

Resource Manual on Flash Flood Risk Management

Module 1: Community-based Management



Arun Bhakta Shrestha
Syed Harir Shah
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Resource Manual on Flash Flood Risk Management

Module 1: Community-based Management

**Arun Bhakta Shrestha
Syed Harir Shah
Rezaul Karim**

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Clockwise from top left: 1) Shuttling people across a river that wiped out the road from Dushanbe to Khorog, Tajikistan (2005) – *Robert van Waarden*; 2) An elderly woman carrying firewood in the Rolwaling Valley, Nepal – *Arun B. Shrestha*; 3) Beding village in the Rolwaling Valley, downstream from Tsho Rolpa, the largest and one of the most dangerous glacial lakes in Nepal – *Arun B. Shrestha*; 4) Agricultural land covered by debris deposited by a flash flood in Kande, Pakistan – *David Archer*; 5) People trying to cross a stream in Sonoguur, Chitral, Pakistan during the flash flood of July 2007 – *Syed Harir Shah*; 6) The mad river (2007) Chainpur, Bajhang, Nepal – *Rajesh Sharma*

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Foreword

The Hindu Kush-Himalayan (HKH) region is one of the most dramatic physiographic features on our planet. As the youngest mountain system in the world, it has unstable geological conditions and steep topography, which, combined with frequent extreme weather conditions, makes the region prone to many different natural hazards from landslides, avalanches, and earthquakes, to massive snowfall and flooding. Among these, flash floods are particularly challenging for communities.

Flash floods are severe flood events that occur with little or no warning. They can be triggered by intense rainfall ('cloudbursts'), failure of natural or artificial dams, and outbursts of glacial lakes. The frequent occurrence of flash floods within the Hindu Kush-Himalayan region poses a severe threat to life, livelihoods, and infrastructure, both within the mountains and downstream. Vulnerable groups – the poor, women, children, and people with disabilities – are often the hardest hit. Flash floods pose a greater risk to human life and livelihoods than do the more regular riverine floods, which build up over days when there is heavy rainfall upstream. Flash floods tend to carry with them much higher amounts of debris and, as a result, cause more damage to hydropower stations, roads, bridges, buildings, and other infrastructure.

Since its establishment in 1983, ICIMOD has explored different ways to reduce the risk of disaster from natural hazards and the physical and social vulnerability of the people in the region. These have included training courses, hazard mapping, vulnerability assessments, fostering dialogue among stakeholders, and developing materials for capacity building. Recognising the important role of flash floods, ICIMOD has recently undertaken several initiatives specifically aimed at reducing flash flood risk. An 'International Workshop on Flash Floods' organised by ICIMOD in October 2005 in Lhasa highlighted the need for capacity building in this area. Since then, ICIMOD has been working towards improving the capacity of practitioners and communities to manage flash flood risk.

Resource materials related to flash flood risk management have been compiled and developed by ICIMOD together with various partners to support the capacity development and training of planners and practitioners. After testing with different groups, these resource materials are now being published to make them more widely available. The present publication is the first module of a 'Resource Manual on Flash Flood Risk Management' and focuses on community-based approaches to managing flash floods. It was produced under the project 'Capacity Building for Flash Flood Risk Management and Sustainable Development in the Himalayas', funded by the United States Agency for International Development, Office for Foreign Disaster Assistance (USAID/OFDA). The second module looks at technology-based, non-structural measures for managing flash floods. These two modules are small, but important steps towards securing the physical security of the people of the Hindu Kush-Himalayas. We hope that they will contribute towards reducing disaster risk in this vulnerable region.

Andreas Schild
Director General
ICIMOD

About this Module

This publication is the first module of the 'Resource Manual on Flash Flood Risk Management' prepared under the project 'Capacity Building for Flash Flood Risk Management and Sustainable Development in the Himalayas', supported by the United States Agency for International Development, Office for Foreign Disaster Assistance (USAID/OFDA).

Floods are a major hazard in the Hindu Kush-Himalayan (HKH) region and inflict suffering on large numbers of people, especially the poor and vulnerable. Most past approaches to alleviating this hazard have concentrated on structural measures, or measures with strong central dominance and little or no role for the communities exposed to the hazard. Unlike riverine floods, flash floods are rapid-onset events that are often unpredictable, or predictable with little lead time. Most flash flood events take place in remote, isolated catchments where the central government's reach is usually nonexistent or very limited. When flash floods strike, external help can take several days to reach the affected communities, during which time they are left to cope on their own. Technological advances and institutional arrangements for disaster risk management are gradually improving in the region, although this process takes a long time. Hence, it is essential to build the communities' capacity to manage flash floods and other disaster risks by themselves. As it is, every household does attempt to manage disaster risk according to its individual capacity, but the effectiveness of these efforts can be enhanced if individual efforts are coordinated. A community flash flood risk management committee (CFFRMC) is a good mechanism to unite the efforts of community members. This module puts CFFRMC at the centre of all phases of flash flood risk management.

Chapter 1 describes the hazard, its causes, and its characteristics. The formation, structure, and roles of a CFFRMC are described in Chapter 2. Women, children, and people with disabilities are the most vulnerable to natural hazards and suffer the most during flash floods. Community-based flash flood risk management must address vulnerable groups in all phases of management. Chapter 3 examines gender and disability issues in flash flood management. Chapter 4 describes the role of local knowledge in flash flood risk management, as local people have been living with this risk and sometimes have very effective knowledge about how to deal with flash floods, which should be incorporated during planning for mitigation strategies. A brief description of watershed management measures to reduce flash flood risk is provided in Chapter 5. Chapters 6, 7, and 8 describe the risk management activities appropriate prior to, during, and after flash flood events. This module is based on several other manuals (e.g., APFM 2004b; 2006; 2007; Prashad 2005), and the first-hand experience of the authors in Nepal, Pakistan, and Bangladesh.

This module is written for community-based organisations working in flash flood management, community workers, and local government and non-governmental organisations working directly with communities. The module can also be used as a resource for training on community-based flash flood risk management.

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Many others also contributed to this manual and have generously given permission to reproduce photographs, maps, diagrams, instructions, exercises, and other materials; ICIMOD would like to thank them all.

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Acronyms

ADPC	Asian Disaster Preparedness Center
APFM	The Associated Programme on Flood Management
CBDMC	community-based disaster management committee
CBDRM	community-based disaster risk management
CBFMC	community-based flood management committee
CFFRMC	community flash flood risk management committee
DDC	district development committee
DM	disaster management
DP	disaster preparedness
DSCWM	Department of Soil Conservation and Watershed Management
ECHO	European Commission's Humanitarian Aid Department
FAO	Food and Agriculture Organization
GLOF	glacial lake outburst flood
GWP	Global Water Partnership
HKH	Hindu Kush-Himalayas/n
ISDR	International Strategy for Disaster Reduction (UN)
IWM	integrated watershed management
JVS	Jalsrot Vikas Sanstha
LDOF	landslide dam outburst flood
LK	local knowledge
NGO	non-government organisation
OFDA	Office for Foreign Disaster Assistance
PRA	participatory rural appraisal
PRC	People's Republic of China
PWMTA	Participatory Watershed Management Training in Asia
SALT	sloping agricultural land technology
SFHM	social flood hazard mapping
UN	United Nations
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNISDR	United Nations International Strategy for Disaster Reduction
USAID	United States Agency for International Development
VDC	village development committee
WMO	World Meteorological Organization

Some Key Terms

Unless otherwise shown, the definitions provided here are based on the UN/ISDR Glossary¹, UNDP/BCPR (2004), ISDR (2004), and UNU-EHS (2006).

Climate, flood and related terms

Weather and climate: Weather is a term that encompasses phenomena in the earth's atmosphere, usually referring to the activity of these phenomena over short periods such as hours or days. Average atmospheric conditions over significantly longer periods of time are known as climate.

Precipitation: Precipitation is the discharge of water, in a liquid or solid state, from the atmosphere, generally upon a land or water surface. Rainfall is precipitation occurring in a liquid state.

Discharge: The volume of water per unit of time that passes through a specified section of a channel is called discharge and is commonly denoted by the letter *Q*. Discharge can be measured in cubic metres per second (m³/s), sometimes referred to as cumecs. In the English system discharge is measured in ft³/s or cusec. A cusec is 35.29 times smaller than a cumec.

Flood: Significant rise of water level in a stream, lake, reservoir, or coastal region.

Flash flood: Flash floods are severe flood events triggered by extreme cloudbursts; glacial lake outbursts; or the failure of artificial dams or dams caused by landslides, debris, ice, or snow. Flash floods can have impacts hundreds of kilometres downstream, although the warning time available is counted in minutes or, at the most, hours. (See Chapter 1 for more about flash floods.)

Return period: Return period, also known as recurrence interval, is the average interval of time within which the given flood will be equalled or exceeded once. For example, a flood of 10 years return period is likely to occur on average once in every ten years.

Landslide dam outburst flood (LDOF): Large landslide debris falling into a river can temporarily block its flow, creating a reservoir in the upstream reach. When the water level rises above the dam or the weight of water upstream of the dam exceeds its holding capacity, the dam will burst, causing a flash flood.

Glacial lake outburst flood (GLOF): A flash flood due to the outburst of a lake of glacial origin.

Communities and disasters

Community: In the context of flash flood risk management, a community can be defined as people living in one geographical area who are exposed to common hazards due to their location. They may have common experiences in responding to flash floods, but different perceptions of and exposure to risk.

Community-based disaster risk management (CBDRM): A process of disaster risk management in which communities at risk are actively engaged in a cohesive manner in the identification, analysis, treatment, monitoring, and evaluation of disaster risks in order to reduce their vulnerability and enhance their capacity. CBDRM places people at the heart of decision making and implementation of disaster risk management activities. Involving both the most vulnerable and least vulnerable groups is important and necessary. In CBDRM, local and national governments are involved and supportive.

Local knowledge: Local knowledge and related practices are complex adaptive responses to internal and external changes. This module uses a broad definition of local knowledge that includes knowledge, practices, and beliefs, because what people know is influenced by what people do (practices) and believe (beliefs, worldviews, values). Indigenous knowledge is a part of local knowledge.

Indigenous knowledge: Indigenous knowledge is a part of local knowledge; it refers to knowledge unique to a given culture or society.

¹ <http://www.unisdr.org/eng/library/lib-terminology-eng.htm> (Accessed June 2007)

Livelihood: All the activities enabling people to make a living including cash and non-cash activities (e.g., subsistence farming, collection of non-timber forest products, and so on). Most of the time, the communities of the HKH have more than one source of livelihood (e.g., migrant labour and subsistence farming) to ensure their survival.

Hazard, risk, response and related terms

Hazard: A potentially damaging physical event, phenomenon, or human activity that may cause the loss of life or injury, property damage, social and economic disruption, or environmental degradation. Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydro-meteorological, biological) or human-induced (environmental degradation and technological hazards). Hazards can be single, sequential, or combined in their origin and effects. Each hazard is characterised by its location, intensity, frequency, and probability.

Vulnerability: The capacity (or lack of capacity) of a society to anticipate, cope with, resist, and recover from the impact of a natural hazard. A society's vulnerability is determined by a combination of factors that determine the degree to which life, property, infrastructure, and services are put at risk by a discrete and identifiable event.

Risk: The chance of loss of life or property, or of injury, damage, or disruption to economic activity due to a particular event for a given area and reference period. Risk is the combination of hazard and vulnerability.

Acceptable risk: The level of loss a society or community considers acceptable given existing social, economic, political, cultural, technical, and environmental conditions.

Response: Activities to address the immediate and short-term effects of an emergency or disaster, including immediate actions to save lives, protect property, and meet basic human needs.

Mitigation: Sustained actions taken to reduce or eliminate a long-term risk to people, infrastructure, and property from hazards and their effects; measures taken in advance of a disaster to decrease or eliminate its impact on society and the environment.

Preparedness: Activities to ensure that people are ready for a disaster and respond to it effectively. Preparedness requires deciding what will be done if essential services break down, developing a plan for contingencies, and practising the plan.

Prevention: Activities designed to provide permanent protection from disasters. These include engineering and other physical protective measures, and also non-structural measures (like legislation, incentives, awareness raising, information dissemination), controlling land use, and urban planning.

Recovery: Reconstruction activities carried out after a disaster. They include rebuilding homes, businesses, and public facilities; clearing debris; repairing roads, bridges, and other important infrastructure; and rebuilding sewers and other vital services.

Coping and adaptation strategies: Short- and long-term strategies developed by communities to avoid, minimise, accommodate and/or spread the negative impacts of natural hazards to livelihood, property and infrastructure, and life.

Structural measures: Action to reduce the effects of floods using physical interventions (like retention basins, embankments, dredging, diversions, dams, levees, floodwalls, elevating buildings, flood-proofing).

Non-structural measures: Action to reduce the effects of floods using non-physical solutions (like land use planning, floodplain zoning, forecasting, advance warning systems, flood insurance).

Other terms

Data, information, and knowledge: Data are pure and simple facts; structured data are known as information. Knowledge is the ability to use information to achieve objectives (source: www.pascaru.net/English/1.html).

Chapter 1

Introduction

The Hindu Kush-Himalayas (HKH) are the youngest mountains on earth and are still tectonically active. They are undergoing uplift and, therefore, the region is characterised by steep slopes and a high rate of surface erosion. In addition to the geological conditions, intense seasonal precipitation in the central and eastern Himalayas, particularly during the summer monsoon, and in the western Himalayas and the Hindu Kush during winter, triggers various types of natural hazards. Floods are one of the most common forms of natural disaster in this region. Intense monsoon rainfall or cloudbursts can cause devastating flash floods in the middle mountains (500–3500 masl). Rapid melting of snow accumulated during winter is the main cause of flash floods in the Hindu Kush and western Himalayas. Furthermore, the region is experiencing widespread deglaciation, most probably as a result of global climate change (WWF 2005; Mool et al., 2001; Xu et al. 2007). Deglaciation has caused the birth and rapid growth of many glacial lakes in the region. These lakes are retained by unstable natural moraine dams that tend to break due to internal instabilities or external triggers leading to a glacial lake outburst flood (GLOF) that can cause immense flooding downstream. Landslides due to intense rainfall in combination with geological instabilities can cause ephemeral damming of rivers. Another type of flash flood common in the region results from the outbreak of dammed lakes. These dammed lakes can break resulting in flash flood.

1.1 Features of Flash Floods

The topography and geology of the Himalayas are the prime factors leading to flash floods. Abrupt slope gradients and poor and fragile watersheds in the hills produce very high flow velocities.

Economic and social factors are also responsible for flash floods. Haphazard encroachment on natural resources due to population growth results in the degradation of watersheds (e.g., ICIMOD 2006; Mehta 2007b; Dixit 2003). The resilience of watersheds is low and regeneration is slow compared to consumption, which leads to various effects on environmental and ecological conditions.

Some characteristics of flash floods and the differences between flash floods and riverine floods are shown in Table 1.

