











Regional Cooperation for  
**Flood Disaster Mitigation**  
in the Hindu Kush-Himalayan Region

Report of the 2<sup>nd</sup> High Level Consultative Meeting on  
Establishment of a Regional Flood Information System  
Kathmandu, Nepal, 10-13 March 2003



# about the organisations

## ICIMOD

The International Centre for Integrated Mountain Development (ICIMOD) is an independent 'Mountain Learning and Knowledge Centre' serving the eight 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 the future of the Hindu Kush-Himalayas. The primary objective of the Centre is to promote the development of economically and environmentally sound mountain ecosystems and to improve the living standards of mountain populations.

## WMO

The World Meteorological Organization (WMO) is the specialised agency of the United Nations system responsible for monitoring and forecasting the state of the world's atmosphere, climate and water resources. In the field of freshwater, its stated aim is "to apply hydrology to meet the needs for sustainable development and use of water and related resources; to the mitigation of water-related disasters; to ensure effective environmental management at national and international levels."

The Organization has its origins in the 1860s and operates on the basis of cooperative action by the National Meteorological and Hydrological Services of its Member countries and territories, which numbered 186 in June 2003.

While WMO's principal contacts are with the National Meteorological and Hydrological Services of countries, its collaborative work embraces joint projects with many other intergovernmental and non-governmental organisations and regional bodies. It receives support from a wide range of donor institutions and countries. This also involves participation in many high-level intergovernmental meetings and programmes. Whether at the local level or intergovernmental level, WMO's aim is to help countries develop the knowledge base that they need to manage their water resources and combat the threats of flood and drought.

## USDS/REOSA

The Department of State's Regional Environment Office for South Asia supports transboundary cooperation in dealing with environmental, other scientific and health challenges among the countries of South Asia. Water issues are a major focus of its efforts. The office is based in the U.S. Embassy in Kathmandu.

## USAID/OFDA

The United States Agency for International Development's (USAID) office of U.S. Foreign Disaster Assistance (USAID/OFDA) is responsible for providing international disaster assistance and coordinating the U.S. government (USG) response to declared disasters in foreign countries. USAID/OFDA's Mission is to minimize and where possible, prevent loss of life, human suffering, and damage to economic assets in disaster affected countries. The sub-regional office of USAID/OFDA is based in Kathmandu.

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**Note:** The affiliation and professional positions of the various participants were those current at the time of the meeting.

## foreword

The mountains of the Hindu Kush-Himalayas (HKH) are some of the largest storehouses of freshwater in the lower latitudes in the world and the source of many mighty rivers including the Indus, Ganges, Brahmaputra, Meghna, and Mekong. These rivers provide water for drinking and food production, and contain the potential for generating the hydropower that could improve livelihoods and support economic development throughout the region. Equally, these same rivers, untamed and uncontrolled, yearly cause such extensive floods as to threaten the lives of millions of people downstream and cause untold damage to property.

Too often, the people in the path of these floods have no warning, and in many cases it is the poorest of the poor, those with the least resources for recovery, who are exposed most. Controlling these floods is a daunting, and perhaps impossible, task – but much can be done to reduce the damage they cause by providing sufficient warning of the impending disaster for threatened populations to protect their property or move to safer areas. Most of the rivers that rise in the HKH region flow through more than one country and thus, by their nature, floods are a regional issue. The countries of the region are drawn together through common river basins, and must come together to link upstream events with downstream consequences, and downstream policies with upstream consequences. To forecast floods with any degree of accuracy, timely and reliable hydrometeorological information is needed from the whole of each river basin, thus information must be exchanged across national borders, and all countries need a sufficient and compatible capacity in data collection, transmission, and flood forecasting.

The International Centre for Integrated Development (ICIMOD) has been concerned with issues of water management and disaster prevention in the HKH region for some twenty years, and has supported regional efforts to increase scientific and technical collaboration on water issues – from watershed management and micro-water harvesting to regional data sharing through the HKH-FRIEND project supported by UNESCO. At the global level, the World Meteorological Organization (WMO) has been promoting regional cooperation in hydrometeorological observation for a number of years through its World Hydrological Cycle Observing System (WHYCOS), which is increasingly being used as a framework for collaboration and development of resources.

