

# Introduction

Flash floods are one of the most common forms of natural disaster in the Hindu Kush-Himalayan (HKH) region. They consist of sudden and very strong surges of water (usually along a riverbed or gully) and can carry rocks, soil, and other debris. The physical environment of the HKH is conducive to flash floods since these are the youngest mountains on earth and are still tectonically active. Since this area is undergoing uplift, it 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 season) and in the western Himalayas and the Hindu Kush (particularly during winter precipitation) 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 (500–3,500 masl), and 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, likely due to climate change, which has caused the formation and rapid growth of many glacial lakes. These lakes can burst their boundaries as a result of internal instabilities or external triggers in a process known as a glacial lake outburst flood (GLOF), which can cause immense flooding downstream. Landslides due to intense rainfall, in combination with geological instabilities and earthquakes, can cause the ephemeral damming of rivers. The outbreak of lakes created by such damming is another type of flash flood common in the region.

Hundreds of lives and billions of dollars worth of property and high-cost infrastructure are lost and much scarce agricultural land is destroyed every year in the region owing to landslides, debris flows, and floods. In the last decade of the twentieth century, floods killed about 100,000 persons and overall affected about 1.4 billion people worldwide; moreover, there is every indication that the number of events (and deaths) is increasing (Jonkman 2005). Statistics show that the number of people killed per event is significantly higher in Asia than elsewhere, and that not only are flash floods responsible for the greatest number of deaths among all water-induced disasters (Jonkman 2005), but in addition mortality rates for flash flood events are significantly higher than for riverine floods.

Despite the destructive nature and immense impact they have on the socioeconomy of the region, flash floods have not received adequate attention and the HKH regional capacity to manage this risk is low. This lack of capacity can be attributed to poor understanding of the processes and a lack of knowledge on what measures can be used. This manual was developed to address this need and to help develop regional capacity to manage the risk of flash floods. It contains a training curriculum and the resource materials needed to deliver a basic training in flash flood risk management. The manual has been prepared to help different stakeholders (government staff, non-governmental organisations and other civil society groups, lawyers, academics, and media people) understand the basics of flash floods and the full range of flood and risk management measures for an integrated approach to flash floods, including the importance of community participation, legal and institutional aspects, the latest social hazard mapping techniques, and an introduction to the various modelling tools. The overall objective of the training is to enable participants to effectively help communities and nations to be better prepared for flash floods using the implements that are available. The aim is to develop a pool of people who are able to serve as knowledge multipliers in the region.

In using the manual, it must be remembered that training needs are subject to the specific context in which the training is being conducted. Since national policies and legislation can and do differ among countries, the trainer should try to place the training in the context of the particular situation at hand, including country-specific policies and legal provisions.

## About This Manual

This manual was designed to help build the capacity of trainers in the field of flash flood risk management. It is largely based on ICIMOD's Resource Manual on Flash Flood Risk Management, Module 1 (Shrestha et al. 2008) and Module 2 (Shrestha 2008). The manual was tested during the 'Integrated Approach to Flash Floods and Flood Risk Management in the Hindu Kush-Himalayan Region' Training of Trainers Workshop which was organised by ICIMOD from 25 October to 2 November 2010 in Kathmandu, and revisions were incorporated.

The manual was prepared assuming that the participants have a basic knowledge and understanding of flash flood risk assessment and management. Building on this basic knowledge the manual aims to provide:

- a better understanding of the types, causes, and impacts of flash floods;
- a better understanding of flash flood hazards, vulnerability, risk assessment, and management methods;
- an appreciation of the role that local knowledge and gender perspectives can play in flash flood risk management;
- an introduction to social hazard mapping techniques, and valuing the process of community participation;
- an understanding of the full range of flood and risk management measures for specific types of flash floods;
- an assessment of the legal and institutional aspects of flood and disaster management;
- an introduction to the various modelling tools that are available;
- an understanding of the full range of concepts and methods for an integrated approach to flash flood risk management;
- an in-depth understanding of the flash flood risk management cycle;
- the necessary tools and materials that will enable the trainers to replicate this course in their own work areas.