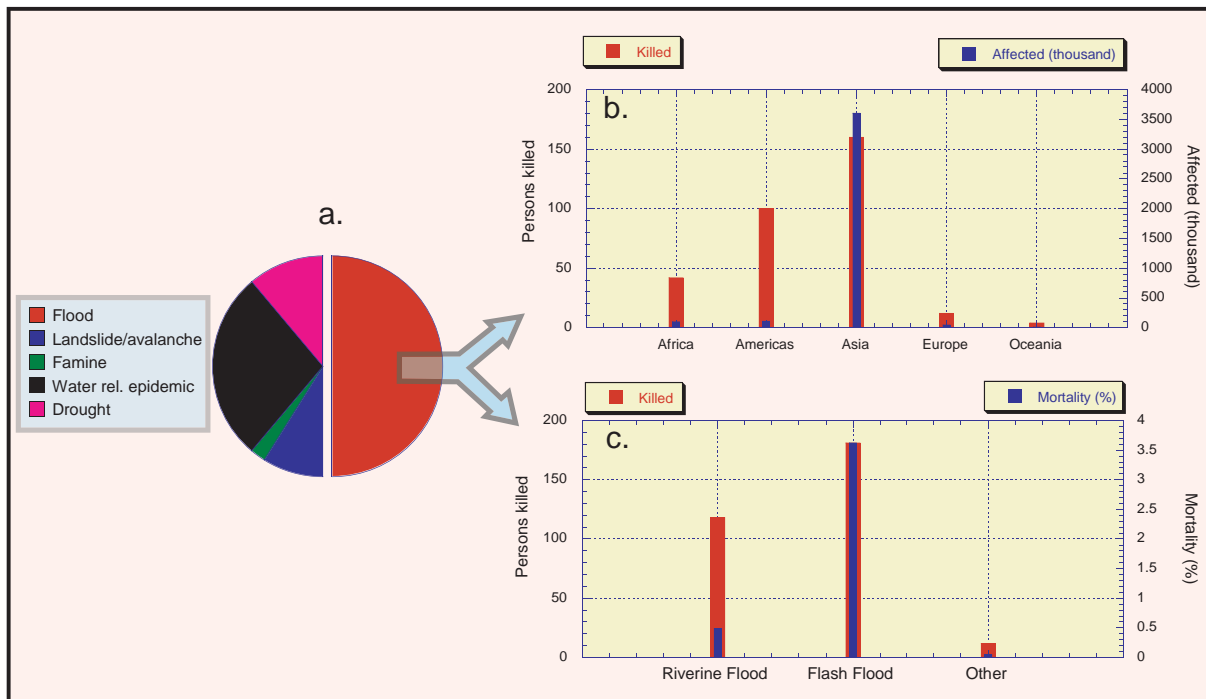
Flash floods in the HKH region

Hundreds of lives and billions of dollars worth of property and investment in high-cost infrastructure are lost in the HKH region every year due to landslides, debris flows, and floods, along with the destruction of scarce agricultural lands. In the last decade of the 20th Century, floods killed about 100,000 persons and affected 1.4 billion people worldwide. The number of events, as well as the number of deaths, is increasing (Jonkman 2005; ICIMOD 2007). Floods account for almost half of all water-induced disasters worldwide, and the number of people killed and affected per event is significantly higher in Asia than elsewhere (Figure 1). This number is even higher for flash flood events than for riverine floods (Jonkman 2005). The region's flash floods occur predominantly in the mountainous parts of south Asia, such as the greater Himalayan range, the Hindu Kush, the Karakorum, the Tien Shan, the Kun Lun, and the Pamir, where they are a major hazard.

Table 1: Flash floods and riverine floods

	Flash floods	Riverine floods
Features	<ul style="list-style-type: none"> – rapid water level rise above natural channels – reaches peak flow within minutes up to a few hours – rapid recession (within minutes to few hours) – often dissipate quickly – not necessarily related to base flow levels – short lag times 	<ul style="list-style-type: none"> – slow water level rise beyond natural channels – reaches peak flow within days to weeks – slow recession (within days to weeks) – mostly coinciding with high base flow levels – medium to long lag times
Causes	<ul style="list-style-type: none"> – very high intensity rainstorms/cloudbursts – rapid snow/glacial melt due to rapid increase in temperature – dam (both artificial and natural) breaks 	<ul style="list-style-type: none"> – prolonged seasonal precipitation of low to high intensity – seasonal snow and glacial melt
Associated problems	<ul style="list-style-type: none"> – often carry high sediment and debris loads – very high hydraulic force and erosive power 	<ul style="list-style-type: none"> – inundation
Frequency	– occasionally, any time during the year	– annually during rainy season
Affected areas	<ul style="list-style-type: none"> – river plains and valleys – alluvial fans – mostly local extent – generally small to medium areas are affected 	<ul style="list-style-type: none"> – river plains and valleys – local to regional extent – large areas can be affected
Predictability	– very difficult to forecast	– with appropriate technology and measures in place, forecasting is easily possible
Potential mitigation measures	<ul style="list-style-type: none"> – early warning systems – community preparedness and awareness – appropriate emergency measures 	<ul style="list-style-type: none"> – real-time flood forecasting – community preparedness and awareness – appropriate emergency measures

Source: Xu et al. 2006



Sources: Based on data drawn from Jonkman 2005; ICIMOD 2007

Figure 1: People killed and affected by floods: a. types of water-related disasters; b. number of people killed and affected by floods disaggregated by continent; and c. number of people killed disaggregated by type of flood

1.2 Causes of Flash Floods

Flash floods have various causes. The most common are intense rainfall, landslide dam outbursts, and glacial lake outbursts – described in more detail below. They can also be caused by the failure of artificial dams and levees, poor management of hydraulic structures, rapid melting of snow and ice, quick release of stored glacial water, and others.

Intense rainfall

Intense rainfall is a very common cause of flash floods. These events may last from one day to several days. The main meteorological phenomena that cause intense rainfall in the region are cloudbursts, a stationary monsoon trough, and monsoon depressions. Figure 2 illustrates the mechanism of cloudbursts.

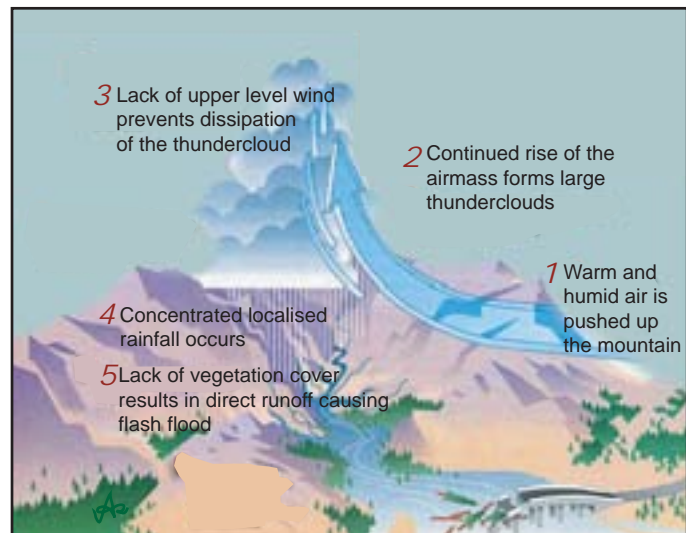
Landslide dam outburst

Intense rainfall on a localised bare slope causes direct runoff and soil erosion. This erosion intensifies as it comes down the slope, causing a landslide or land slip. Debris from the latter can create a natural dam across a stream or river. When the water level rises above the dam or the weight of water upstream of the dam exceeds its holding capacity, the dam will burst, causing a flash flood. Figure 3 shows a schematic representation of the formation of a natural dam.

These kinds of dams often form in steep and narrow valleys where there is less room to spread the landslide mass. Formation of the dam is a very complex phenomenon starting from slumping or sliding of a soil mass. Besides heavy rainfall, soil erosion can be triggered by earthquakes and volcanic eruptions.

Glacial lake outburst

Glacial lakes are directly related to glacier fluctuation processes, which in turn are attributed to climate variability. The Himalayan glaciers have been in general retreat since the end of the Little Ice Age around the middle of the 19th Century. However, the retreat has accelerated in recent decades, most probably due to anthropogenic climate change, which is highly pronounced in the HKH region. The retreat of a glacier leaves behind a large void, which is filled by meltwater, thus forming a moraine-dammed glacial lake. These natural dams are composed of unconsolidated moraines consisting of boulders, gravel, sand, and silt; they are structurally weak and unstable, and undergo constant changes due to slope failure, slumping, and so on. They are susceptible to catastrophic failure, causing glacial lake outburst floods. Glacial lakes may burst due to tectonic movement, seepage through the moraines, or overtopping of the moraines.



Source: Modified from Jarrett and Costa 2006

Figure 2: The mechanism of a cloudburst

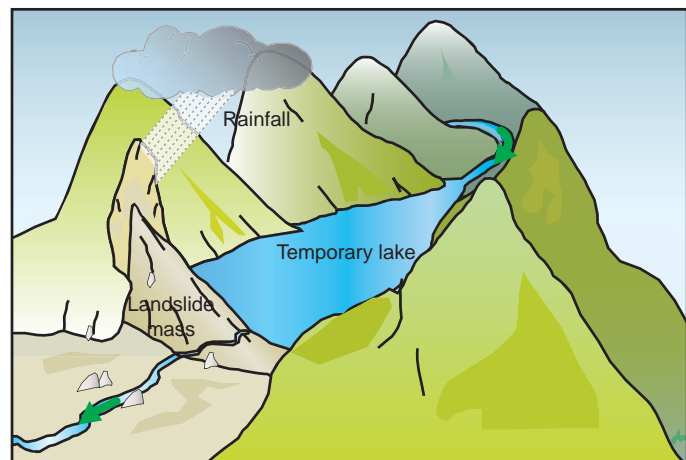


Figure 3: Formation of a natural dam

Flash flood in Chitral, Pakistan, 4 May 2007

At 5pm on Friday 4 May 2007, there was panic in Chitral when everybody in five villages ran to save their lives and those of their dear ones.

Within just half an hour, 42 well-established families were homeless and looking for food, clothes, and shelter. The wealth accumulated by these families and the community from generation to generation – houses, fertile agricultural land, beautiful gardens full of fruit-bearing trees, green fields with standing crops, animal sheds full of livestock, irrigation channels, roads, water supply lines, electric poles and supply lines, transport – everything except their lives was gone. Thunderstorms had started at 4pm and continued for an hour followed by a half-hour hailstorm, causing flash flooding more intense than ever before experienced in the history of Chitral. Life in Chitral was completely paralysed. When the flood receded, the green agricultural lands were full of boulders and standing crops were completely ruined. It seemed as though there had been no human settlement before. The flood moved at such a tremendous speed that it moved huge boulders, tore out trees, destroyed buildings, and obliterated bridges. The damage was estimated at over 30 million Pakistani Rupees (US \$0.5 million).

Flash flood in Central Nepal, on 19-20 July 1993

In July 1993, the Kulekhani catchment in central Nepal experienced intense rain, which caused several devastating flash floods that transported high loads of debris and sediment into the reservoir of Nepal's only storage-type hydropower station, thereby reducing its life by several decades. Other installations of the power plant were severely damaged. The highway joining the capital city to the rest of the country was seriously damaged, with several bridges and kilometres of paving washed away. Fourteen hundred lives were lost. The total impact was so enormous that it pushed the country back in its development efforts by several years.

(Dhital et al. 1993)

1.3 Impacts of Flash Floods

Flash floods contain water flowing at high velocity with large amounts of debris (Figures 4 and 5). They can be highly destructive and can sweep away critical infrastructure and lifelines of mountain communities. The heavy debris loads increase the destruction, and often damming can occur at constricted areas such as gorges. The major impacts can be separated into socioeconomic and environmental.



S.H. Shah

Figure 4: Debris fan due to a flash flood in July 2006 in Brep, Chitral, Pakistan



S. Dhungana

Figure 5: Large boulders deposited by a flash flood in Madi River, Central Nepal in August 2003

Socioeconomic

Landslides and debris flows associated with flash floods can have major socioeconomic impacts on people, their homes, and possessions, industrial establishments, and lifelines such as highways, railways, and communication systems.

The indirect impacts of flash floods include such things as reduced real estate values in areas threatened by landslides and loss of tax revenue on property devalued as a result of landslides. Like other natural disasters, flash floods can cause loss of industrial, agricultural, and forest productivity, and of tourist revenue as a result of damage to land or facilities or interruptions to transportation systems (Figure 6). Flash floods can also cause loss of domestic animal productivity because of death, injury, or psychological trauma. The disruption of transportation systems causes financial hardship as people cannot transport their perishable agricultural products to market.

Environmental

Flash floods in the Himalayan region have enormous impacts on the natural environment. The mudflows cover terraced land with boulders and debris, damage standing crops, and render fields useless for agriculture until massive efforts are made to reclaim them (Figure 4). In the foothills and plains of the river valleys, floods often deposit coarse sediment, which damages valuable crops and renders the land infertile.

Riverbanks in such areas are subjected to severe bank erosion and loss of soil, which in turn provides more sediment for the river to deposit downstream. Switching from an old course to a new one is common after a severe flash flood. Landslides often give rise to debris flows that aggrade river beds and cause flow diversion and riverine flood. This in turn aggravates the flood susceptibility of the downstream floodplains by creating drainage congestion.



Figure 6: Damage to highway by a flash flood in July 2005 in Garam Chasma, Chitral, Pakistan

S. Khan

Community-based Flash Flood Risk Management

2.1 The Need for Community Level Flood Management Initiatives

Communities must be involved in the development process if activities are to be successful and sustainable. This is as true for disaster management as it is for other development initiatives (ADPC/ECHO/UNESCO 2004). The following are some points to take into account in relation to community involvement.

- Local communities know their village and the local situation best and no outsider can understand the local opportunities and constraints as they do; thus, they need to be involved in identifying and resolving disaster vulnerability issues.
- Communities have a personal interest in avoiding disasters and are the main source of local resources; thus, they have the motivation and ability to carry out local activities.
- Communities are naturally very concerned with the local affairs on which their survival and wellbeing depend, so information should be generated in a manner and language that is understood by the community.
- Central level management and response programmes often fail to assess the needs of vulnerable communities, undermine the potential of local resources and capacities, and may, in some cases, even increase people's vulnerability.

Generally, households prepare for flash floods individually, taking care of everything from stocking food, obtaining bedding materials, and searching for easy passage and shelter during floods. This results in maximum loss during floods as individual households cannot perform all the necessary preparations effectively. A participatory approach ensures that activities are coordinated with others and there is a distribution of responsibilities; hence, the community is better prepared to avoid disaster. A community flash flood risk management committee² (CFFRMC) can be formed as a local institutional arrangement to increase the capacity of households and communities to withstand the damaging effects of natural hazards. Forming an organised committee brings a whole community under an umbrella and makes other stakeholders aware of available resources and ways to protect themselves against flood risks. The process of working and achieving things together can strengthen communities. It reinforces local organisations; enhances confidence, skills, and the capacity to cooperate; increases awareness; and achieves critical appraisal.

An organised committee can more easily obtain external support, as an authorised unit can speak on behalf of the whole community. This also facilitates the networking of information and communication with external supports, which are often available only during the affected period. In development projects, the CFFRMC builds support and ownership of the project, thus increasing the possibility of interventions being sustained after the project ends. Community participation in planning and implementing projects accords with people's right to participate in decisions and is an important part of democratisation in society.

² Depending on the hazards, the committee can have different forms. In general cases, it can be a community-based disaster management committee (CBDMC), which addresses multiple hazards. In areas where one specific hazard is predominant, the committee can be focused on that particular hazard, e.g., community-based flood management committee (CBFMC).

2.2 Conceptual Framework for Community Participation

The community must be part of risk identification, prioritisation, plan formulation, implementation, monitoring, and evaluation (ADPC et al. 2004). People must be involved in all aspects of the risk management process, beginning with assessment. Community-based risk assessments can be carried out using participatory rural appraisal (PRA) tools, which can gather the information needed for assessing the community's risk. A community risk assessment allows all community members to participate, and to identify the flood hazard they face and understand it. The assessment provides them with the information they need to enable them to participate in decision making. Risk mapping can be a community project that encourages participation and awareness. It is an exercise that not only produces a risk map that is understood by the participants, but also informs them of potential hazards, vulnerability of risk elements, and potential exposure. Figure 7 shows the conceptual framework for community participation.

A community-based risk assessment is a simple method to assess risk and to design community-level flash flood risk management plans. It has a low level of accuracy because the information collected is subjective and tends to be more qualitative. For example, community members may not remember events accurately, especially those that happened long ago. But, in spite of all the constraints, community resources cannot be underestimated. Participation is the key to conducting a successful community-based risk assessment. The opinions, knowledge, and experience of the community can be tapped by establishing a process for active participation.

