007). *Excreta Disposal in Emergencies*. Loughborough University, London: Water, Engineering and Development Centre. Available at wedc.lboro.ac.uk/publications.

Following flooding in Nicaragua, the construction of latrines increased. However, when local rivers swelled to high levels, the latrines became a source of contamination (Oxfam, 2003). **Water and sanitation interventions need to be locally appropriate and take into consideration possible problems regarding the availability of water, local perceptions regarding water quality and purity, testing water purity regularly and prevalent sanitation practices and needs.** In Bangladesh, for example, agencies distributed water purification tablets, even though lessons from past flood response indicated that people do not use them because they spoil the taste of the water and laboratory tests indicate that they have limited effectiveness.

Water-borne diseases, such as diarrhoeal diseases, acute respiratory infections (ARI) and skin infections, are common among flood-affected people, especially children. They can increase to epidemic levels even in a moderate flood, particularly in rapidly expanding urban areas with their often poor environmental conditions.³ **Water-borne diseases are preventable through provision of clean water and sanitation.**

Selected key lessons

- ◆ **Guatemala.** Beneficiaries acknowledged the utility of health education interventions that systematically accompanied water, sanitation and nutrition activities and the participative methods used to impart them. Although available funds and technical personnel were too few to repair widespread damage to water distribution systems, various agencies combined their resources and worked together, which meant that they were able to repair more systems than anticipated (Estrada de Zomet, 2001).
- ◆ **Kenya flood 1996–1997.** While the Ministry of Health issued an early warning about a potential malaria epidemic, health agencies were not adequately prepared. As a result many lives were lost (Oxfam, 1999).

³ For example, during the 2007 floods in Bangladesh, more patients than ever before attended the ICDDR,B health centre in Dhaka. Most of the patients lived in Dhaka city. The centre identified Dhaka's continued population growth, which has forced increasing numbers of low-income households to live in areas with poor water and sanitation, as a contributing factor (ICDDR,B, 2007).

LESSON 8 – SHELTER AND HOUSING

Shelter is necessary to provide security and personal safety, protect from the climate and enhance resistance to ill health and disease. It is also important for human dignity and to sustain family and community life as far as possible in difficult circumstances (Sphere Project, 2004). Thus shelter and housing are more than just a roof over a person's head. The livelihood activities of many flood-prone communities are home- or homestead-based and may be destroyed by flooding. This may cause displacement, the nature and duration of which depend on the duration of inundation. The World Bank report on the Mozambique flood noted the 'improvement in the houses of people displaced through the floods has had a lasting positive psychological effect on the beneficiaries' (World Bank, 2005b). Strategies for post-flood housing programmes need to be based on the impact of flooding on houses and their long-term consequences rather than on the standard housing cycle concept (transitional to permanent housing). The response needs to cover affected people's immediate survival needs up to the point at which durable solutions are reached.

Box 5. Flood-resistant shelter

Effective shelter and settlement planning can reduce damage and build resilience. Some examples include:

Reconstruction:

- ◆ Raised plinths and foundations (DEC, 2000a; Kent et al., 2004).
- ◆ Combining a strong frame with lighter wall material that can be replaced after floods, which has been used successfully in Vietnam by the Vietnamese Red Cross and IFRC (IFRC, 2001)
- ◆ Raised shelves to protect valuables.
- ◆ Using more durable building materials which resist water damage.
- ◆ Planting water-resistant plants and trees to protect shelters from erosion (ITDG).
- ◆ Establishing community committees to monitor construction quality and settlement planning (AIDMI, 2005).
- ◆ Community outreach to promote hazard resistant design approaches in future building.

Settlement Planning:

- ◆ Prohibiting resettlement in the most hazardous areas, if possible.
- ◆ Improving access to safe land. Many people must choose to live in flood-prone areas to ensure access to shelter or livelihoods (McCluskey, 2001).
- ◆ Limiting obstruction of natural channels, using absorbent paving materials and roof catchments to reduce runoff, and designing drainage to minimize intensity of water flows.
- ◆ Community emergency shelters and evacuation routes.
- ◆ Early warning systems, including rain or river gauges and community monitoring, to alert communities to flood threats.

