

# Resource Manual on Flash Flood Risk Management

## Module 1: Community-based Management



Arun Bhakta Shrestha  
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# About ICIMOD

The International Centre for Integrated Mountain Development (ICIMOD) is an independent regional knowledge, learning and enabling centre serving the eight regional member countries of the Hindu Kush-Himalayas – Afghanistan 🇦🇫, Bangladesh 🇬🇧, Bhutan 🇧🇹, China 🇨🇳, India 🇮🇳, Myanmar 🇲🇲, Nepal 🇳🇵, and Pakistan 🇵🇰 – and the global mountain community. Founded in 1983, ICIMOD is based in Kathmandu, Nepal, and brings together a partnership of regional member countries, partner institutions, and donors with a commitment for development action to secure a better future for the people and environment of the Hindu Kush-Himalayas. ICIMOD's activities are supported by its core sponsors: the Governments of Austria, Denmark, Germany, Netherlands, Norway, Switzerland, and its regional member countries, along with programme co-financing donors. The primary objective of the Centre is to promote the development of an economically and environmentally sound mountain ecosystem and to improve the living standards of mountain populations.

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**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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# 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 Glossary<sup>1</sup>, 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 (m<sup>3</sup>/s), sometimes referred to as cumecs. In the English system discharge is measured in ft<sup>3</sup>/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.

<sup>1</sup> <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](http://www.pascaru.net/English/1.html)).