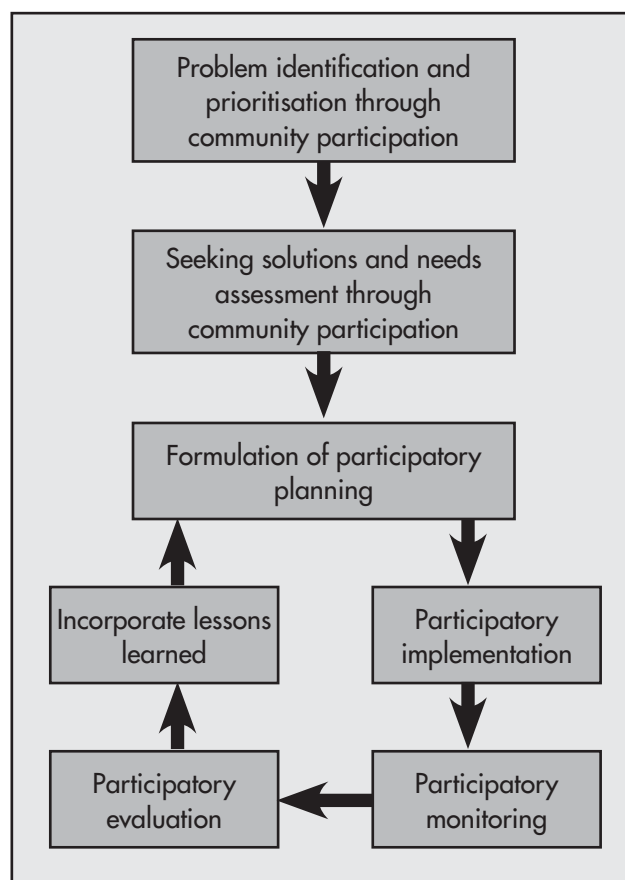


Figure 7: Conceptual framework for community participation

2.3 Community Flash Flood Risk Management Committee

Forming a committee

The first step in forming a CFFRMC is to collect information regarding its importance; existing institutions; and roles, responsibilities, and formation procedures; and to disseminate that information to stakeholders. Involving socially deprived and marginalised groups like women and indigenous people helps the committee to function successfully by ensuring it addresses the concerns of every level of the community.

An ad-hoc committee of five to seven members should be formed before the formation of the main committee. The ad-hoc committee should involve itself in discussions and interactions with the communities likely to be affected, local leaders, and teachers, including women and different ethnic and social groups. For such discussions, the ad-hoc committee should seek the help of a catalytic organisation (see Box). The main objective of this committee is to draw up a draft constitution and facilitate the formation of the CFFRMC. The ad-hoc committee should call for meetings to discuss the draft constitution, which should be amended to reflect the suggestions made in the mass meeting.

Role of an external catalytic agent

An external agency like an NGO, or knowledgeable and motivated persons are needed during the formation of the CFFRMC to provide motivation, training, and guidance. CFFRMC members alone might fail to draw the attention of the villagers to the need for flash flood risk management. The catalytic role of external agencies in facilitating joint ownership between the CFFRMC and villagers is very important. External catalytic agents, including dynamic and knowledgeable local leaders, teachers, and NGOs, can act to bridge gaps between villagers and the CFFRMC. They can mobilise and influence communities to designate responsibilities, and can also play a role in liaising between the CFFRMC and government institutions.

The committee structure

A CFFRMC is a legal community representative organisation that can plan, implement, and monitor different activities of flash flood disaster risk management and minimise the impact of flood on the community.

The CFFRMC should have at most 11 members elected from a general assembly according to the procedure set by the constitution. Care should be taken to ensure proper representation from different sections of society, particularly women and disadvantaged groups. There should be an advisory committee made up of representatives of district-level government organisations, concerned members of VDCs³, schoolteachers, local health workers, agricultural extension workers, representatives of local NGOs, doctors, engineers, and so on. The committee should be chaired by the head of the local government body and should nominate a secretary from among its members.

Every CFFRMC should include different teams or sub-committees with various responsibilities, each team led by a team leader. The central committee should decentralise responsibilities to various teams to work effectively for risk reduction. Figure 8 illustrates the structure of a CFFRMC. This is a typical structure; actual structures may differ according to the specific needs of each location and community.

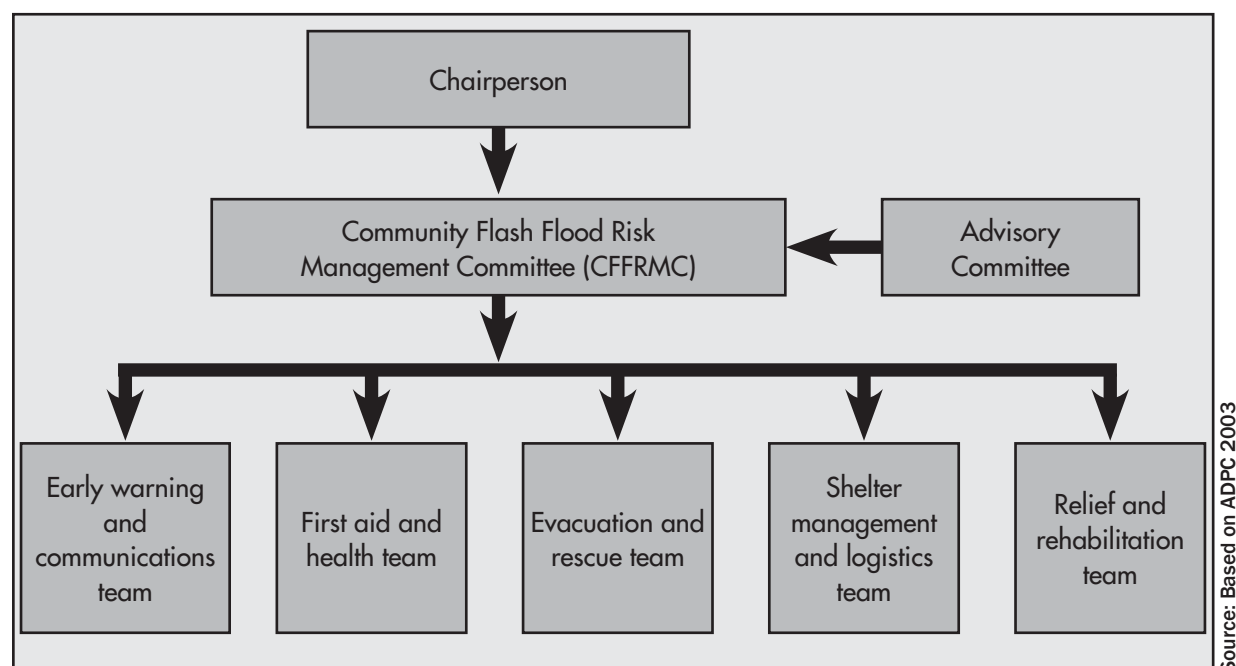


Figure 8: Typical structure of a community flash flood risk management committee

³ VDC (village development committee) is the lowest unit of local government in Nepal. The equivalent unit in India is the panchayat and in Bangladesh, the union parishad.

Early warning, communication, and information team: The early warning, communication, and information team is responsible for establishing communication within the community and also with other stakeholders. It develops early warning systems and disseminates information to all communities and concerned agencies. The team should incorporate local knowledge on flash flood risk management in the process and communicate existing local knowledge to external agencies. It should develop systems for documenting the response by different teams and for assessing community needs. Its chairperson should liaise with local government for continued relief operations during and after floods.

First aid and health team: The first aid and health team is responsible for raising community awareness about health, hygiene, and education in times of flash floods. During flash flood events it mobilises and organises camps to treat injured people.

Evacuation and rescue team: The evacuation and rescue team works during the flood period to evacuate affected people. If possible, it should arrange to evacuate cattle and wealth along with people. It can also work with first aid teams to provide first aid support.

Shelter management and logistics team: The shelter management and logistics team manages shelter for victims and so must establish and maintain stockpiles of material and develop logistical systems to distribute relief, with community accountability.

Relief and rehabilitation team: The relief and rehabilitation team ensures the necessary stock of relief goods and its proper security and monitoring. During floods, it identifies the needs of individuals and families, and coordinates the rehabilitation and reestablishment of the victims.

The role of volunteers in the five teams is very important. In fact, the whole CFFRMC depends on volunteers. Each team needs to enrol a certain number of volunteers. The team members and volunteers should be selected to maintain proper geographic, gender, and social representation. The detailed roles and responsibilities of these teams are given in Annex 1. For the volunteers to be able to work according to their responsibilities, they should be trained after joining the teams. Refresher trainings should be organised periodically (see below).

Responsibilities of the committee

A CFFRMC is a community-level forum representing all stakeholders and implementing flash flood risk management measures, as well as promoting flash flood awareness and advocacy at policy and planning levels. The roles and responsibilities defined here are the major, but not the only, responsibilities of a CFFRMC.

- organise and mobilise the community to prepare against disaster and reduce the loss of life and property
- awareness raising and advocacy at a multi-stakeholder level regarding elements that can reduce flash flood risk
- train volunteers and community members regarding what to do before, during, and after flash floods
- maintain an emergency stockpile and ensure its proper distribution during flash flood events
- manage distribution of shelter and relief among affected people equitably and according to need
- monitor the exact allocation of relief to affected people

Emergency functions of CFFRMC

- issue warnings
- manage evacuation
- organise search and rescue with community participation
- provide first aid and arrange subsequent medical assistance
- conduct damage needs capacity assessment and report damages and needs to government and disaster-management agencies
- coordinate, plan, and implement relief delivery operation with aid agencies in an equitable manner

- advocate for the rights of victims in the event that political considerations influence the allocation of relief items
- influence local governments to design sustainable development plans for the most vulnerable people by reducing their geological and ecological hazards through a participatory approach
- coordinate with responsible agencies before flash flooding for timely support
- design evacuation and contingency plans for the cluster and prepare the community accordingly
- motivate community people to avoid construction and settlement in flood-prone zones
- motivate community members to flood proof buildings to increase their capacity to withstand flooding
- develop a local flood warning system based on local knowledge
- extend support to link indigenous and local knowledge for early warning and preparedness with the experts in developing plans and programmes
- promote flood-friendly agricultural practices and other regeneration of economic activities after flood devastation

Institutional empowerment

Forming the committee and sub-committees (teams) does not end the need for flash flood management. Proper empowerment and skills must be developed to react to crises and work accordingly. Quick and rational decision making by the functional bodies is very important. Every member has different responsibilities, and each responsibility is important, so committee members, team leaders, and volunteers must have appropriate expertise and understanding of responsibilities. Various training events and knowledge-sharing opportunities must be organised to empower these actors.

Training must cover skill development in the areas of early warning, preparedness, and risk reduction. Some examples of such skills could be measurement of precipitation, water-level gauge recording, early warning, participatory hazard and vulnerability mapping, preparedness planning, community-based first aid, community-based disaster management, building mitigation structures, watershed management, and agriculture management. The CFFRMC should conduct training needs assessments at regular intervals.

Financial empowerment

Many of the CFFRMC's activities will require funding (see Chapters 6, 7, and 8). Therefore, the CFFRMC must establish close contact with external agencies, including government agencies, to obtain funds.

The community members must arrange some funds themselves to feel ownership and a sense of accountability. Villagers in affected areas are often economically weak and, therefore, their cash contributions may not be significant. However, community contributions do not necessarily have to be in cash; people can contribute in the form of agricultural products or labour.

Some of the existing fundraising mechanisms include the following.

- Social and religious events can be organised to raise donations. For example, in Nepal it is common to organise a religious ceremony (e.g., purana), which may last several days to weeks, during which a large number of devotees visit the ceremony and pledge donations for development work (e.g., building schools, health posts, roads).
- Mountain forests are rich in herbal and medicinal plants, some of which can be sold commercially. Environmental safety should not be compromised while conducting such activities.
- Some funds can be diverted from the products of community forestry. Community cultivation of cash crops can also be encouraged.
- Some portion of local taxes (e.g., road tax, quarry tax) can be extracted for CFFRMC funds.

Transparency and accountability of the funds used in flash flood management activities is very important. The CFFRMC must hold a general assembly to give details of its financial activities, with villagers, government personnel, and other external parties involved in the auditing.

Governance

Why is governance an essential element of a CFFRMC? Governance provides the enabling conditions for communities to absorb or resist perturbations such as flash flood events, bounce back from disturbances, and adapt to changes brought about by the events.

The CFFRMC is responsible for practising good governance in its risk management procedures. Assessment of needs, prioritisation, and equitable allocation of resources are key points for good governance, which effectively mainstream planning for risk management. Every person has his or her own view on the matter, so it is important to sort the disputes and maintain equal priorities by incorporating various ideas in the planning. The governance process, no matter in what country or system it occurs, must encourage a cyclical planning process that allows for learning and improvement over time. This is also known as 'adaptive management'.

Good community governance for flash flood risk management can be achieved by the following.

- **Participation:** A participatory approach that includes the whole community is important. Voices are raised about needs and demands for the mitigation procedure. The goal of a CFFRMC can only be sustained if all stakeholders can envision a path toward a desired future outcome.
- **Communication:** A CFFRMC's effectiveness can be measured in terms of its input into teaching the community about a problem, its causes, and appropriate solutions to minimise loss. Peaceful resolution of stakeholder disputes is vital.
- **Efficiency:** Efficiency of the committee is achieved by minimising financial, political, social, and environmental costs. CFFRMCs should be accountable to the public and stakeholders.
- **Equity and inclusiveness:** Mainstreaming gender issues is important. Promoting the empowerment of women and marginalised groups is necessary, and such groups must have opportunities to become involved.
- **Responsiveness:** The committee must be responsible and accountable to the community and include all stakeholders.
- **Transparency:** Transparency of procedures indicates good governance. Decisions should be taken and their reinforcement done in a manner that follows rules and regulations. Information should be freely available and directly accessible to those who will be affected by such decisions and their enforcement.

Redressing grievances

Despite all possible care, some people's interests might not be protected to the extent desirable. When such lapses are reported, the CFFRMC should try to redress the grievances to the satisfaction of the concerned parties in order to maintain harmony and mutual trust in the community. Those dissatisfied must have an opportunity to appeal to higher authorities. The formation and success of a mechanism to redress grievances is an important factor in the long-term sustainability of the community approach to flash flood management. The institutional mechanism to be created should take note of this aspect.

A public cell to redress grievances should be established under the CFFRMC with direct supervision by the district-level government⁴ to resolve disputes arising out of allocation of shelter, distribution of relief items, and other causes. The CFFRMC's secretary is responsible for logging appeals and researching the validity of grievances. The working mechanism of the committee has to be clean, transparent, efficient, and speedy – acknowledging an appeal within five days and disposing of it within 90 days. People not satisfied with a judgment can appeal to the local government body, the decision of which will be final and must be accepted by all parties.

⁴ This could be the district development committee (DDC) in Nepal, or the district government (zilee-hakomat) in Pakistan, and so on.

2.4 Government Involvement in Risk Management

National governments have a fundamental role to support ‘preparedness and recovery’ at various levels of administration. The superior financial resources, institutional mechanisms, and technical capacity of national governments are targeted to assist local governments in the recovery tasks following an emergency. It is presumed that, through legislation, the national government has organised the resources under its mandate, has planned the necessary coordination between its various agencies and departments, and is generally prepared to assist the local levels during the response period (Sutardi 2006).

The role of government in improving community preparedness and participation can include ensuring the legal status of the CFFRMC, distinguishing the roles and responsibilities of the CFFRMC and local governments, mainstreaming risk management and vulnerability reduction activities in the local development plans, and enhancing the capabilities of the CFFRMC. The areas where government involvement is necessary are listed in Table 2.

It is essential that the activities mentioned in Table 2 be conducted in close collaboration and coordination with the CFFRMC. Along with these responsibilities, monitoring and supervision of the whole process is also very important. Government organisations should monitor relief measures, relief camps, and provision of basic amenities: water, sanitation, health care, rural communication links, and other facilities.

Pre-flash flood preparedness	During flash flood	After flash flood
Facilitate a meeting involving the CFFRMC, local government, and local NGOs before the monsoon to review the preceding year’s successes and failures in flash flood management and to update the arrangements	Mobilise qualified search and rescue teams like army or police according to the severity of the disaster	Contribute to the distribution of relief items
Provide funds for capacity building of the CFFRMC, awareness-raising campaigns, construction of mitigation structures, and construction of safe heavens on uplands	Allocate health personnel and medicine	Assist in rehabilitation processes
Facilitate the strengthening of the functioning of the control room (see Chapter 6)	Assist in providing basic necessities like safe drinking water, food, and shelter	Make arrangements for financial support to the community
Assist in collecting grain and fuel to use during a crisis	Allocate police to save the remaining property of the people in affected areas	
Provide technical assistance during construction of structures for mitigation and capacity building and awareness-raising campaigns		

Gender and Disability Issues⁵

Those who are already socioeconomically and physically disadvantaged or lag behind in access to resources are at much greater risk of suffering severe impacts of a disaster. Similarly, those who are illiterate and cannot read early warning announcements and instructions barely participate in disaster preparedness activities. Women generally participate less in early preparedness activities and, in any kind of disaster, there is a higher percentage of death among women and children. Women's physical size, strength, and endurance in relation to men; states of pregnancy and lactation; their primary responsibility for infants, small children, and the elderly; and often clothing, may all serve to slow them down at the very moment when time is crucial to survival.