Suggested further reading

- ◆ OCHA (2004). *The OCHA guide to tents*. www.sheltercentre.org/shelterlibrary/publications/201.htm
- ◆ Corsellis, T. and Vitale, A. (2005). *Transitional Settlement: Displaced Populations*. Oxford: Oxfam Publications. www.sheltercentre.org/shelterlibrary/publications/112.htm
- ◆ UNESCO (2001). *Guidelines On Non-Structural Measures In Urban Flood Management*. Paris: International Hydrological Programme. unesdoc.unesco.org/images/0012/001240/124004e.pdf

Quick provision of temporary shelter reduces exposure, can help to limit the outbreak of disease and allows people to move quickly out of community shelters, which may be needed for schooling or other community facilities. Reconstructing permanent housing in large-scale disasters may take a long time. **In such cases, temporary or transitional shelter should have adequate facilities (for water and sanitation and cooking)** (SCF, 2005) and a system should be in place to monitor conditions of shelter (AIDMI, 2005).

Agencies have addressed challenges, such as land tenure, linking with service provision, and government policy, through good coordination with local authorities, participation of the affected communities and advocacy. After the tsunami in 2004, ActionAid mobilised the media to raise concerns about the buffer zone (to relocate people from the coast to more inland areas) imposed by the government of India, as did Oxfam in Aceh (Indonesia) over the land rights issue. Oxfam has also facilitated links to legal advice (Oxfam, 2006).

Preferences in housing vary by sex and age. **An effective owner-driven approach means that key decisions are taken by the owners and that NGOs and the government support their decisions with resources and technical inputs** (AIDMI, 2007). After the tsunami, in Aceh, participation helped to integrate important aspects such as water and sanitation in the design of houses (Oxfam 2006).

Basic service provision is equally important for resettlement. After the 2001 flood in Sudan, the community refused to relocate to non-flooded areas as local government could not meet their demand for schools and health centres that had been promised as part of the resettlement package (IFRC, 2001).

Helping affected people to understand their future vulnerability, including likely flood levels, duration and frequencies **will allow them to better determine in what ways their building patterns are vulnerable to flood risks, what efforts can be made to strengthen housing and community facilities with minimum adverse impact on the local economy and environment, and how this protection can be maintained over the longer term.** Resettlement is often a key component in vulnerability reduction in areas at risk from floods, allowing active participation by the local communities (DEC, 2001a).

If a housing strategy is to be successful, materials should be chosen with care to ensure that they have multiple uses, can protect people from climatic conditions and do not adversely affect the local environment (Oxfam, 2006; AIDMI, 2005; ECHO, 2002).

LESSON 9 – MANAGING NATIONWIDE RESPONSE AND COORDINATION

A pluralistic institutional environment and decentralised capacity, with horizontal and vertical coordination and information flow, have worked well in responding to large-scale floods in Africa and South and South-east Asia. **Coordination at both national and local levels is absolutely necessary for nationwide coordination to be effective** (DEC, 2000a; World Bank, 2005a).

Under the UN's recently developed regime of 'clusters', key emergency sectors have lead agencies with responsibilities for coordination and delivery in case of last resort. The response to the Pakistan floods in 2007 was one of the first test cases for the clusters and highlighted the importance of streamlining coordination structures to facilitate engagement with local government and NGO partners (IASC, 2007). Coordination takes time and effort, but done properly it is time well spent.

Selected key lessons

- ♦ In a context where government is the major player, it is not enough for agencies to focus on their own projects. They have an obligation to engage with wider processes particularly in supporting local communities' own recovery plans (DEC, 2007).
- ♦ The establishment of a mandate is required to avoid conflicts of authority and to allow for follow-up to decisions. Mechanisms are needed to enable the links between NGOs and the administration to ensure mutual exchange of information (INGC 2001).
- ♦ Existing mechanisms for technical coordination should be protected and improved rather than weakened or substituted (UNICEF, 2006).
- ♦ Provincial government can act flexibly by decentralising decision-making and supporting NGOs to act in the severely affected districts so that assistance reaches beneficiaries directly and duplication can be avoided (INGC 2001).