In 2001, ICIMOD joined with WMO, with the support of ICIMOD's regional member countries, to initiate a project designed to address flood data and information exchange in the HKH region and its downstream plains areas, in particular the establishment of a regional flood information system. ICIMOD and WMO are ideally situated to help forge the active partnership between countries in the region that will be pivotal in the project's success, as all the HKH countries are members of both organisations.

The project has been substantially supported by the U.S. Department of State Regional Environment Office for South Asia (USDS/REOSA) and the U.S. Agency for International Development Office of Foreign Disaster Assistance (USAID/OFDA), with further support from the Department of Hydrology and Meteorology of His Majesty's Government of Nepal and a small contribution from the Danish International Development Agency (DANIDA). The overarching goal of the project is to reduce the flood vulnerability of the HKH region and minimise the loss of lives and property, focusing in the first instance on the Ganges-Brahmaputra-Meghna and Indus river basins. The two major challenges are collection of the necessary high quality hydrometeorological data in all parts of the major river basins, including in remote areas with limited infrastructure, and facilitating a system for exchange of this data in real-time between the countries through which each river runs which builds on the bilateral arrangements already established in some cases.

The project has proceeded through a series of meetings: a 1<sup>st</sup> High Level Consultative Meeting held in May 2001, during which a framework was developed for a regional flood information system based on the proven concept of the WHYCOS, now called HKH-HYCOS; a Consultative Panel Meeting held in May 2002, at which a concept note was drafted and short, medium, and long term action plans outlined; and the 2<sup>nd</sup> High Level Consultative Meeting held in March 2003 which is the subject of this report. HKH-HYCOS has been formalised as a joint project of WMO and ICIMOD, as facilitating organisations between the regional member countries, through a Memorandum of Understanding between the two organisations.

This publication summarises the development of the project to date and provides a detailed report of the 2<sup>nd</sup> High Level Consultative Meeting held in March 2003, including summaries of the technical papers, and an outline of future plans. The full text of the technical papers is being published in a supplementary volume. The meeting provided a valuable opportunity for high-level government representatives, directors of national hydrological and meteorological services, technical experts from the region and from the United States United States Geological Survey (USGS) and National Oceanic and Atmospheric Administration (NOAA), and representatives of international organisations, to share information and discuss organisational and technical approaches to flood forecasting and mitigation of flood-related damage. The participants discussed the draft project document and agreed on the action plan for the next stage. In the ongoing process, national consultations are now being held to identify the specific needs and priorities of each country for the establishment of the regional flood information system.

The people of the region have learned to seek in the Himalayas both spiritual solace and the means to improve the livelihoods of the people, both upstream and downstream. We hope that the optimism and cooperative spirit displayed at the meeting will imbue the commitment to follow through in each country and that we will be successful in establishing a regional flood information system, building on bilateral arrangements, that will provide the basis for ensuring physical security, saving lives, and reducing economic loss, while safeguarding the environment. ICIMOD is proud to be a part of this valuable initiative, and hopes that this publication will help to stimulate interest in and support for the project.

Dr. J. Gabriel Campbell  
Director General  
ICIMOD

## acknowledgements

This report was substantially compiled by Mandira Shrestha and other members of ICIMOD's Water Hazards and Environment Management Programme, with support from Wolfgang Grabs and the ICIMOD editorial team. We thank all those who have contributed to the development of the project and the preparation of this report.

The present publication presents the outcomes of the most recent meeting, a 2<sup>nd</sup> High Level Consultative Meeting held on 10-13 March 2003 in Kathmandu, Nepal, at which a draft project document was discussed that will assist in securing funding for the implementation of the project. The March 2003 meeting followed a First High Level Consultative Meeting held in May 2001, at which a basic framework for flood information exchange to facilitate flood forecasting in the region was developed, and a Consultative Panel Meeting held in May 2002, at which a final note was approved and short, medium, and long term action plans outlined.