Women's greater socioeconomic marginality is due to their limited access to resources, social and cultural practices, their responsibility for the household, and so on. The social construction of predefined gender bias creates a gap between equal accessibility to resources and opportunities. This is particularly visible at the household level, where relationships between females and males are structured around asymmetrical access to resources, which at their most extreme, are expressed in women's disproportionately poorer health and nutritional status; lower levels of literacy, education, and income-generating work; and higher morbidity and mortality rates relative to men. The culture and society of the HKH region generally considers women as a means for reproduction and domestic work, and confines them to the domestic periphery. Because it is felt that women do not need education to run a house, they have limited access to education. Furthermore, they are always busy with household activities, in addition to working in the field, which increases their dependency on men. They are less exposed to the outside world and are very much unaware of what is happening in their surroundings, including any impending natural hazards.

Gender issues are vital to disaster risk management. Gender-biased attitudes and stereotypes can complicate and extend the time for women's recovery from a disaster. It is, therefore, critical to understand the gender dimensions of the disaster-management process in order to address root causes and take equitable and efficient risk-reduction measures.

In these and other examples from real life, the gender issue is seldom just a woman's issue. More often than not it is a family affair, a community concern, a social issue, a financial and economic question, and, in the final analysis, a matter of individual and collective choice.

When priorities are established, women's interests are often the most poorly represented as they are generally absent from decision-making forums. Thus, women's concerns are least likely to be addressed, whereas women are most likely to be affected by floods.



Figure 9: Woman carrying a child while crossing a drainage channel

Cha 2007

⁵ Prepared with contributions from Ms. Dechenla Sherpa, ICIMOD.

Training women to deal with disease control, malnutrition, food shortages, revival and treatment of the land, and crop production is an important role of CFFRMCs. A gender perspective would advocate that the roles of men and women be examined separately and strategies for protection and mitigation be targeted specifically at men and women based on these roles.

Women's lower literacy and educational levels relative to men also contribute to their reduced access to post-disaster relief activities. After disasters, women often have to prove their legal right to land and other productive resources if their husbands have died. There is a wide gap between the written rules and the reality, with customary laws, traditions, and cultural factors often holding sway, especially in rural areas.

Women are also adversely affected by socio-cultural norms of female modesty, which restrict them from moving about easily and interacting with relief and reconstruction workers, who are typically male.

3.1 Why Focus on Gender Roles?

It is important that men and women participate equally in disaster preparedness activities. Women can play important roles in identifying those who need rescue during disasters. For example, they are aware of the sick, the elderly, and children. It has been observed that most women die in disasters when they try to save their children and property. Because women often use the land, water, and animals to earn a living and feed their families, they try to conserve these resources for future use, and help keep water clean, soil fertile, forests sustainable, and livestock healthy.

Women are more likely than men to share ideas and resources, because they are more organised at the grassroots level (Mehta 2007b). They build lively networks of friends at work, in schools, in their neighbourhoods, and in their religious obligations. Often in a disaster, women's groups take the lead in helping rebuild community solidarity. In addition, women and children are the frontline community volunteers in the villages and are the 'first responders'. Therefore, it is important to build their capacity, not only to enable them to save their lives and property, but also to be active partners in mitigating flash floods. Proportional representation of women to address women's issues about the distribution and use of relief funds and available government funds must be assured. Women's participation will ensure that during and after flash floods they are not seen as a burden, but as a resource for the community.

Capacity building initiatives for women will not only strengthen them to face flash floods, but will also bring about a positive change in personality development. The knowledge and skills gained for preparedness are useful in emergencies, but given women's role in the household, they can also use this knowledge in everyday life. Therefore, it is important to target women in capacity building initiatives and to empower them (CAP-NET 2006).

There is considerable evidence that in the aftermath of disasters women and girls have an increased risk of physical and sexual violence. Authorities typically fail to intervene because of the widespread assumption that domestic violence is a personal matter, or they just let the matter go because they think that people have already suffered a lot from the flash flood (FAO 2004).

Some examples of problems faced by women during disasters

Violation of privacy: During disasters such as floods or prolonged waterlogging, women often face problems with bathing. As the whole area is inundated, they have to bathe in unhygienic situations or in polluted water. Moreover, since their mobility is restricted, they cannot go far from the house and need to leave behind children and elderly family members.

Lack of sanitation facilities: As the sanitation system breaks down during a disaster, women become victimised. They cannot go to any open place like men (FAO 2004). When we visited a government office that was used as a temporary shelter for flood stricken people in Jamalpur district, Bangladesh, during the 2004 flood, we found that the officers had closed the sanitary facilities because they did not want the refugees to make the toilets dirty. Some women courageously approached us and said, "Sir, we don't want relief. Please

tell the officers to allow us to use the latrine. Every morning we will clean it before they come to the office. We know that you have come to observe the situation and ultimately provide relief, but what you will not provide are sanitation facilities for us.”

Creation of new vulnerabilities through relief interventions: Sometimes relief measures can create vulnerability for women. Moving to the relief distribution place, waiting in queues for a long time, even for a whole day with their children, and carrying the relief goods all become a tremendous burden for women. Very often clothes distributed to disaster-stricken families are inadequate and are used by the male members of the family. The specific needs of women are not considered.

Harassment during disasters: Adolescent girls and middle-aged women are prime targets for harassment (IUCN 2006). In many cases after floods, the husband has to go out in search of earnings and leave the women behind. As a result, the whole family has to face scarcity of food and other basic necessities. Poor adolescent girls who have to work away from their homes also face harassment – even getting trapped by brokers of brothels.

Lack of access to information: Women have less access to information than men and are often ignored during planning and implementation of risk reduction programmes at the community level. In the case of a disaster, they may not be aware of evacuation routes, safe locations, shelters, relief distribution points, and so on.

3.2 Women’s Potential to Combat Disaster

Women possess strengths that can play a very significant role in combating disaster, especially at the family level. Patience, the capacity to make decisions quickly, the extraordinary capacity for household management, and taking care of children and aged members of the family with profound affection are a few worth mentioning.

Women play a key role in family-level preparedness and can introduce innovative mechanisms and techniques such as making portable stoves for cooking during floods; preservation of dry foods, fodder, and fuel; and saving in contingency funds for emergencies. They have developed these from family wisdom and traditional practices for coping with disasters (FAO/WFP 2008). These abilities of women provide great strength to combat disaster.

3.3 Gender Equality in Flash Flood Risk Management

Differentiating target groups: Gender-differentiated approaches are essential in all interventions with target group-related objectives. Whenever a response is associated with, or directed to, a particular target group, it will have different impacts on men and women, which must be addressed separately (FAO/WFP 2008).

Include women in pre- and post-disaster planning: Gender should be mainstreamed in any kind of disaster management activity in the community. Emergency planning must have the participation of women.

Keep women safe: Women’s safety is important in disaster risk management. Relief agencies must ensure women’s physical safety by creating safe spaces and facilities for women and the means to ensure their legal rights.

Protect girls’ education: Girls are more likely to miss school after a disaster. As soon as possible after a hazardous event occurs, special attention must be paid to girls’ education.

Target women’s health needs: Agencies and the CFFRMC itself must make special efforts to address the specific health needs of women in disaster situations. This includes providing suitable bathrooms, appropriate garments, sanitary supplies, and parental and maternity care. Psychological counselling for post-traumatic stress must be available to women and children.

Help women become self-sufficient: Women must be encouraged towards income generating activities. Special attention must be given to provide training on small-scale income generating activities.

Ensure equitable aid distribution: Very often women are deprived of aid distributions due to their limited mobility, physical limitations, and lack of proper access to information. Care must be taken to ensure that women have equal access to aid materials.

Bring women into all decision-making processes: For the long-term sustainability of plans for risk management, women should be encouraged to participate and even take leadership. Capacity building and advocacy trainings are important for women to increase their participation and leadership roles.

Points to keep in mind when engaging in gender analysis

- Gender is about women and men in relation to one another: the fact of being female or male plays a critical role in shaping vulnerabilities, first responses, information and sharing capacities, and access to decision-making.
- Communities and households are not made up of individuals with equal entitlements and access to resources (e.g., food, money, decision-making); understanding the structures of both is an essential component of gender analysis.
- Assumptions about what women and men do, their roles and responsibilities, should be examined rather than taken for granted. For instance, much of what women do is not considered 'work' because no remuneration is received for it.
- Class (social position, wealth), caste, age, and education also influence gender roles, responsibilities, access to resources and power. A poor woman's or man's needs and priorities are likely to be different from those of better-off men and women.
- Participatory approaches may not necessarily ensure that gender perspectives are taken into account; notions of wellbeing need to be based on a range of definitions given by local people.

(adapted from Mehta 2007a)

3.4 Disability Issues in Risk Reduction

Disabilities are part of diversity in human society. People have different physical and mental characteristics, different needs, and are differentially vulnerable during disasters. The so-called 'normal', non-disabled people created a discriminatory relationship with the disabled community, in which they are not tolerant of any limitations to the human body, intelligence level, or sensibility.

The usual belief is that these people are weak and dependent on the others. As a result, they remain the most vulnerable segment during disasters, as disaster risk management usually targets the 'average' person. The word average itself can have a different meaning depending on the location. For example, in Bangladesh 'average people' means Bengali Muslims, usually male. Urdu-speaking non-Bengalis, aboriginals, Hindus, Christians, Buddhists, or small segments like the Ahmedia community people are not 'average'.

What may happen during a disaster?

A physically handicapped person may need additional support. The assisting equipment for a disabled person (e.g., crutches, hearing aid, spectacles, wheelchair, medicine) may be lost or damaged. He/she may need new or different types of materials or equipment. A visually impaired person may face problems proceeding to a shelter without assistance. During disasters, loudspeakers are often used to issue important warnings and instructions, but a hearing-impaired person may not hear them. Mentally challenged people require assistance so that they can be evacuated to a shelter safely. Most importantly, these people may not be able to communicate their problems effectively.

Some recommendations in addressing disability issues in flash flood management

In every disaster (including flash floods), disabled people face the most problems. Many of them cannot reach the shelters because of limited mobility, vision problems, and so on. They are also left out of receiving minimum relief materials. The CFFRMC and the evacuation and rescue team should take the following points into consideration during all stages of disaster risk management.

- Disabled people are usually excluded before any emergency. After the emergency, the situation deteriorates even further.
- Disabled people and people with special needs must be located in the social flood hazard mapping (SFHM) process (see Chapter 6). The nature of the impairment should be noted on the map.
- Ensure that techniques for search, evacuation, and so on consider the concerns of the disabled. The mentally disabled, physically challenged, blind, deaf, disabled children, women, and adolescents, each have their own needs. The CFFRMC and people of the community should take these differences into consideration.
- Ensure that the safety of disabled and other disadvantaged people is considered. For example, in shelters there is sometimes the risk of sexual harassment.
- Are the shelter and sanitation facilities easily accessible? User-friendly? High steps or high-placed houses may cause difficulties, particularly for elderly people, children, and the sick.
- Information disseminated using sound and recordings instead of posters will be more useful for the blind or non-literate.
- Audio, visual, and printed media should all be considered in providing information to people with special needs. Instead of a common modality, a needs-based approach to dissemination could be better suited to reach out to disabled people.
- Ensure mentally shocked or wounded persons receive psychological comfort.
- Usually relief operations give most attention to material assistance. The main items included in a relief package are generally cereals, canned food, clothes, and so on. But health and medical services, and supportive materials for the disabled should also be included.

Chapter 4

Local Knowledge⁶

4.1 Lessons from the Field

Flash floods are frequent events in Chitral District, the north-western most area of Pakistan. Most of the time, villagers manage to save their lives. They know how to interpret local environmental signals and where hazardous places are. But, on 14 July 2006, a foreign engineer lost his life at a tunnel construction site. That day, an intense rainstorm occurred between 4:00 and 5:30pm. The extreme rainfall triggered a flash flood, which rapidly washed away the engineering company's equipment and residential quarters on the fringe of the riverbed. This tragic event, which took the life of one person and damaged a million rupees of equipment, was not a surprise to the locals. "We told them twice!", said the leader of a nearby village. "We knew that the retaining walls were too small to channel the water during the rainy season and that they should have been raised." The villagers had learned from previous experience, remembering that two people died in the same place about 40 years ago in a major flash flood. Unfortunately, the engineering company, interested in settling in an easily accessible and cheap area, neglected local advice.

Many stories like this one can be found in Chitral District and other parts of the Himalayan region. They illustrate that local knowledge, in general, and local knowledge on natural hazards, in particular, is normally ignored by external agencies at both national and international levels. Agencies tend to favour scientific and specialised knowledge, a great deal of which is not in tune with local contexts and realities. The residents, whether they live in a remote village of Pakistan or in the suburbs of Kathmandu, are often the first victims and respondents to natural hazards. In the Himalayas, local knowledge is all the more important because many communities are isolated. Ignoring their knowledge may result in important human and economic costs, especially in the long term. The failure of many disaster management (DM) projects and activities, as illustrated recently by the impacts of relief aid during and following the December 2004 Asian tsunami, is partly attributed to a lack of understanding of local contexts and needs.

4.2 Local Knowledge and Community Participation for Improved Disaster Management

Flash flood management is a major challenge for government and non-government organisations (NGOs) due to difficulties with accurate forecasting and the short warning lead-times. Therefore, community participation in flash flood management is a pre-requisite to improve local preparedness and response capacities. But how can practitioners work with communities to improve disaster management?

This chapter argues that respecting, understanding, and integrating people's knowledge and practices into flash flood management activities, and exploring ways to combine this knowledge with scientific knowledge, can improve community participation in disaster management. Ultimately, a deeper understanding and use of community knowledge can help external organisations to further reinforce the community's strengths and to minimise possible unsustainable practices for improved disaster management. Therefore, this chapter seeks to provide understanding of local knowledge and its role in disaster management. This will be done by investigating the following key questions: what is local knowledge, where is it located, who has it, when and how is it produced, how to identify and document it, what are the advantages and disadvantages of using local knowledge in disaster preparedness and disaster management, and how to make use of local knowledge in flash flood management. Trainings on local knowledge related to disaster preparedness and disaster management should provide an entry point to change attitudes towards local knowledge and improve

⁶ This chapter was contributed by Ms. Julie Dekens, ICIMOD.

communication and tolerance between communities and the different stakeholders working in disaster management. It should also be an entry point to move from the conventional top-down approach in disaster management towards the participation of communities and the mainstreaming of disaster management into development programming.

This chapter is based on ICIMOD's past experience and publications on local knowledge for disaster management (Dekens 2007a, b, c, d). A training exercise on documenting local knowledge along with necessary supporting documents is provided in Annexes 2a-e.

4.3 What is Local Knowledge?

The term 'local knowledge' is used here in its broadest sense to refer to what the residents (or the people living with risk) know about natural hazard risks, and indirectly what they believe and do about them in a given situation. Peoples' practices, lifestyle, and beliefs influence their knowledge on natural hazards and, therefore, the way they respond to them (Figure 10). Indigenous knowledge is part of local knowledge: it refers to knowledge unique to a given culture or society. The term 'local knowledge' puts the emphasis on a place or a region, rather than time (i.e., a knowledge that is anterior to another). Local knowledge and practices are not static: they are complex adaptive responses to change. In many cases, people have been living with natural hazards for generations and have been able to cope and adapt to minimise, reduce, or avoid the negative impacts of natural hazards to their livelihoods, properties, and lives.