Further information

- ♦ An overview of the organisation of the clusters and the various lead agencies is available at www.humanitarianinfo.org/iasc/content/cluster

This briefing was written by Khurshid Alam (www.khurshidalam.org) with support from Maurice Herson and Ian O'Donnell. Thanks are due for comments to Margaret Arnold, Andy Bastable, Tom Corsellis, Hisham Khogali, John Mitchell, Anna Maria Selleri, and Avinash Tyagi.

BIBLIOGRAPHY AND KEY RESOURCES

ACF (forthcoming), *How to make projects sustainable and successfully disengage in vulnerable contexts*. Action Contre La Faim – International Network.

ActionAid (2002). *Emergencies impact review*. London: ActionAid International. [www.reliefweb.int/rw/lib.nsf/db900SID/LGEL-5E6ATQ/\\$FILE/actionaid-impact-mar02.pdf?OpenElement](http://www.reliefweb.int/rw/lib.nsf/db900SID/LGEL-5E6ATQ/$FILE/actionaid-impact-mar02.pdf?OpenElement)

ActionAid (2005). *People-centred governance: Reducing disaster for poor and excluded people*. Johannesburg: ActionAid International. www.actionaid.org/docs/people_centred_governance.pdf

ActionAid (2007). *Unjust Water. Climate change, flooding and the protection of poor urban communities: experience from six African cities*. London: ActionAid International. www.actionaid.org.uk/doc_lib/unjust_waters.pdf

Adhikari, K.D. et al. (eds.) (2000). *Cooperation of eastern Himalayan rivers: opportunity and challenges*. Delhi: Konark Publishing Pvt. Ltd.

ADB (2006). *Early warning systems study*. Dhaka: Asian Development Bank.

ADPC and UNDP (2005). *Integrated flood risk management in Asia*. Bangkok: Asian Disaster Preparedness Center and United Nations Development Programme. www.adpc.net/maininforesource/udrm/floodprimer.pdf

AIDMI (2005). *Review of AIDMI's Temporary Shelter Programme in Tsunami-Affected Southern India*. Delhi: All India Disaster Mitigation Institute. www.tsunami-evaluation.org/NR/rdonlyres/DAE7AB27-EA7A-471A-ADBA-CF488D8BE1C1/0/aidmi_temporary_shelter_programme.pdf

AIDMI (2007). *2007 floods in South Asia: from impact to knowledge*. Special issue 39. Delhi: All India Disaster Mitigation Institute. www.southasiadisasters.net/downloads/snet/39%20Sadnet%20Bihar%20Flood%202007.pdf

Alam, K. et al. (2007a). *Report for the evaluation of the DIPECHO III (RRVC) project implemented by ActionAid Bangladesh 2006-7*. Dhaka: ActionAid Bangladesh.

Alam, K. et al. (2007b). *Drowning Sand and the Holy Banana Tree. The tale of people with disability and their neighbors coping with Sharbanasha floods in the Brahmaputra-Jamuna Chars of Bangladesh*. Handicap International.

Ali Mir, M. et al. (eds.) (1998). *Bangladesh floods: views from home and abroad*. Dhaka: The University Press Ltd.

ALNAP and ProVention 2007. *Slow-onset disasters: drought and food and livelihoods insecurity. Learning from previous relief and recovery responses*. www.alnap.org/publications/pdfs/ALNAP-ProVention_lessons_on_slow-onset_disasters.pdf

CARE (2005). *Flood 2004: response and learning*. Dhaka: CARE Bangladesh.