## How to Use This Manual

This Training of Trainers Manual uses an adult learning method for the presentation of materials. Participant-centred learning has been kept in mind in designing the sessions and activities and in the training process. The authors envisage that a 'facilitator' will oversee the entire training session and that each session will be taught by one or more 'trainers' who can, in turn, call upon specific experts for the technical sessions and resource persons who either have some specific expertise or who can help with local arrangements for the field visits, if and when required. The facilitator intervenes at the end of activities to conduct the discussion and other training-related matters. For effective learning, the participants are requested to engage fully in the sessions and to be active and open.

Presentations, case studies, discussions, and question and answer sessions are used to enhance learning in each session. Suggestions are given to help the trainer lead the training effectively. For effective teaching the participants need to be actively involved and the facilitators need to allot time for motivating them. It is suggested that participatory teaching and learning methods be used as much as possible in each session, but for highly technical subjects it may be necessary to rely primarily on a presentation format. Sufficient time is allotted for each session so that the participants are engaged in both learning and sharing. The authors have designed a total of 21 sessions to take place over five days, but the number of days can be modified based on the needs of the participants and the context. In addition, a three-day field trip is recommended to provide the participants with hands-on learning about various aspects of field methods and techniques. In total, it is proposed that the training can be completed in eight days.

Experience shows that the maximum number of participants that can be accommodated is around 30. With more participants it is difficult to ensure the interaction and participation of all.

The training process is outlined at the beginning of each session. Resource materials are included at the end of each session, so the manual can also be used as a resource manual. The sessions are structured as follows.

**Session Title:** Introduces the main content of the session

**Time:** Rough guide of the minimum time needed for the session and the exercises

**Objectives:** Broad objectives and areas to be covered, followed by a point-wise list of specific focus areas, issues to be discussed, and skills to be imparted

**Suggested method:** The methods and techniques appropriate to the activities for the session are left to the discretion of the presenter who can choose to do a verbal presentation, use a media tool such as PowerPoint, or come up with his/her own innovative methodology to present case studies and exercises. When a specific method, such as group work, is warranted, it is signalled at the beginning of the session; otherwise it is assumed that the normal classroom situation applies.

**Materials required:** The resource materials needed are given at the end of each session. These activity-wise resource materials will make it easier to understand each activity and can also be valuable for future reference. The numbering follows the numbering of the activities; for instance, RM 7.1 refers to the resource materials for Activity 7.1 of Session 7.

**Note to the trainer:** Additional instructions or supporting material on methodology, process, and themes to be discussed are given in the text as needed.

**Activities:** The activities and exercises

## Course Structure

The session themes for each day are listed on the first page of the sections for each day. The suggested outline is as follows.

**Day 1:** Introduction, flash flood hazards in the HKH region; types, causes and impacts; hazard analysis and assessment

**Day 2:** Vulnerability and flash flood risk assessment, local knowledge on disaster management, community-based flash flood risk management, gender perspective in disaster management, social hazard mapping and risk assessment

**Day 3:** Non-structural measures for flash flood risk management, integrated flash flood and watershed management, hazard-specific flash flood management for intense rainfall floods and landslide dam outburst floods

**Day 4:** Country presentations, flash flood management for glacial lake outburst floods, briefing on the field trip

**Days 5, 6, and 7:** Field trip

**Day 8:** Legal and institutional issues of integrated flood risk management, flash flood management cycle (preparedness, response and recovery), and overall discussion

The curriculum and schedule for the training are provided at the start of the manual.

The manual has been designed so that learning during training sessions can be incorporated when the manual is updated and revised. It is hoped that trainers will be able to conduct the training easily with the help of the manual, and that participants in the training sessions will be able to act as multiplier agents by training others.