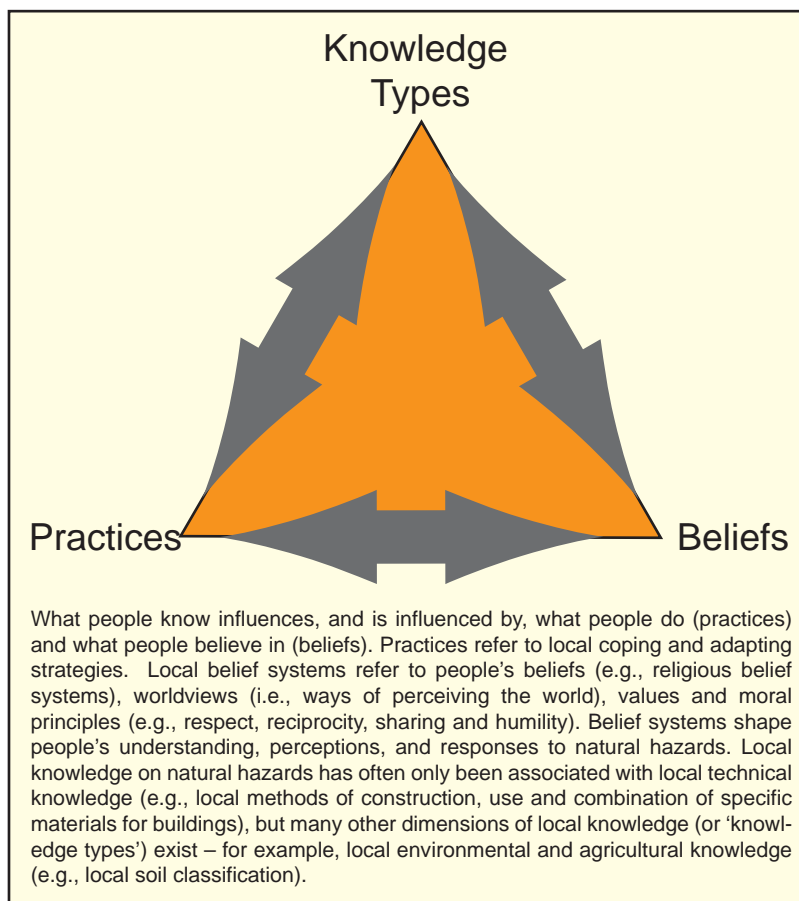


Figure 10: What is local knowledge?

4.4 Where is Local Knowledge Located? Who has Local Knowledge?

Local knowledge is everywhere: in people's heads, beliefs, buildings and other constructions, farming tools, landscape, urban and rural areas, cultural and religious ceremonies, and practices, taboos, local rules, songs, proverbs, books, and so on. Local knowledge is located at the individual and household level as well as collectively through community stewards and other key social actors (e.g., shamans, elders, local religious and political leaders, healing artists). We all have local knowledge, but knowledge differs among groups (e.g., ethnic, clans, gender, age, wealth groups) due to existing differences concerning access to or control over production resources; access to education, training, and information in general; labour divisions between women and men, farmers and herders, and others; control over the benefits of production; and so on (FAO 2005).

4.5 When and How is Local Knowledge Created, Transmitted, Transformed?

Local knowledge is being created and lost all the time. As opposed to conventional, scientific knowledge it derives more from memory, intuition, and the senses than from the intellect. Local knowledge is always a mixture of experiential and transmitted knowledge. Experiential knowledge refers to knowledge gained through experience (i.e., historical observation). Transmitted knowledge refers to knowledge gained from one generation to another. Depending on the type of knowledge, transmission will occur in different ways. For example, the transmission of shared or specialised knowledge takes place through specific cultural and traditional information exchange mechanisms (FAO 2005).

4.6 How to Identify and Document Local Knowledge

To identify local knowledge relevant to disaster preparedness, practitioners should go to communities and learn from them about local natural hazards. Figure 11 provides a simple framework describing how local knowledge on disaster preparedness is related to: (1) people's ability to observe their local surroundings, (2) people's capacity to identify and monitor environmental indicators (of an upcoming flood), (3) people's ability to develop adaptation strategies for recurrent floods, and (4) people's ability to communicate about past and present floods. Practitioners working in disaster management should always ask questions related to these four key dimensions to understand what people know about natural hazards in their locality and what they do for disaster preparedness. Documentation is not to conserve local knowledge, but to learn from it to strengthen sustainable and equitable local coping mechanisms and to create new concepts, methods, or strategies for improved disaster management. Documenting local knowledge is not enough: it is only a means for the inclusion and participation of local people in disaster management and disaster preparedness activities.

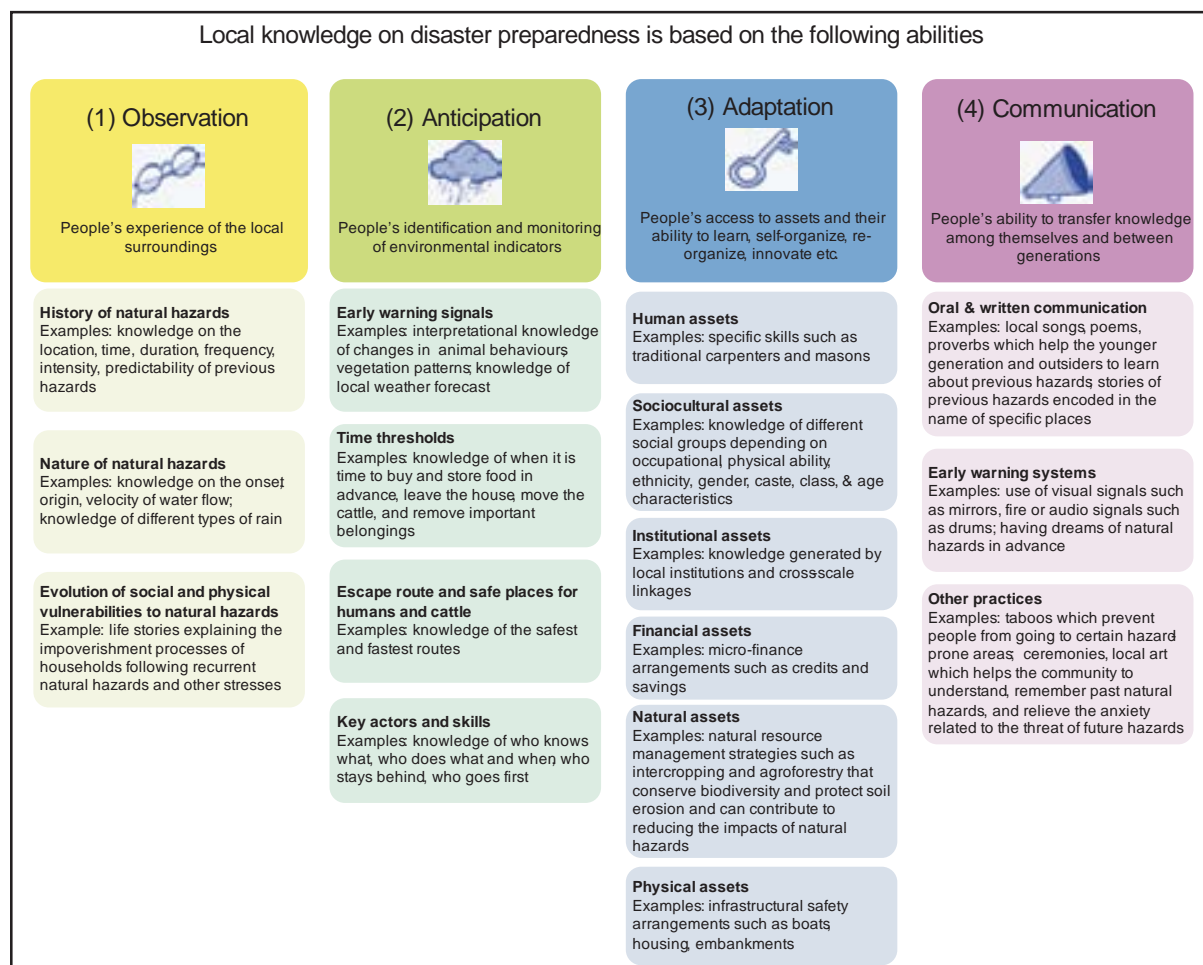


Figure 11: The four pillars of local knowledge on disaster preparedness

Source: Dekens 2007a

4.7 What are the Advantages of Using Local Knowledge in Disaster Preparedness and Disaster Management Activities?

Local knowledge and practices often, but not always, have the following advantages compared to most external, top-down strategies:

- They are low-cost strategies using local resources and know-how.
- They are well-accepted, trusted, and understood (internalised).
- Community ownership and involvement are more prominent.
- They are culturally sensitive.
- They provide continuous monitoring.
- They include time-tested reliability.
- They are in tune with local contexts and needs (more data and technology alone will not improve people's lives unless they are combined with an understanding of local contexts and needs).
- They empower the community, including the most vulnerable and disadvantaged groups, to take action instead of relying on external help only.
- They are holistic (take into account other stresses or priorities that affect the vulnerability of social groups, households, or individuals).
- They provide clues on how recurrent shocks gradually increase the vulnerability of communities and their environment.

Flash flood in Chitral, Pakistan, 4 May 2007 How to make use of local knowledge

In order to identify local knowledge on disaster preparedness, practitioners should go to the communities and learn from them by observing their day-to-day life and asking questions about at least four key aspects of local knowledge on disaster preparedness: (1) people's observations of natural hazards through daily experience of their local surroundings; (2) people's anticipation of natural hazards through identifying and monitoring local indicators such as early warning or environmental signs of imminent hazards, time thresholds, safe places for humans and cattle, and key skills and actors; (3) people's adaptation strategies (i.e., how people adjust, experiment, and innovate in the face of natural hazards and how they learn from them); and (4) people's strategies for communicating about natural hazards among community members and between generations.

4.8 What are the Limitations/Barriers to the Use of Local Knowledge in Disaster Preparedness and Disaster Management?

At the same time, practitioners also need to be aware of the limitations or barriers to the use of local knowledge in disaster management and disaster preparedness. They include the following aspects:

- The dominant belief that conventional or scientific knowledge is 'superior' to local knowledge.
- Local knowledge is difficult to identify, use, assess, validate, generalise, and replicate because it is very context specific and often taken for granted by local people themselves.
- Local knowledge is often monopolised by dominant groups in the community.
- Some local practices, beliefs, adaptations, and strategies are unsustainable or not socially equitable.
- Due to rapid changes in socio-cultural, politic, economic, technological, institutional, and environmental contexts, some local knowledge and practices are becoming inappropriate, irrelevant, or inaccessible over time. For example, government development projects may restrict people's access to natural resources

they used earlier, and people cannot 'read' their local environment anymore due to rapid changes in climatic conditions and excessive human interventions.

- Local knowledge lacks accountability within communities themselves, especially with the younger generations.
- The focus on local knowledge can be perceived as a threat to national interests and political structures, especially in authoritarian regimes.
- Natural hazards and disasters have been conceived primarily as an issue pertaining to national defence and security, which makes decentralisation efforts in this sector difficult.
- The documentation and use of local knowledge can be used by outsiders against local people to maintain control over communities and their resources.
- Exceptional disasters often require external means, beyond normal coping strategies.

4.9 How to Use Local Knowledge in Flash Flood Management

Case studies undertaken by ICIMOD in Pakistan and Nepal demonstrate that communities, based on experience and close relationships with their local environment, know about flash floods and have developed strategies that help save life and reduce damage to property. Local knowledge can provide information related to local environmental variability and specificities; local perceptions of natural hazards; risk tradeoffs in the context of multiple stresses; vulnerable groups and individuals; the local elite and power relations; and changes in people's vulnerability to natural hazards over time. Examples of potential applications of local knowledge in flash flood management include local advice about safe locations and construction sites (buildings and roads), combining local knowledge with conventional knowledge for hazard mapping, early warning systems, surveys, and other inventories to verify information, adapting communication strategies to local understanding and perceptions, and integrating local values into decision-making processes.

Watershed Management⁷

Watersheds are rich in natural resources and are often exploited for subsistence farming, economic interests, and tourism. Some activities, when unmanaged, have impacts that degrade the environment in the long term. These factors exacerbate flood hazards by increasing the quantity and velocity of flash floods. It is very important to incorporate the dynamics of exploiting natural resources in terms of natural disasters. Integrated watershed management is needed to suppress the processes that trigger flash floods. Proper uses of land, forest, and water resources are primary acts of mitigation. The role of the community in properly managing watersheds is paramount. This section provides some suggestions on watershed management measures targeted towards reducing flash flood hazards.

5.1 Land Use Management

Overexploitation of resources has adversely affected the land's resilience. Proper management of land use in vulnerable areas is essential to ensure the minimum loss of life and property. Management of land use in a watershed can include two major activities to reduce flash flood risk: a) management of settlements, and b) management of agricultural land and forests.

Management of settlements

Numerous social, economic, and environmental benefits of living near water have historically outweighed the risk of floods (FAO 2005). Settlements near flood zones not only put people at risk, they also alter the natural flow of water. Extension of settlements in floodplains must be restricted, and existing settlements near riverbanks must consider special housing designs that minimise interference with the natural flow of water.

Management of agricultural and forest land

Rapid population growth and poverty have compelled people to overexploit resources. They are forced to convert forest and pasture land to farmland to feed their families.

Since landholdings in high mountain areas tend to be very small, more people rely on livestock for their livelihood. Overgrazing of pasture land adversely affects soil stability. Overgrazing destroys plant cover, leading to a decrease in both interception and infiltration of rainwater, and, thus, enhanced surface runoff. Further, as there is no humus layer, the water-holding capacity of the soil is greatly reduced, and there is no vegetation to retard the flow of water carrying large quantities of sediment in its wake. As a result, a flash flood can be triggered. It is, therefore, important to manage both agricultural land and forest land properly to reduce the effect of disasters. Table 3 provides some tips for the management of agricultural land and forests.

Agricultural land	Forested land
Proper soil management activities to enhance the infiltration capacity of soil (for example, certain types of soil tillage, increase of the organic fraction, etc.)	Increase the intensity of forest land
Favourable agricultural practices to minimise soil loss (crosswise tillage, grass covering, etc.)	Increase community participation in conserving forest
Introduction of agroforestry	Increase the multifunctional use of woods (productive, protective, recreational, ecological, landscape functions)
Proper drainage channels to overcome inundation of fields	Maintain stability of woods from the ecological point of view (mixed woods, woods of different age, etc.)

⁷ Contributed by Mr. Keshar Man Sthapit, ICIMOD.

How to make land-use planning effective in reducing vulnerability to natural disasters

- Be subject to stakeholder participation and scrutiny to ensure that its role and purpose are understood.
- Mobilise adequate resources in terms of finances, people, skills, and equipment.
- Enact legal status and power to enforce plans, codes, and legislation.
- Coordinate with other mitigation methods.
- Raise awareness of measures, benefits, and limitations.
- Monitor and evaluate the success of the plans.

ADPC 2005

5.2 Remodelling Agriculture

Agriculture in flood-prone areas should be planned to mitigate the possible flood damage to crops. Agriculture in Assam, where floods are a regular feature, is a good example. The successive floods from the Brahmaputra and Barak rivers and from their tributaries cause extensive damage to agriculture, for example:

- damage to the Ahu crop (rice) before the harvest
- damage to the sali (the main rice crop), which cannot be transplanted in time as the seedlings are damaged either in the nursery or after transplanting, or sometimes even destroyed in the field
- damage to the jute crop or quality is adversely affected

The strategies concerning remodelling of land use proposed to minimise the adverse effects of recurrent floods include (Swaminathan 1980):

- **Multiple cropping:** Cropping of medium-tall Ahu rice with deep-water rice in low-lying areas as an insurance so that if the Ahu rice is damaged there will be some production from the deep-water rice.
- **Restructuring of the cropping pattern⁸:** The safest way to assure crop production in flood-prone areas is to grow more crops in the flood-free period.

The flood-free period and the potential for growing crops in this period are shown in Figure 12.

5.3 Maintenance of Watercourses⁹

Maintenance and restoration interventions along natural (e.g., rivers, streams, nullas) and artificial (e.g., canals, drainage channels, pipelines) watercourses are necessary to assure discharge capacity during strong flood events. Watercourses often change their paths, and human activities like mining river materials (sand, stone, water itself) can intensify this meandering process. It is wise to leave a watercourse in its natural state, but if this cannot be achieved, certain precautionary measures should be taken.