The meeting was organised jointly by the International Centre for Integrated Mountain Development (ICIMOD) and the World Meteorological Organization (WMO), with support from the Department of Hydrology and Meteorology (DHM) of His Majesty's Government of Nepal (HMGN), and was sponsored by the US Department of State, Regional Development Office for South Asia (USDS/REUSA), the US Agency for International Development, Office of US Foreign Disaster Assistance (USAID/OFDA), and the World

## executive summary

Starting in 2001, a long-term project was initiated aimed at establishing a regional flood information system to reduce flood vulnerability and minimise the negative impacts of floods in the Hindu Kush-Himalayas. As part of this project a series of meetings have been held and reports and papers prepared, and a website <[www.southasianfloods.org](http://www.southasianfloods.org)> has been set up to facilitate sharing of data and information. The present publication presents the outcomes of the most recent meeting: a 2<sup>nd</sup> High Level Consultative Meeting held on 10-13 March 2003 in Kathmandu, Nepal, at which a draft project document was discussed that will lay the basis for securing funding for the implementation of the project. The March 2003 meeting followed a First High Level Consultative Meeting held in May 2001, at which the basic framework for flood information exchange to facilitate flood forecasting in the region was developed, and a Consultative Panel Meeting held in May 2002, at which a concept note was approved and short, medium, and long-term action plans outlined.

The meeting was organised jointly by the International Centre for Integrated Mountain Development (ICIMOD) and the World Meteorological Organization (WMO), co-hosted by the Department of Hydrology and Meteorology (DHM) of His Majesty's Government of Nepal (HMG/N), and was sponsored by the US Department of State, Regional Environment Office for South Asia (USDS/REOSA); the U.S. Agency for International Development, Office of US Foreign Disaster Assistance (USAID/OFDA); and the World Meteorological Organization (WMO). The participants were high-level government representatives of the national hydrological and meteorological services and organisations involved in flood disaster management of Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan, and representatives from the organising and sponsoring organisations.

The principle objectives of the meeting were to discuss a draft project document on the development of a regional flood information system and agree on technical, managerial and implementation aspects; to present state-of-the-art accounts of flood forecasting and information systems; to develop an action plan to help promote the project with national implementing agencies, regional organisations, and donor agencies; and to provide input to WMO and ICIMOD on the final version of the project proposal. When finalised, the proposal will be submitted to the relevant ministries of the participating countries for their approval.

The meeting was held in two parts - a Technical Conference and the 2<sup>nd</sup> High Level Consultative Meeting itself. The background information for the discussions was presented at the Technical Conference, with twelve presentations by international and regional technical experts on flood forecasting and information exchange. The



Consultative Meeting itself focused on discussion of the draft project document and conceptual, technical, organisational, and operational issues related to the project implementation. The representative from India provided an additional note that documents the official stand of the Government of India with respect to the further development of the project.

Funds have been secured for national consultation and a study to be carried out in 2003 to 2005 to test the technical feasibility of the project, and participants discussed the approach to be used. They recommended that the experiences of the regional countries be taken into consideration in the selection of the equipment and flood information system to be used in the test phase and made suggestions about the national consultations to be held in each country as a component of the feasibility study. These national consultations will be used to identify and assess individual countries' needs and priorities for a flood information system, and to suggest pilot basins as possible test sites.

The participants also agreed on an action plan for further implementation of a regional flood information system and adopted a resolution endorsing the project subject to the revision of the draft project document. The draft project document will be revised to incorporate the participants' comments and suggestions and submitted to the countries for final approval.

This publication provides background information on the project, short summaries of the presentations at the technical conference, and a brief account of the presentations at the consultative meeting and the results of the discussions of the draft project document. The technical papers are published in full in a supplementary volume. The action plan is presented in the Annexes together with background material gathered from the preceding meetings and consultations.