C-Safe (2005). *What We Know about Exit Strategies: Practical Guidance for Developing Exit Strategies in the Field*. Consortium for Southern Africa Food Security Emergency. www.c-safe.org

DEC (2000a). *Bangladesh 1998 Flood Appeal – An independent evaluation*. Final report. London: Disasters Emergency Committee. apps.odi.org.uk/erd/ReportDetail.aspx?reportID=2859

DEC (2000b). *Independent Evaluation of Expenditure of DEC Central America Hurricane Appeal Funds*. Final report. London: Disasters Emergency Committee. apps.odi.org.uk/erd/ReportDetail.aspx?reportID=2873

DEC (2001a). *Independent Evaluation of Expenditure of DEC Mozambique Floods Appeal Funds*. London: Disasters Emergency Committee. apps.odi.org.uk/erd/ReportDetail.aspx?reportID=2999

DEC (2001b). *DEC evaluations synthesis report*. London: Disasters Emergency Committee.

DEC (2007). *Lesson from Gujarat Earthquake response*. Draft version. London: Disasters Emergency Committee.

DFID (2001a). *Evaluation of DFID-B Response to Southwest Bangladesh Floods – October 2000–mid 2001*. Dhaka: UK Department for International Development–Bangladesh (DFID-B).
apps.odi.org.uk/erd/download.aspx?rep=summary&ID=3003

DFID (2001b). *Emergency Food Aid Assistance to Flood-affected People in South-western Bangladesh: Evaluation Report*. London: UK Department for International Development.

DFID (2005). *Disaster risk reduction: a development concern. A scoping study on links between disaster risk reduction, poverty and development*. London: UK Department for International Development.
www.dfid.gov.uk/pubs/files/drr-scoping-study.pdf

DFID (2006) *Ethiopia's Productive Safety Net Programme (PSNP): Trends in Transfers within Targeted Households*. S Devereux, R Sabates-Wheeler, M Tefera and H Taye. Brighton and Addis Ababa: IDS and Indak.

DipECHO (2004). *The Evaluation of DIPECHO Action Plans in the Caribbean Region*. Brussels: Directorate-General for Humanitarian Aid Disaster Preparedness Programme.
apps.odi.org.uk/erd/ReportDetail.aspx?reportID=3276

ECHO (2001). *Hurricane Mitch, ECHO Global Plans for Central America 1998 and 1999 Synthesis Report*. Brussels: Directorate-General for Humanitarian Aid.
apps.odi.org.uk/erd/ReportDetail.aspx?reportID=2929

ECHO (2002). *Evaluation of ECHO Relief Operations in favour of the Victims of the Earthquakes in January–February 2001 – Synthesis Final Report*. Brussels: Directorate-General for Humanitarian Aid.
ec.europa.eu/echo/pdf_files/evaluation/2002/india_el_salvador_synth_exsum.pdf

Estrada de Zomet, R.M. (2001). *Multi-agency Evaluation Of The Response To The Emergency Created by Tropical Storm Stan In Guatemala*. CARE, Oxfam GB and Catholic Relief Service.
ecbproject.org/publications/ECB2/MAE%20Guatemala%20Summary.pdf

Hellmuth, M., A. Moorhead, M. Thomson and J. Williams (eds) (2007). *Climate Risk Management in Africa: Learning from Practice*. New York: International Research Institute for Climate and Society (IRI), Columbia University.
iriportal.ideo.columbia.edu/portal/server.pt?space=CommunityPage&control=Set%20Community&CommunityID=684&PageID=0

IASC (2007). *Inter-Agency Real Time Evaluation Of The Pakistan Floods/Cyclone Yemyin*. Inter-Agency Standing Committee.

ICDDR,B (2007). *Health and Science Bulletin*. Vol. 5 No. 3, September 2007. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh.
www.icddrb.org/pub/publication.jsp?classificationID=56&pubID=8886

ICDDR,B (undated). *Drugs and Medical Supplies During and in the Aftermath of the 1998 Flood in Bangladesh*. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh.
www.icddrb.org/pub/publication.jsp?classificationID=1&pubID=859

IFPRI (2001). *The 1998 Floods in Bangladesh Disaster Impacts, Household Coping Strategies, and Response*. Washington DC: International Food Policy Research Institute.
www.ifpri.org/pubs/abstract/abstr122.htm

IFRC (2000). *Operational Review of the 1999 Flood Relief Operation in China*. Geneva: International Federation of Red Cross and Red Crescent Societies.