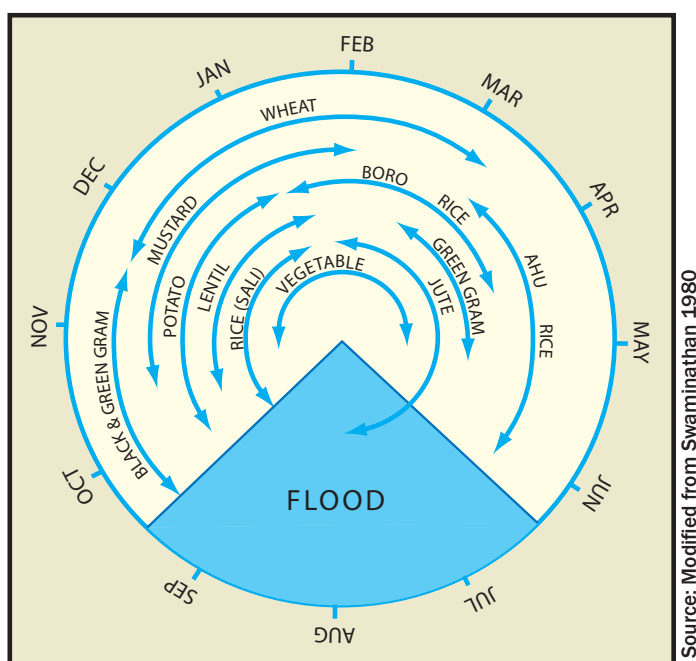


Figure 12: Modification of cropping pattern to suit flooding period

⁸ The strategy suggested here is more applicable for flash flood-prone areas in the central part of the Himalayas of Nepal and India where rainfall-induced flash floods occur mainly from mid-June to October. In other areas, the scheme might be applicable with appropriate modifications.

⁹ Many of the measures listed are beyond the capacity of communities and CFFRMCs; however, they must be aware of these measures so that they can create an enabling environment for external agencies and the government to implement them.

Some general maintenance measures to attain acceptable conditions in watercourse areas are listed below.

- delineate a buffer zone in the floodplain and restrict settlement and agricultural activities
- develop the floodplain as an ecological corridor
- non-interference with natural water conditions
- upkeep watercourse reaches that are still in their natural state
- protect specific habitats
- undertake structural interventions to improve ecological functions (activation of old branches and creation of biotopes where necessary to comply with the ideal conditions established by environmental models)
- undertake flood damage prevention measures (e.g., local bank protection, constant stabilisation interventions, and rechannelling of course deviation into the original bed)
- take measures to counter harmful influences on the whole system originating from the neighbourhood (e.g., protection against deposition of erosive materials and promotion of water-friendly exploitations)
- upkeep and activation of floodplains
- maintain natural depressions that act as natural retention during floods

5.4 Bioengineering

Bioengineering is the integration of vegetative methods with simple engineering practices, and can be a very effective watershed management measure using local resources (Bhatta et al. 1999). Bioengineering measures are effective in protecting unstable slopes. In bioengineering systems, vegetation provides additional strength to the engineering structures with which they are integrated. Commonly practised bioengineering techniques that can be used for slope stabilisation and minimisation of runoff include the following (Wagley 1999; Li 1999).

Planting trees, shrubs, and grasses: Trees, shrubs, and grasses can be planted on degraded slopes, either alone or in combination. A dense network of roots in the soil and a canopy overhead helps to protect the slope from erosion, which in turn prevents river-damming landslides. Methods of planting should be selected depending upon the purpose, site condition, and availability of resources. On hill slopes, contour-line planting at regular intervals is the general practice (Wagley 1999).

Planting stumps/woody stems: Stumps can be cut or woody vegetation planted along the contour to trap soil particles and debris falling down the slope (Wagley 1999).

Seeding grass, trees, and shrubs: Seeds of grass, trees, and shrubs can be sown directly on site either alone or in combination. Methods and timing for seeding depend upon site conditions and availability of resources. Seeds can be broadcast to cover large areas in a short time at low cost. This method can be used on steep, rocky, and unstable slopes where seedlings and cuttings cannot be planted directly.

Bamboo/broom grass planting: Rooted culm cuttings, rhizomes, and wild seedlings of bamboo and broom grass can be planted directly on slopes. Bamboo and broom grass perform slope stabilisation work effectively once they are established.

Wattling: Bundles of live branches with buds are put into a trench along the contour and covered with a thin layer of soil. When the branches put out roots and shoots, a strong vegetative barrier is formed that is effective in holding soil particles moving down hill slopes. This technique is not popular as it is expensive and works only on gentle slopes.

Brushwood check dams: Brushwood check dams of bamboo and wood are commonly used to stabilise gullies on slopes. After construction of the check dams, grass and shrubs are planted on side slopes and on the gully head.

Vegetated riprap: Side slopes of gullies and gully beds are sometimes protected by constructing dry stone walls, after which grass seeds are sown or planted in the gaps between the stones to reinforce toe walls and gully beds.

Loose stone and gabion check dams: Constructing loose stone and gabion check dams is a very common method for stabilising slopes. After the construction of check dams, seedlings of trees, shrubs, and grasses are planted either separately or in combination on gully heads, side slopes, gully beds, and in and around the structure for reinforcement.

Jute netting: Jute netting is another way to protect slopes using grass slips or seedlings. Jute, being a biological product, decomposes into the soil and functions to support the seedlings during their early growing period. This method can be useful on steep and hard slopes where establishing vegetation is difficult.

Integrated watershed management (IWM) is essential to ensure sustainability of risk management (Bhatta et al. 1999; APFM 2004a). For any land use planning and development, certain guidelines must be followed to reduce the risk. The wish to obtain optimal utilisation of natural resources often results in a devastating hazard like flash flood. Reducing overgrazing of pasture and introducing stall feeding, and introducing bio-friendly methodologies like biogas or solar power for household activities, can reduce the dependency on natural resources. Good governance, transparency, and proper grip and unity in a community are fundamental requirements to ensure that the activities in a watershed do not increase hazards, CFFRMCs can play an important role here.

Chapter 6

Preparedness

Preparedness is perhaps the most important component of a disaster risk management programme; it includes activities and measures taken in advance to ensure an effective response to the impact of hazards. Disaster preparedness plans and procedures guide rapid response and recovery actions. Preparedness lessens the severity of disasters by preparing people or communities for disaster, developing contingency plans to ensure an effective response and recovery, and training communities to implement plans after a hazardous event occurs.

Pre-flash flood management activities primarily include:

- risk assessment
- hazard/risk mapping
- preparedness activities
 - community mobilisation and awareness building
 - demonstration
 - forecasting and early warning
 - structural mitigation
- emergency relief (contingency) planning

6.1 Risk Assessment

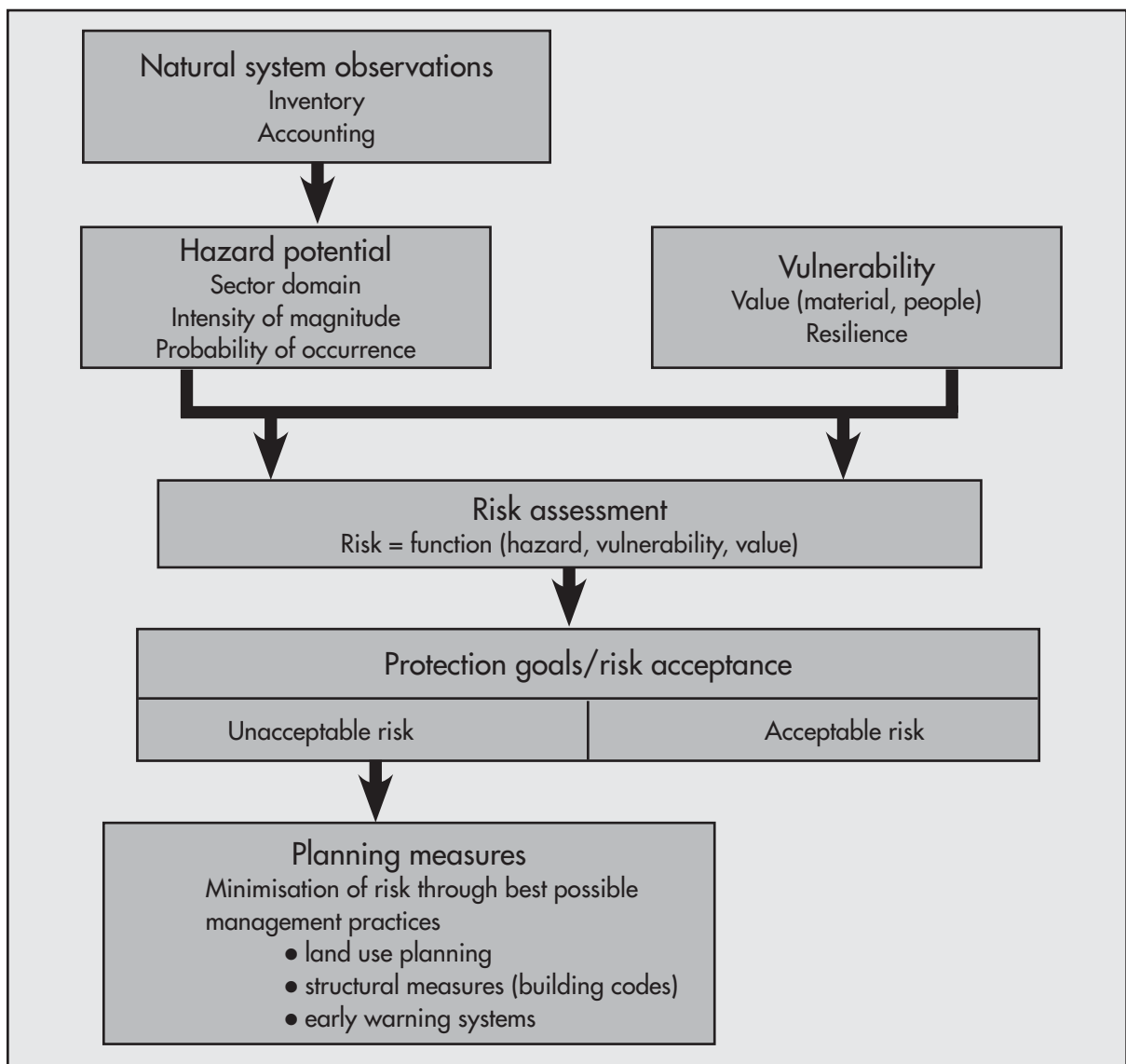
Risk assessment is the process to determine the nature and extent of potential hazards and vulnerabilities. Risk assessment comprises gathering information related to the hazard (e.g., rainfall, slope, stability, potentially dangerous lakes), vulnerability (e.g., people, exposure to hazard, susceptibility, coping capacity), and the value of elements exposed to the hazard. Risk assessments should take into account the changing nature of the physical, natural, and social environments. This is a basic step for any kind of mitigation planning. Figure 13 illustrates the framework for risk assessment and risk management.

The flash flood hazard, vulnerability, and capacity of communities living within the impact area, and the level of exposure of various elements located within the area, are used to define the flood risk. Hazard assessment is conducted to analyse the nature and mechanisms of flooding, including frequency, velocity, magnitude, and hazard. Similarly, the capacity and resources of the community to prepare and cope with the impact of flood hazard and people's skills and abilities to make them resilient are highlighted.

6.2 Social Flood Hazard Mapping and Assessment

Social flood hazard mapping is a tool practised by the CFFRMC through a participatory process of collecting baseline data and information and plotting them on a map to help the planning team analyse the strengths (resources/opportunities available) and risks (exposures and vulnerabilities) in the unit area (cluster, district, ward). The baseline information incorporated in the map details the geomorphology, demography, and other crucial conditions including critical facilities. Social flood hazard mapping is carried out by the CFFRMC or an external competent organisation with the active participation of the CFFRMC.

Social flood hazard mapping is the symbolic reflection of the conditions and location of a certain area. A flood hazard map shows the location of houses, assets, problems, services delivery organisations, infrastructure (roads, schools, hospitals, bazaars), and so on using symbols.



Source: Based on WMO 1999

Figure 13: Framework for risk assessment and management

Social flood hazard mapping highlights resources as the basis of discussions about the location of social resources and helps in analysing local risks and identifying possible damage. It also helps in identifying vulnerable groups (people with disabilities or those with special needs) who need special consideration during emergency rescue and relief. As it incorporates all possible local resources, it helps in searching for opportunities, like measures that can lessen the magnitude of loss, the safest path for evacuation, and safe places for temporary settlements.

It is vital for the CFFRMC to train volunteers to develop map sketching and map reading skills through a participatory approach. During the community training sessions, a practical demonstration of social hazard mapping needs to be done (Figure 14). If needed, the CFFRMC should seek help from government officials in preparing a social flood hazard map.

Some tips for preparing a social flood hazard map

- The top side of the map indicates the north. Boundaries of wards and villages should be marked. It is desirable to provide the map's distance conversion factor.
- Give the location of every cluster of households, markets, and public buildings.
- Give the location of structures like canals, weirs, roads, and railway tracks, airports, bridges, the river path, highlands, and lowlands.

- Vulnerable areas of the ward should be marked specially.
- Evacuation routes, safe havens, emergency volunteers' set-up, the formation and structure of houses, and infrastructure should be shown on the map to indicate their availability, as well as vulnerable areas, safe structural constructions, hazard-prone houses and infrastructure, and the locations of the most vulnerable (elderly, pregnant women, children, and people with special needs).
- Public safety and security: Show civil defence installations, communications centres, emergency management centres, fire stations, hospitals and other medical facilities, mass emergency shelters, police stations and other installations for public security, stockpiles, and community emergency organisations.
- Utilities: Clearly mark communication lines, printing presses, relay points, and antenna complexes.
- Agriculture: Show food-storage and processing facilities, irrigation systems, impoundments and reservoirs, levees, and dikes.



S.H. Shah

Figure 14: Preparation of a social flood hazard map, Chitral, Pakistan

Annex 3 provides an example and steps for preparing a social flood hazard map¹⁰.

Emergency actions by individuals

Communities must be prepared for flood hazards, and each member of the hazard-prone community should be aware and have prepared the following:

- emergency supplies and important items (such as medication, money, bank information)
- stockpile of food, water, and fodder for livestock
- stockpile of cooking utensils and fuel
- be aware of safe refuges in case of an evacuation
- emergency flood-proofing measures (sandbagging and boarding)
- plans to move vehicles and livestock to higher land

6.3 Planning Emergency Relief

The intensity and magnitude of potential flash flood risk needs to be determined in advance by the CFFRMC together with the community. During an actual emergency, quick and effective action is required to evacuate and provide relief to the affected people according to their requirements. Preparing a contingency plan to cope with the devastation is called emergency relief planning.

A comprehensive risk analysis for flash floods in terms of intensity, magnitude, and impacts on vulnerable human lives and livestock needs to be conducted in advance so that plans can be made for emergency shelter sites, evacuation routes, and emergency water sources; volunteers and responding personnel can be trained; and people educated about what to do in case of an emergency. Rapid onset disasters like flash floods do not allow enough time to collect secondary information. It is very important that the CFFRMC has collected such information well before the onset of the flash flood.

¹⁰ Annex 3 was prepared based on the experiences of the Asian Disaster Preparedness Center (ADPC), Bangkok.

In a preliminary plan, planning will have to be realistic and relevant even though the details of a hazard may be uncertain. Emergency relief plans need to be culturally friendly and consider ethics and religion so that no disputes arise at the time of relief actions. The plans must be comprehensive and look at the needs of the local population. The only way of ensuring this is by maximum participation from all corners of the community.

Emergency relief planning involves the following:

- Identifying the resources needed for emergency relief.
- Setting clear roles and responsibilities for CFFRMC members, team leaders, and volunteers.
- Preparing clear policies and procedures.
- Ensuring the participation of beneficiaries (including women and other vulnerable groups) in planning.
- Planning activities to ensure timely disaster relief.
- Ensuring accountability and transparency.
- Ensuring availability of emergency stockpiles at each cluster level for use during the emergency. These include emergency first aid boxes, search and rescue equipment (ropes, D-rings, picks, shovels, etc.), shelter items (waterproof tents and blankets), and food (Figure 15). The collective ownership will be with CFFRMC; the stockpile will be maintained by the CFFRMC members and provided to affected community members during an emergency.
- Identifying safe places for evacuation of the community during flash flooding and having a flood evacuation plan in place.
- Planning for the specific needs of children, women, and people with special needs during the relief phase (e.g., milk and nutrition for children under five, dietary needs of pregnant women, health and hygiene needs).
- Keeping an inventory of the trained human resources available in case of an emergency.
- Developing the capacity of the CFFRMC in rapid disaster needs assessment at local level.