# acronyms and abbreviations

|        |   |
|--------|---|
| ADB    | Asian Development Bank  |
| ADPC   | Asian Disaster Preparedness Centre                                  |
| ARGOS  | Satellite-Based Data Collection and Localisation System of CNES/CLS |
| BUP    | Bangladesh Unnayan Parishad   |
| BWDB   | Bangladesh Water Development Board                                  |
| CFAB   | Climate Forecast Application in Bangladesh                          |
| CLS    | Collecte Localisation Satellite (France)                            |
| CMA    | China Meteorological Administration                                 |
| CNES   | National Centre for Space Studies (French Space Agency)             |
| CWC    | Central Water Commission (India)                                    |
| DANIDA | Danish International Development Assistance                         |
| DCP    | data collection platform  |
| DEM    | digital elevation model   |
| DHI    | Danish Hydraulic Institute  |
| DHM    | Department of Hydrology and Meteorology (Nepal)                     |
| DWIDP  | Department of Water Induced Disaster Prevention (Nepal)             |
| ECMWF  | European Centre for Medium Range Weather Forecasting                |
| EFFS   | European Flood Forecasting System                                   |
| FFWC   | Flood Forecasting and Warning Centre (Bangladesh)                   |
| GBM    | Ganges-Brahmaputra-Meghna   |
| GIS    | geographic information system                                       |
| GLOF   | glacial lake outburst flood   |
| GPS    | geographic positioning system                                       |
| GTS    | global telecommunication system                                     |

|            |  |
|------------|--|
| HKH        | Hindu Kush-Himalayas(n)  |
| HKH-FRIEND | Hindu Kush-Himalayan Flow Regimes from International Experimental and Network Data         |
| HKH-HYCOS  | Hindu Kush-Himalayan Hydrological Cycle Observing System                                   |
| HMGN       | His Majesty's Government of Nepal  |
| ICIMOD     | International Centre for Integrated Mountain Development                                   |
| IMD        | India Meteorological Department  |
| JICA       | Japan International Cooperation Agency   |
| MRC        | Mekong River Commission  |
| NCAR       | National Centre for Atmospheric Research (USA)   |
| NCEP       | National Centre for Environmental Prediction (USA)   |
| NCMRWF     | National Centre for Medium Range Weather Forecasting (India)                               |
| NHS        | national hydrological service  |
| NMS        | national meteorological service  |
| NOAA       | National Oceanic and Atmospheric Administration  |
| POES       | Polar Operational Environmental Satellite (NOAA)   |
| UNDP       | United Nations Development Programme   |
| UNESCO     | United Nations Educational, Scientific and Cultural Organization                           |
| USAID/OFDA | United States Agency for International Development, Office for Foreign Disaster Assistance |
| USDS/REOSA | United States Department of State, Regional Environment Office for South Asia              |
| USGS       | United States Geological Survey  |
| WHYCOS     | World Hydrological Cycle Observing System  |
| WMO        | World Meteorological Organization  |

# Contents

|                            |  |
|----------------------------|--|
| foreword                   |  |
| acknowledgements           |  |
| executive summary          |  |
| acronyms and abbreviations |  |