IFRC (2001). *World Disasters Report*. Geneva: International Federation of Red Cross and Red Crescent Societies. www.ifrc.org/publicat/wdr2001/

- IFRC (2002). *Sudan: from risk to opportunity. Flood risk reduction*. Case study. Geneva: International Federation of Red Cross and Red Crescent Societies.
- IFRC (2003). *World Disasters Report*. Geneva: International Federation of Red Cross and Red Crescent Societies. www.ifrc.org/publicat/wdr2003/
- IFRC (2004). *World Disasters Report*. Geneva: International Federation of Red Cross and Red Crescent Societies. www.ifrc.org/publicat/wdr2004/
- IFRC (2005). *World Disasters Report*. Geneva: International Federation of Red Cross and Red Crescent Societies. www.ifrc.org/publicat/wdr2005/
- IFRC (2006). *World Disasters Report*. Geneva: International Federation of Red Cross and Red Crescent Societies. www.ifrc.org/publicat/wdr2006/
- INGC (2001). *Mozambique Floods 2001: Lessons Learned Summary Report*. National Institute for Disaster Management. apps.odi.org.uk/erd/ReportDetail.aspx?reportID=2945
- IPCC (2007). *Fourth Assessment Report*. Geneva: Intergovernmental Panel on Climate Change. www.ipcc.ch
- ISDR (2004a). *Water and disaster: be informed and be prepared*. Geneva: United Nations Inter-Agency Secretariat for the International Strategy for Disaster Reduction.
- ISDR (2004b). *Water and risk in Africa: a community leader's guide. UNISDR, Africa. March to December 2000. Expanded Executive Summary*. Nairobi: United Nations Inter-Agency Secretariat for the International Strategy for Disaster Reduction. www.unisdr.org/africa/af-publications/water-risk-africa-community-leaders-guide-english.pdf
- ITDG (date unknown). *An Attempt on Application of Alternative Strategies for Community Based Flood Preparedness in South-Asia (Bangladesh)*. Bangladesh: ITDG Practical Action. www.unisdr.org/eng/public_aware/world_camp/2003/english/Others/Bangladesh.pdf
- Kent, H. et al. (2004). *Linkages between flood and drought disaster in Cambodia and rural livelihood and food security*. International Federation of Red Cross and Red Crescent Societies and the Cambodian Red Cross Society.
- Kiess, L. et al. (1999). *Impact of the 1998 Flood on Nutrition and Health: What Can We Learn for Future Disasters?* Dhaka: Helen Keller International, Bangladesh and Institute of Public Health Nutrition. www.icddrb.org/images/9thascon_poster-impact.pdf
- McCluskey, J. (2001). *Water supply, health and vulnerability in floods*. Waterlines. Vol.19 No.3 January 2001.
- Oxfam (1999). *Evaluation of the Wajir Relief Programme – 1996-1998*. Oxford: Oxfam Publishing. www.odi.org.uk/hpg/papers/Wajir_Oxfam.pdf
- Oxfam (2002). *External Evaluation of Oxfam Brazil's Pernambuco Flood Relief Project – August 2000-May 2002*. Oxford: Oxfam Publishing. apps.odi.org.uk/erd/ReportDetail.aspx?reportID=3055
- Oxfam (2003). *External Evaluation of the Project 'Humanitarian Assistance for Populations affected by Floods and Malnutrition in the Atlantic Coast of Nicaragua*. Oxford: Oxfam Publishing. apps.odi.org.uk/erd/ReportDetail.aspx?reportID=3402
- Oxfam (2006). *Final Version Evaluation of OI's Response in Nias and Aceh*. Oxford: Oxfam Publishing.
- PAHO (1981) *A Guide to Emergency Health Management after Natural Disasters*. Scientific Publication 407. Quoted in McCluskey 2001.
- SCF (2005). *Review of Save the Children in Sri Lanka (SCiSL) Tsunami Response*. Colombo: Save the Children Fund. apps.odi.org.uk/erd/ReportDetail.aspx?reportID=3370