Figure 15: Emergency stockpiles

- Planning for camps and shelter management.
- Having communication mechanisms in place during the relief phase to avoid duplication and overlooked populations.
- Establishing an emergency operation centre (i.e., control room) at unit level (district, ward, cluster, etc.) which operates 24 hours a day during an emergency (see below)
- Identifying locations which can be used for warehouses in case external relief is required; in addition to this, a transportation system needs to be organised for timely distribution of relief material
- Ensuring security, transparency, and accountability in relief distribution

6.4 Preparedness Activities

Community mobilisation and awareness

Maximum community involvement is essential for effective preparedness towards mitigating flash flood risk. The CFFRMC is responsible for coordinating and uniting the whole community and distributing the responsibilities according to the plan.

Awareness must be created about the hazard and existing resources. Various awareness campaigns can be done to inform and unite the community. Methods to influence people can include:

- posters
- brochures
- songs/dramas/street dramas
- school arts and essay competitions
- audio-visual methods
- training and demonstrations
- regular drills
- promotion by local celebrities like singers, leaders, and actors

The objective of community mobilisation is to increase the resilience of communities to natural hazards.

Demonstration

In addition to all the preparation measures, drills are very helpful. CFFRMCs must conduct these exercises and prepare communities to act in an emergency. These drills must include all levels of the community, including women, children, and older people. CFFRMCs can organise occasional drills on evacuation to safe ground through marked escape routes and training on safety measures, and prioritise the things people need to carry during an evacuation.

Drills, simulations, demonstrations, and so on are necessary for efficient disaster preparedness. Exercises and demonstrations may include orientations to provide general information on evacuation plans. Drills also serve to verify the plans and their effectiveness (ADPC/UNDP 2005).

Flood forecasting and early warning

Although flash floods are an instant phenomenon, communities must still use different forecasting methods to help minimise losses. The key to effective forecasting and warning systems is communication and dissemination of understandable information to a mass audience.

Radio and TV broadcasts provide weather data such as rainfall and its magnitude and location. This information can be useful in forecasting flash floods. Therefore, during the monsoon season, these news broadcasts should be watched and listened to carefully. The CFFRMC and the early warning and communication team can even designate a volunteer or a person from the community to analyse the hydrology of the

catchments and water levels in the river, if such capacity exists. Observing clouds in the upper catchments, changes in the water flows (e.g., rising levels of water, river water mixed with mud, leaves floating on the water), increasing numbers of fish in the river, unusual sound/smell of river, unusual behaviour of animals, and so on also provides clues on which a flood warning can be based. Similarly, continued rainfall in the surrounding areas or in the upper catchments of the stream often provides clues as to likely flood events. The CFFRMC through volunteers may set up a network of rain gauges and means of communicating the amount and intensity of rainfall. Ice avalanches and glacial calving cause loud noises that can serve as early warning signals.

Chapter 4 provides a comprehensive description of local knowledge relevant to flash flood early warning. CFFRMCs should recognise local knowledge and incorporate it in preparedness plans and early warning systems. The committee should also communicate the communities' local knowledge to external agencies.

According to the severity of the flash flood, different warning levels should be applied to different parts of the community. CFFRMCs should make proper arrangements to disseminate the forecast and corresponding warnings to the people. Various media can be utilised to issue warnings (see Box). CFFRMCs should also communicate the situation to the concerned agencies outside the community for possible help and rescue operations.

Some ways to communicate warnings

- warning flags
- radio broadcasts
- loudspeakers
- police
- interpersonal communication
- telephone – landline and mobile

Often communities have their own ways of transmitting news through various media. A typical method of conveying messages and monitoring the upstream climate in Chitwan District, Nepal, is shown in Figure 16. A person from the community keeps an eye on the upstream watershed condition from this tower and if the water level rises beyond normal, either shouts a warning or creates some sounds to warn the community.

Mirror and traditional fire systems: These traditional systems were practised in Chitral, Pakistan. One system uses a mirror as a visual signal system. Locals use the reflection of the sun on a mirror to convey warnings to other people and villages. Alternatively, creating large fires on hilltops warn downstream communities of impending danger, both of flash flood and of enemy attack (Itturizaga 1997; Itturizaga 2005; Xu et al. 2006).

Herder system: This traditional method formerly used in rural Pakistan is now extinct (Dekens 2007b). Each clan within Chitral district used to have a herder in charge of taking livestock to the pastures during the rainy months from June to August. The herder was a person from the village itself and had strong socioeconomic ties with the community. If a herder noted a threatening event and was in the right position to communicate, he or she would shout a message to another herder in a lower pasture or to the nearest village in a chain system. Different herders would choose different places in order to spread the flocks evenly on the available grazing space. This way, they could also warn each other. A few of them also knew



G. Gurung, Practical Action, Nepal

Figure 16: Community-based early warning system, Chitwan, Nepal

how to blow the boog, a trumpet-like instrument made from the horn of a yak or a wild goat. Rhythms and tunes would vary from valley to valley, village to village, and herder to herder, conveying different meanings. For instance, a certain tune could indicate that the herder was ready to take the livestock up to the pastures and that villagers should release their animals; another tune would indicate the return of the flock to the village. In some cases, specific tunes would also warn of the danger of predators and of the danger of floods and avalanches.

Different warning systems are required for different environments. In some places and contexts, one warning signal will work more effectively than another according to the nature of the hazard, the distances between the lower and higher pastures and between villages, day time or night time, and so on. Traditional warning systems were well adapted to and in tune with the local socio-cultural context, ensuring some level of acceptability, trust, and cost effectiveness (e.g., use of the mosque loudspeakers).

Interpretation of warnings is done according to the landscape and history of past flash floods.

Structural measures for hazard mitigation

To properly address hazards, some community-level structural measures should be implemented. A comprehensive description of possible structural measures is beyond the scope of this manual. Taking into account past history and technical assistance, the community should set their households to minimise damage during flash floods. This can be done by:

- embankments along tributaries that are subjected to flash flooding and backwater effect of the main stream
- minor drainage works to pass the flood and avoid inundation
- irrigation canals diverting water to agricultural fields
- provision of culverts and floodways
- submersible embankments in deeply flooded wetlands, designed to protect winter paddy from early floods and allow them to be overtopped by floodwaters
- houses, villages, and roads built on raised land or embankments
- polders enclosing houses, fields, food supplies, or animal fodder
- construction of public places like schools or auditoriums, where a whole community can stay during the flood period, on uplands; such buildings should provide for adequate safe drinking water and sanitary facilities

Structural measures have their limitations and often give a false sense of security. These structures should be implemented in close collaboration with the concerned government authorities. CFFRMCs should emphasise small-scale, community-manageable structures.

6.5 Control Room

To be effective, the CFFRMC should monitor relevant activities including liaising with government departments and other agencies for timely help in respect of flood forecasting, issuing flood warnings, round-the-clock vigils on embankments and vital installations, rescue and relief operations, and establishing communication links with relief agencies and NGOs. An effective and well-equipped central point is needed under the management of the early warning and communication team to smoothly carry out these activities. A control room should be created at a convenient and easily accessible location in the village. Such a control room should become operational a few days before the flood season and work on a 24-hour basis during the occurrence of a flood.

The control room will not only act as centre for information dissemination, it will also undertake preparatory measures with the involvement of the community. It will set advance contingency plans; instigate rescue drills; allocate duties during a flash flood to members and volunteers; train the volunteers; and acquire, repair, and maintain all equipment in the control room so that it is in good working condition.

The control room may vary depending on the location, the communication facilities, and the human and financial resources available. Some suggested features of a control room are listed below.

- It should be located in an easily accessible and convenient location, safe from potential flood waves.
- An enquiry counter and an information display board should be located in the front of the premises.
- It should be provided with communication links such as landline telephone/fax, mobile phone, mini-transistor radio, walkie-talkie set, HF/VHF, wireless set (subject to availability).
- It should have up-to-date information readily available, with telephone numbers of all emergency services at the village and district levels.
- It should be responsible for keeping an updated inventory of rescue items like ropes, ladders, torches, and loudspeakers.

The functions of the control room are listed below.

- A CFFRMC can make arrangements to receive forecasts of weather conditions, after which it will identify level of risk and disseminate the same to the community and local NGOs through available means like telephone, loudspeakers, or drum beating.
- It will identify zones for air dropping of relief materials in consultation with the district administration and army personnel. It will keep villagers informed about the possible air dropping sites.
- It will act as a centre for collecting messages from every corner of the affected area and give messages to the higher authorities in time.
- Following a flash flood, the control room will collect information of losses to be used in distributing relief items.

Responses during Flash Floods

The response during a flash flood event is critical. It is imperative to maintain good coordination and management of organisations and activities to contain the flood disaster and minimise loss of life and injury during the flood. Possible responses during a flood may include the actions outlined below.

7.1 Evacuation

The aim of evacuation is to move people away from flooding and associated hazards. As there is little or sometimes no prior warning of flash floods, early planning and guidelines are necessary to minimise loss and damages.

The following factors must be considered by the evacuation and rescue team of the CFFRMC during a flash flood event:

- The severity of the flood (height and velocity) determines whether people can walk or drive out of the area (only possible in shallow and slow-moving water) or if they have to move to higher ground or the tops of buildings to await assistance.
- Warning lead time determines the evacuation procedures. People should know not to lose any time once a warning has been issued.
- When the flash flood has receded, people should be aware of possible secondary hazards such as landslides, mudslides, moving debris, polluted floodwaters, live power cables, and snakes.
- Special consideration should be given to the evacuation of vulnerable groups such as children, the elderly, pregnant women, and people with disabilities.
- The evacuation and rescue team should consider the availability and type of transport such as walking, non-motorised vehicles, buses, cars, boats, helicopters, and army vehicles. Alternative evacuation routes should be clearly marked in the social flood hazard map.
- A communication cell based on the CFFRMC is needed to notify people of evacuation and safe areas (e.g., control room as described in Chapter 6).

Much of this information will be available if the community has already prepared a social flood hazard map.

Safe areas

Safe areas should be provided for people to convene temporarily before evacuation camps and temporary shelters are arranged, or until they can return to their houses. This allows people to find their friends and relatives and provides them with basic needs such as blankets, water, food, medication, first aid, and sanitation facilities.

Security

Many people may resist evacuation and rescue in order to protect their houses and assets, thus endangering their lives. Preventing looting after the emergency phase by protecting people's assets will reduce the individual losses incurred. The military or police may provide security for the period of time after the flood event until people can return to their homes. The CFFRMC should coordinate security with the military and police. Women's safety and privacy must be prioritised.

7.2 Search and Rescue

As soon as possible after the onset of the flash flood, the evacuation and rescue team should initiate search and rescue activities. Trained, untrained, or semi-trained volunteers can be mobilised and led by an experienced team leader. Volunteers must be dispatched in groups working on a rotational basis to minimise stress and exhaustion. Search and rescue work plans can be arranged allowing for 4-6 hours on and 4-6 hours off for each rescue worker (ADPC/UNDP 2005). They should have communications equipment to maintain contact with the control room at all time.

Suggested equipment for a search and rescue team

- suitable rescue ropes
- ladders
- buckets
- torches
- loudspeakers
- blankets
- floating rescue devices, inflatable boats
- 2-way radios and other reliable communication equipment

The search methods must be systematic and planned.

There will be time constraints as people left in floodwaters may be affected by continuous time spent in the water. Furthermore, prolonged exposure to floodwater for the members of the proposed rescue team could expose them to health risks. Rescue work should be fast and effective.

7.3 Temporary Shelters

Temporary shelters must be adequate to protect people immediately after flooding and provide them with a level of security and privacy. The shelter management and logistics team of the CFFRMC should do adequate planning so that the shelter meets people's needs. As soon as the affected people enter the shelter they must be registered so that missing people can be identified and people can search for their relatives.

Site selection: The shelter location should be close enough for people to get to, but far enough not to be affected by the flash flood if it worsens.

Capacity: The population must be managed so that requirements do not exceed supplies.

Relief item distribution: Relief items can include, food, clothing, medicines, cooking utensils, and general household items. Distribution of relief material should be well managed. In some cases, supplies have been intercepted and sold on the black market instead. False claims of relief distribution are also common in the region. The shelter management and logistics team should work to avoid such situations and work with other teams and the committee to inform the authorities about the real situation.

Gender: Arrangements for women in temporary settlements are often very poor. No matter how bad the situation is, minimum sanitation, security, and privacy are essential. See Chapter 3 for details.

7.4 Health Response

The first aid and health team of the CFFRMC must be able to deal with a large number of people injured directly by flooding, and with secondary health problems such as water-related diseases. There are various communicable diseases related to water during and after floods. Thus, it is important to ensure the availability of enough medicines and vaccines to treat affected people. Diseases like typhoid, acute diarrhoea, skin infections, scabies, malaria, dengue, and so on are very common in flood affected areas.

These diseases can be prevented by encouraging good hygiene practices and preventing flies from gathering in waste disposal areas. The spread of disease from decomposing bodies should be another important concern. The death of dear ones is always difficult to face, but proper management is necessary to prevent spreading of disease.

The team should arrange the following key measures in relation to health and sanitation during flood events.

- Provide facilities for people to defecate safely and hygienically.
- Protect water supplies from contamination (Annex 4 describes water-purifying methods).
- Use oral saline when there is an outbreak of diarrhoea; if deemed necessary, quickly transfer the patients to the nearest hospital/healthcare facility. Give aspirin if a scorpion bites or put ice on the sting, if possible, or use calcium tablets or powdered eggshell to minimise allergic reactions (for details, see Annex 5).
- Keep carbolic acid in small bottles (mouth remaining open) hanging on the outside walls of shelters out of reach of children to avoid snake invasion and snakebites.
- Control house flies by using deltamethrin and permethrin around cooking and eating places.
- Provide at least the minimum amount of water needed for drinking, cooking, personal, and domestic hygiene.
- Ensure that people have enough containers to collect and store water cleanly.
- Ensure people have sufficient cooking utensils, equipment, and fuel to cook and store food safely.
- Make people aware of health hazards.
- Ensure that people have soap for hand washing.

Some DOs and DON'Ts in emergency response are provided in Annex 6.

Chapter 8

Post-disaster Measures

The impact of flash floods causes considerable devastation to physical infrastructure, households, and livelihoods, but relief efforts are often short term and do not deal with the environmental, economic, and social impacts. Proper planning is required and work should be initiated based on an assessment of damage followed by sustainable rehabilitation work.

Returning a community to its original state is very challenging. Victims may have suffered not only physical loss, but may also have undergone significant mental trauma. Thus, any planning process must address and highlight the various socio-cultural and economic aspects of the community.

8.1 Damage and Needs Assessment

Damage and needs assessment is the first step after a flash flood event. Unless properly assessed, community needs cannot be prioritised. However, one should be cautious in the assessment process. In doing assessments, often the distinction between 'damage assessment' and 'needs assessment' is not clarified. Sometimes the need for a distinction is undermined, causing overlapping of one with the other.

After a disaster occurs, a lot of information can be gathered on the damage situation, but large amounts of information on damage and losses may overshadow the priority needs of the affected community. Damage assessment may not reflect the needs of the community. For example, if a flood damages the crops in a crop-surplus area where rich landowners are the most affected, the area may not need immediate emergency food-aid. But the crop damage may affect migrant seasonal labourers who usually come to the area to harvest those crops. They will be unemployed and may face starvation. In that case, they should be selected as a priority group for any food-aid programme, even if they are not directly affected by the flash flood.

It is very important to focus on the community needs instead of listing the damage. The vulnerability of the community should come first in a needs assessment. Community vulnerability is linked to a rights-based approach and attitude. It is the right of the most vulnerable people to receive priority in needs assessment. Their needs should be assessed first. For this, the relief and rehabilitation team of the CFFRMC should have proper skills and expertise. The following points should be considered in performing an assessment.