## Materials for the Workshop

Ensure that the materials required for the workshop are ready before the training begins. Some materials may need to be procured in advance. Planning will help save time and overcome confusion. The following materials are required for the workshop:

- a bag for each participant containing a pen, writing pad, and any relevant documents and materials, to be distributed during registration;
- laptop, overhead projector, extension cords, and any other associated equipment, depending on the training venue and the trainer's chosen methodology;

- wall clock;
- flipcharts, soft boards, different coloured meta cards (i.e., 6 x 8 cm pieces of coloured card), masking tape, ruler, a whiteboard or blackboard, board markers or chalk, soft pin board and pins, writing pads, pens, and other similar materials;
- an appropriate number of copies of reading material for distribution to the participants.

The training room should be set up every day. The materials required for the day should be available during the entire training period.

Ensure that media presentations are prepared in advance and that equipment is set up and tested before the participants enter the training room.

### Suggestions for the facilitator

- Set up the training room in advance to ensure that everything is in its right place.
- Test equipment in advance to ensure that session time is not used up in making it work.
- Acquaint yourself with the training methodology in advance.
- Prepare exercises prior to the session.
- Put a wall clock in the room and ask participants to align their watches with the clock to ensure that everyone arrives at the right time after breaks.
- Make participants as comfortable as possible.
- Seating arrangements should be made keeping aspects of human behaviour in mind.
- Be aware of, and sensitive to, the culture and views of participants.
- Group rules and norms should be made clear at the beginning of the training.

#### Use of an interactive approach

An interactive approach keeps the participants interested. Engage the class in short question and answer sessions throughout the day to keep them alert. Interacting with the class also allows the presenter the opportunity to assess how well the class understands the material and, if needed, to clear up any misconceptions.

#### Energising participants

Observe participants' level of engagement during the sessions and be aware when an energising activity is needed. Ask participants between sessions if they need an energiser and let them know that they should tell you if they feel they need one. Choose an energiser yourself or ask participants to suggest one. Always have an energiser exercise or game ready in case the participants cannot suggest one. Typical energisers can be found in HAA (2002) and Pike and Busse (2004).

## Suggested Schedule

The eight-day training schedule is based on an average day lasting from 9:30 to 17:00, with two breaks of 30 minutes each, morning and afternoon, and a one-hour break for lunch. Participants are expected to review the day's material in the evening. The day can be extended (e.g., starting at 8:30 or ending at 18:00) if participants need more time to understand the material.

Day 1	
Morning	Session 1 Introduction
	Session 2 Flash Flood Hazards in the HKH Region
Afternoon	Session 3 Types, Causes, and Impacts of Flash Floods
	Session 4 Flash Flood Hazard Analysis and Assessment
Day 2	
Morning	Session 5 Vulnerability and Flash Flood Risk Assessment
	Session 6 Local Knowledge on Disaster Management
Afternoon	Session 7 Community-Based Flash Flood Risk Management
	Session 8 Gender Perspectives in Disaster Management
	Session 9 Social Hazard Mapping and Risk Assessment
Day 3	
Morning	Session 10 Non-Structural Measures for Flash Flood Risk Management
	Session 11 Modelling Tools for Flash Flood Management
	Session 12 Integrated Flash Flood and Watershed Management
Afternoon	Session 12 Continued
	Session 13 Hazard-Specific Flash Flood Management: Intense Rainfall Floods
	Session 14 Hazard-Specific Flash Flood Management: Landslide Dam Outburst Floods
Day 4	
Morning	Session 15 Country Presentations
	Session 15 Continued
Afternoon	Session 15 Continued
	Session 16 Hazard-Specific Flash Flood Management: Glacial Lake Outburst Floods
	Briefing for the Field Trip
Days 5, 6, and 7	
	Field Trip Activities
Day 8	
Morning	Session 17 Legal and Institutional Issues of Flash Flood Management
	Session 18 Flash Flood Management Cycle: Preparedness
	Session 19 Flash Flood Management Cycle: Response and Recovery
	Session 20 Overall Discussion
Afternoon	Session 21 Training Evaluation and Closing Session