SCF (2006). *Watermarks: Child Protection During Floods in Bangladesh*. Dhaka: Save the Children Fund. www.reliefweb.int/library/documents/2006/SC-bgd-30jul.pdf

Sphere Project (2004). *Humanitarian Charter and Minimum Standards in Disaster Response*. Oxford: Oxfam Publishing. www.sphereproject.org

Sultana, P. et al. (2007). *Can England Learn Lessons from Bangladesh in Introducing Participatory Floodplain Management?* Netherlands: Water Resources Management. www.springerlink.com

TEC (2006). *Synthesis Report: Executive Summary*. London: Tsunami Evaluation Coalition. www.tsunami-evaluation.org/The+TEC+Synthesis+Report/

UN (2001). *Mozambique Floods 2001*. Maputo: United Nations Resident Coordinator Mozambique.

UNICEF (2006). *Ethiopia: Real Time Evaluation Of The 2006 Emergency Response*. . New York: United Nations Children's Fund. ochaonline3.un.org/OchaLinkClick.aspx?link=ocha&docid=1008392

Viet Nam Red Cross and International Federation of Red Cross and Red Crescent Societies (2002). *Lessons from the floods Voices of the people, local authorities, and disaster management agencies from the Mekong delta in Viet Nam. Summary*.

von Kotze, A. and A. Holloway (1996). *Reducing Risk: Participatory learning activities for disaster mitigation in Southern Africa*. Durban: International Federation of Red Cross and Red Crescent Societies

WEDC (2007). *Excreta Disposal in Emergencies*. Loughborough University, London: Water, Engineering and Development Centre. wedc.lboro.ac.uk/publications

WFP (2000). *Full Report of the Evaluation of CHINA EMOP 6045 - "Emergency Food Aid to Flood Affected People in Anhui, Hubei and Jiangxi Provinces of China"*. Rome: World Food Programme. documents.wfp.org/stellent/groups/public/documents/reports/wfp007319.pdf

WFP (2006). *Emergency Needs Assessments and the Impact of Food Aid on Local Markets*. C Donovan, M McGlinchy, J Staatz and D Tschirley, SENAC Project, WFP/ Emergency Needs Assessment Branch, documents.wfp.org/stellent/groups/public/documents/ena/wfp086537.pdf. (quoted in Alnap and ProVention 2007)

WHO (2000). *Lessons Learned Workshop on the Mekong Floods in 2000*. Geneva: World Health Organization.

WMO (2003). *Integrated Flood Management Case Study. Bangladesh: Flood Management September 2003*. Geneva: World Meteorological Organization.

WMO (2004). *Case Study: Brazil: Flood Management In Curitiba Metropolitan Area*. Geneva: World Meteorological Organization. www.apfm.info/pdf/case_studies/cs_brazil.pdf

World Bank (2002). *Bangladesh: disaster and public finance*. Working paper series 6. Washington DC: World Bank. www.proventionconsortium.org/?pageid=37&publicationid=6#6

World Bank (2005a). *Learning Lessons from Disaster Recovery: The Case of Bangladesh*. Disaster Risk Management Working Paper Series No. 11. Washington DC: World Bank. www.proventionconsortium.org/?pageid=37&publicationid=39#39

World Bank (2005b). *Learning Lessons from Disaster Recovery: The Case of Mozambique*. Disaster Risk Management Working Paper Series No. 11. Washington DC: World Bank. www.proventionconsortium.org/?pageid=37&publicationid=40#40

World Bank (2005c). *Natural disaster hotspots: a global risk analysis*. Working paper series 5. Washington DC: World Bank Hazard Management Unit. www.proventionconsortium.org/?pageid=37&publicationid=38#38

World Bank (2006). *Natural disaster hotspot: case studies*. Working paper series 5. Washington DC: World Bank Hazard Management Unit. www.proventionconsortium.org/?pageid=37&publicationid=128#128