- The assessment should determine the magnitude and area of damage.
- The assessment should provide information on the quantity and types of support needed.
- The assessment can be useful in seeking external funds, as the figures and resources can be used to support claims.
- The assessment should record data for future reference.
- The assessment can identify the precise area where the sustainability of the watershed can be improved to reduce the possibility that such a disaster could recur.

Damage can be physical and quantifiable such as damage to structures and loss of assets, but losses can also be non-physical and difficult to quantify, such as productivity loss, injuries, and so on. A conceptual framework for damage and needs assessment is given in Figure 17. Table 4 simplifies and categorises some of the direct and indirect, quantifiable and non-quantifiable, physical and non-physical impacts.

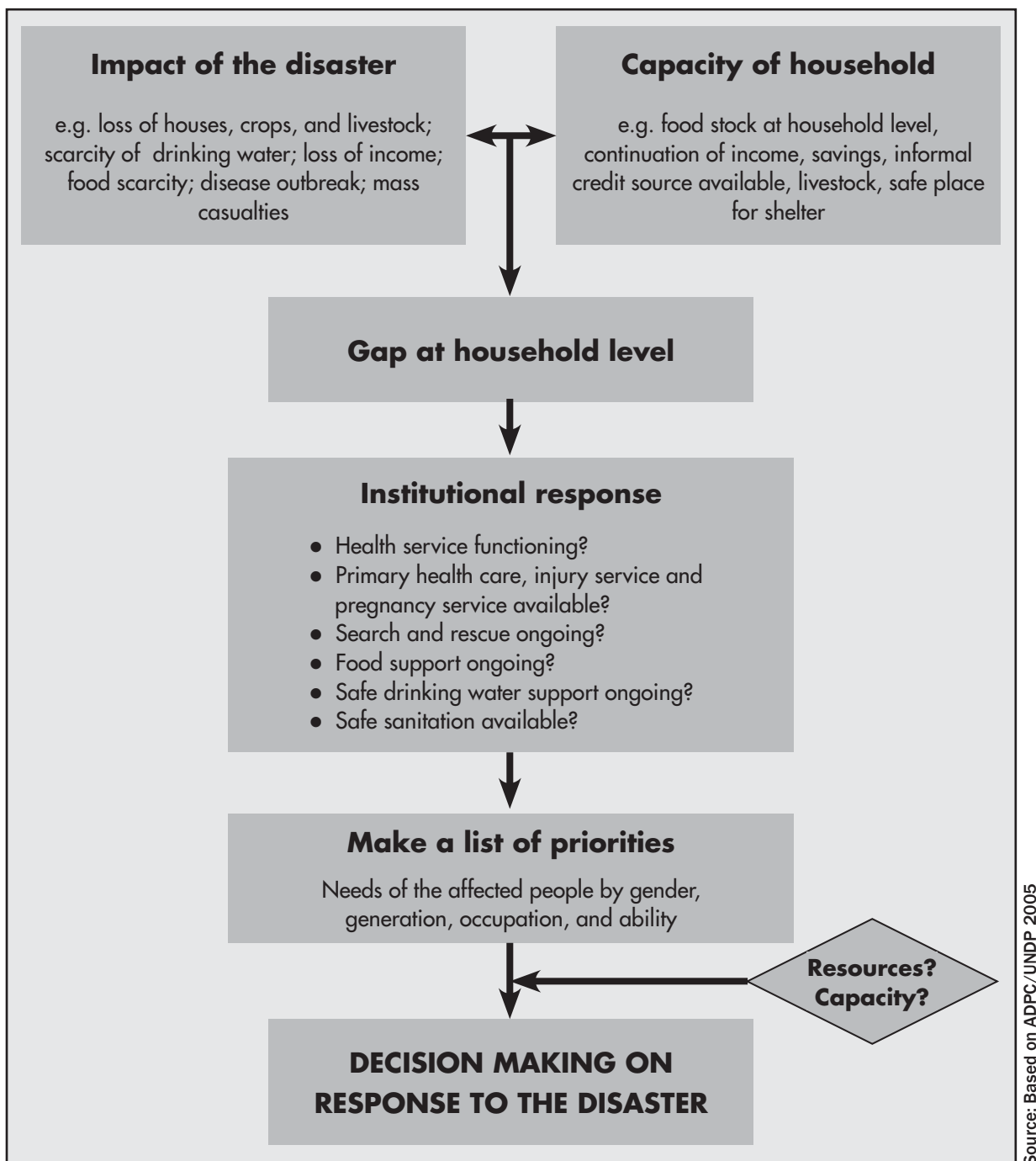


Figure 17: Conceptual framework for damage and needs assessment

Socioeconomic assessment

Trauma stemming from a natural disaster can be very devastating and sometimes ends the survivor's interest in living (ADPC/UNDP 2005). Therefore, such losses must be assessed very minutely and carefully. It is difficult to correlate economic and social losses. These two elements complement each other, so assessment should be done to fulfil immediate needs. Assessment of very urgent needs like shelter, water and sanitation, medical facilities, and mental health counselling can be done.

Environmental assessment

The impact of a flash flood on the environment should be assessed properly, as its effects are seen in the agricultural productivity, tourism, and economic growth of the area. Environmental damage caused by flash floods may include such things as soil erosion, sedimentation, and damage to ecosystems and biodiversity.

Table 4: Some typical impacts of flash floods

Impact	Physical/quantifiable/direct	Non-physical/non-quantifiable/indirect
Infrastructure damage	X	X
Household		
- Assets	X	
- Employment	X	X
- Injury ^a		X
- Death	X	
- Mental health		X
- Trauma		X
Economic loss/business		
- Assets (merchandise)	X	
- Labour	X	X
- Down time	X	X
- Productivity loss	X	
Agricultural loss		
- Crops destroyed	X	
- Surplus damaged	X	
- Field damaged	X	
- Equipment damage	X	
- Labour	X	X
- Time lost		X
^a It is also common to consider injury as physical damage Source: ADPC/UNDP 2005		

8.2 Recovery and Rehabilitation Activities

While carrying out recovery and rehabilitation activities, various aspects of community needs must be assessed to ensure that the process is both holistic and integrated. A participatory approach must be adopted. Recovery and rehabilitation may include the following efforts.

Location of reconstruction

People often show a great deal of courage in accepting their losses and trying to rehabilitate their property. Once water starts to recede, people return and try to rebuild their households, but rebuilding must be done carefully. A huge amount of debris is left behind after flash floods, and rehabilitation is often very difficult. Often due to sentimental attachment, people tend to rebuild at the original location. If possible, a new location should be carefully selected so that future flash floods do not impact on it.

New construction should be done so as to reduce exposure to potential future floods. Proper drainage should be established between settlements so that waterborne diseases can be eliminated.

Health care

Health effects can appear immediately after a disaster and continue for a long time. Mental illness, disease, and malnutrition are very pronounced in these areas. Volunteers must be prepared to assist the community with mental and physical health. Extensive counselling is needed to help victims overcome the trauma of their losses.

Waterborne diseases are very common and severe at this stage, thus action should be taken to eliminate them. Good sanitary health and hygiene practices are also important.

Post-disaster activities

Immediate rehabilitation activities:

- work to drain the floodwater
- maintain the hygiene and sanitation of victims to check spread of disease
- supply hygienic water
- mobilise health personnel to the injured and sick people
- ensure the availability of basic food items in the market at affordable prices
- ask agencies for help on needs
- ensure the fair distribution of relief materials

Intermediate rehabilitation activities:

- prepare immediate restoration plan and decentralise the responsibilities
- seek external help by communicating with related agencies
- coordinate external restoration activities
- help people get reconstruction materials such as wood and roofing material
- educate people in reviving damaged crops and help them get seeds, fertiliser, and external support
- help needy people to get work for their day-to-day maintenance. Activities such as food-for-work can be brought to the area so that poorer sections of the community can work to earn.
- facilitate reconstruction by ensuring that the rebuilt houses and bridges are safe against the next flood

Rehabilitation activities when normalcy returns:

- review the effectiveness of the preparedness measures and decide what the deficiencies were and what improvements are necessary in preparing for the next flood
- a restoration plan should be prepared as per the revisions
- facilitate the start of income generating activities for the poor
- facilitate growing new crops according to the situation and needs
- start those activities that can be done by the community and seek help from external agencies for those that cannot
- coordinate the work being done by different aid agencies
- conduct the next cycle of preparedness

Source: JVS 2003

Water sources often are affected by flash floods, and the contamination and inadequacy of water increases the difficulties. Quite often water sources are buried by debris. Thus, water of adequate quality and quantity must be provided.

Enhance economic vitality

The direct effect of a flash flood is seen in the economic condition of the community. Prosperity achieved over a lifetime is shattered in seconds. Thus, rehabilitation of economic activities is important for the resilience of the community

Various economic activities need to be carried out to boost the local economy. The availability of important commodities like electricity, kerosene, gas, and so on must be established as soon as possible. Transportation routes must be rebuilt to improve the transmission and transaction of goods. Reconstruction and strengthening of river training works, must be ensured. Agricultural planning is an important measure to enhance economic viability.

Immediate jobs, as well as long-term businesses, are required for community resettlement. Distribution of relief items during the disaster is not always sufficient, so various livelihood support programmes must be conducted. These activities are beyond the scope of local communities and NGOs, and, therefore, external assistance should be sought.

Temporary work schemes like debris clearance, construction, and so on can help victims by providing jobs from which they can earn their daily needs. Different trainings on income generating activities can help communities who have lost their livelihoods. Initiating various training programmes (handicrafts, carpentry, electrician training, masonry, sewing) in small-scale household businesses can enhance people's ability to earn a living. Providing soft loans can help them restart their businesses. Such initiatives should include all stakeholders.

While reclaiming farmland, special attention should be made to reduce future risk. New farming techniques should be adopted and emphasis should be given to planting cash crops. Crops like bananas, peanuts, and melons can be grown in flood affected areas. While reclaiming the slopes, the focus must be on checking the topsoil and enhancing the infiltration capacity of the soil. Agroforestry and sloping agricultural land technology (SALT) are some very beneficial methods for mountain agriculture (Bhatta 1999).

Enhance social and gender equity

Richer members of the community often have an advantage, even in disasters, and receive more during distribution of relief. It must be ensured that every person benefits equally.

After a disaster, women can be affected by domestic violence as men's frustration at the situation is vented on them. They may suffer badly from physical and mental violence. Effective advocacy must ensure the safety of women in such areas.

Enhance environmental quality

Conservation of the environment is the key to reducing the occurrence of floods. Land use planning and protection are needed. People must be aware of the resources and their advantages (see Chapter 5).

8.3 Enhancing the Community's Resilience

Flash flood disasters act as a cross-check on the resilience of a community. Resilience is a community's capacity to regain its original state. Even after vast destruction, relatively resilient communities stand by themselves and work to rebuild their property.

Characteristics that enhance resilience include vibrant leadership, shared goals and values, established institutions and organisations, positive socioeconomic trends (stable and healthy population and diversified economic base), constructive external partnerships and linkages, and the availability and use of resources and skills (Gardner and Dekens 2007).

There is now a lot of emphasis on building the resilience of communities towards natural hazards. Various changes in natural resources utilisation can challenge the resilience of a community. Changes include shifts in biophysical conditions; the expansion of infrastructure such as buildings, facilities, and roads; the erosion of traditional knowledge and practices; natural population growth through a reduction in mortality due to improved nutrition and health care; immigration of permanent and transient residents; natural resource extraction; development of commercial agriculture and horticulture; protection of strategic interests and national security; war; and tourism development (Gardner and Dekens 2007).

Learning: Learning from past experience is an important tool for enhancing the resilience of a community. People can identify the magnitude and extent of risk by incorporating the flash flood event with past similar events and can prepare accordingly.

Diversity: Knowing how and what diversity is required to enhance resilience comes about by learning through experience. Various kinds of ecological and social diversity can reduce the risk of vulnerability. Changing cropping patterns, stall-feeding livestock to discourage pasture degradation, and improving the forest area are some ecological practices that enhance resilience. Further, the process of economic diversification does not mean that everyone in a social-ecological system will benefit. Lack of equality and equity within such

systems may prevent or erode resilience and increase vulnerability among disadvantaged groups (Gardner and Dekens 2007).

Local knowledge: Local knowledge can be a primary factor in building resilience in a community. People know their own area best, so they are more aware of the activities that are needed. Underestimation of local knowledge can increase vulnerability rather than strengthening the effectiveness of resilience procedures (see Chapter 4).

Self-organisation: Resilience procedures cannot be effective or complete unless the community is united with a common aim. People have different types of expertise; there is a need to bring all the expertise to one forum to address the disaster and its effects. Organising people can be very site-specific and should also incorporate minute details about local customs and religions. If these details are ignored, there can be continuous disputes about authority, rather than working together for resilience.

Linkages and partnerships: Linking with responding partners and stakeholders is necessary. There must be appropriate links to import support and relief.

A community must be integrated and addressed properly to enhance resilience. Issues that need special attention in building resilience in communities include the following.

- In addition to physical needs, counselling is needed to help survivors overcome the mental trauma of losing family members and property.
- The recovery plan must address gender issues and link marginal people.
- It is important to draw on the support of the community by being adaptable, flexible, and patient, and work on their livelihood support programmes.
- Use of local material and labour for reconstruction should be encouraged, thus restoring the local economy.
- Prepare the community to reduce future vulnerability as the recovery proceeds.

8.4 Monitoring and Evaluation

The monitoring and evaluation (M&E) role of the CFFRMC is very important. The recovery process and effectiveness of the programmes should be monitored, evaluated, and fed back into the process. Monitoring provides management with timely, accurate, and complete information on the effectiveness of the CFFRMC and its teams. It even provides information and enables stakeholders to assess progress and to take timely actions/decisions to ensure progress is maintained according to schedule (ADPC/ECHO/UNESCAP 2004). Financial and administrative provision for M&E of the CFFRMC should be made during the formulation of the latter. M&E can be done by a supporting NGO or a district-level government representative.

Monitoring is beneficial in implementing any project (including flash flood risk management) for the following reasons:

- determining what actually happened rather than what was planned
- promoting the approach and its transparency
- understanding changes
- learning lessons
- identifying problems and priorities in projects

Monitoring can be done in three phases: process monitoring, effect monitoring, and monitoring the significant change. Monitoring and evaluation of flash flood management activities are conducted with the following objectives, which in turn help improve the effectiveness of CFFRMCs (ADPC/ECHO/UNESCAP 2004) in order to:

- determine the full extent of positive and negative outcomes and impacts, usually at the end of a project or programme
- identify lessons that can be applied to future programme strategies and improve effectiveness of interventions
- document experience for advocating for policy change and institutionalisation
- collect data demonstrating the quality and effectiveness of the process that can be used for institutional marketing
- ensure and demonstrate accountability
- improve monitoring methods
- critique their own work
- see where strengths and weaknesses lie
- compare the programme with others like it
- share experiences
- see if work is costing too much and/or achieving too little

It is important to maintain transparency in allocating relief. CFFRMCs must maintain records of resources and expenditures. Public auditing of all financial activities must be done to ensure that relief and support reaches those in need.

8.5 Managing Information for Future Reference

Programmes are often implemented only during disasters, and no one keeps records of the events for future reference. Managing information for future reference is important because it:

- gives planners a vision about the deprived people who need appropriate long-term support
- provides a reference point to allow development workers and researchers to find out the cause of disasters and their magnitude and duration in the watershed; this information can be used to support integrated watershed management
- quantifies the loss of life and property
- explains the constraints on preparedness that caused extensive loss
- describes what went wrong regarding evacuation and temporary settlements
- gives ideas for further improvements to reduce future losses

CFFRMCs should keep records of all flash flood events and associated damage, along with their own activities in response to the flood. In coordination with various organisations, CFFRMCs should collect the relevant information on forecasting and warning available to the people: flood preparedness; crop management before, during, and after flood situations; and so on.

Information on the damage and losses caused by individual flash floods – including information on the local occurrence, depth, and duration of inundation or the occurrence and extent of flash floods – is very important for reviewing preparedness and action plans. CFFRMCs can keep records of maximum flood levels at different locations, which can facilitate post-flood investigations by technical agencies.

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