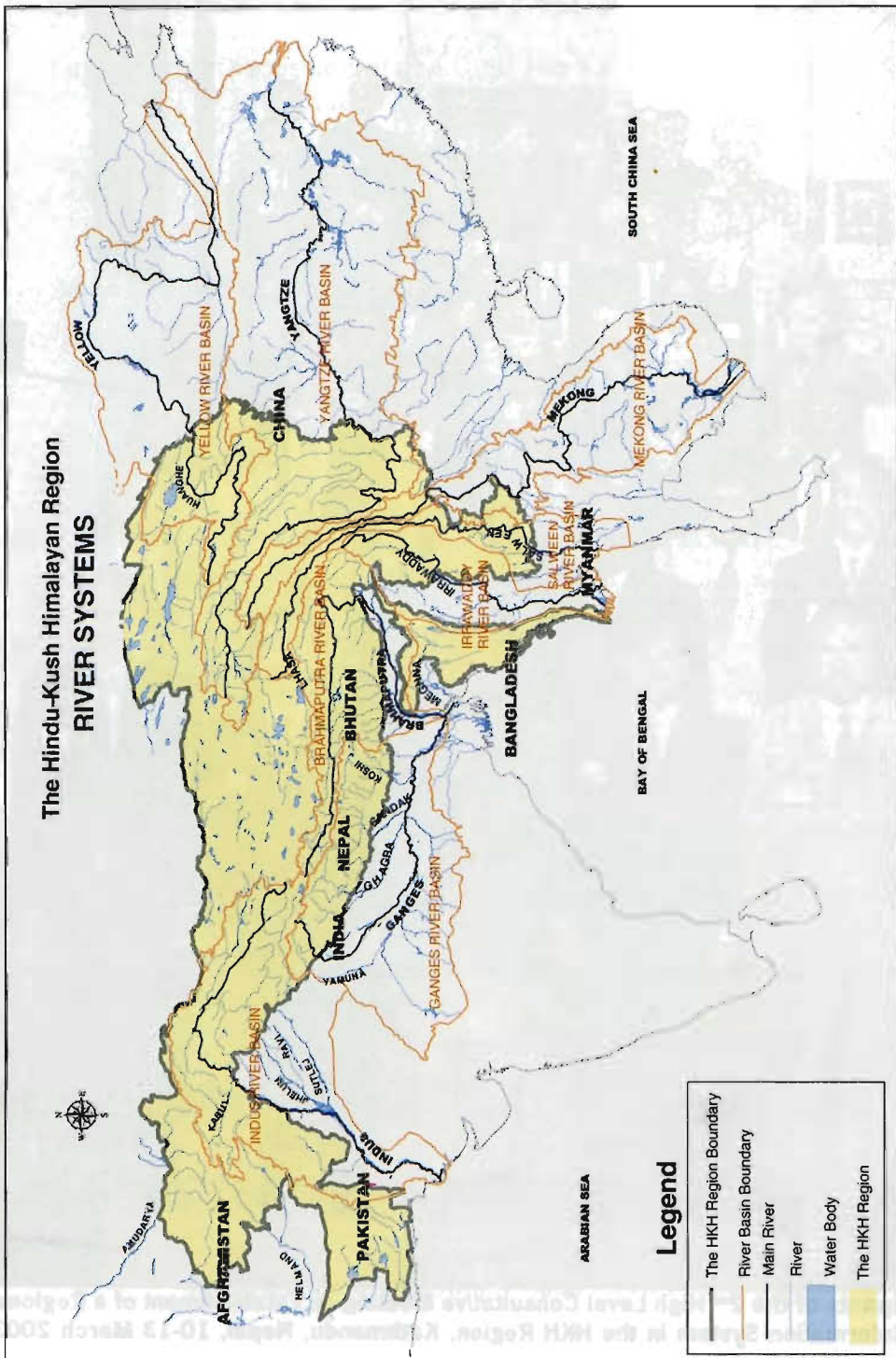
|   |          |
|---|----------|
| <b>introduction to the project</b> .....  | <b>1</b> |
| Background .....  | 1        |
| The History of the Project.....   | 2        |
| The Second High Level Consultative Meeting .....  | 3        |
| <b>the technical conference</b> .....   | <b>5</b> |
| Opening Session .....   | 5        |
| Session 1: Hydrometeorological Data Acquisition and<br>Transmission Systems for Flood Forecasting .....             | 7        |
| State-of-the Art Methods of Hydrological and Meteorological Data<br>Acquisition Systems for Flood Forecasting ..... | 7        |
| Telecommunication Systems for Real-time Hydrometeorological Data<br>Collection and Transmission .....               | 7        |
| Briefing on the ARGOS Telecommunication System .....  | 8        |
| Session 2: Integrated Hydrometeorological Information and<br>Network Design for Flood Forecasting .....             | 10       |
| Use of Short-term and Long-term Meteorological Forecasting<br>Information in Flood Forecasting .....                | 10       |
| The Flood Forecasting System in Europe .....  | 11       |
| Integrated Hydrometeorological Network Design and Operation<br>for Flood Forecasting .....                          | 11       |
| Data and Information Management in Integrated Hydrological<br>and Meteorological Networks .....                     | 12       |
| Session 3: Flood Forecasting and Flood Management .....   | 13       |
| Food Management in Integrated River Basin Development .....   | 13       |
| Development of a Flood Forecasting and Warning System in<br>Bangladesh, a Case Study .....                          | 14       |
| Integrated Hydrological-Hydraulic Modelling Approach for Flood<br>Forecasting and Warning .....                     | 16       |
| Flood Management and Local Adaptation and Response Strategies .....   | 16       |
| Climate Forecast Applications in Bangladesh .....   | 17       |

|   |           |
|---|-----------|
| <b>the second high level consultative meeting .....</b>   | <b>19</b> |
| Session 1: Opening .....  | 19        |
| Session 2: Discussion of the Draft Project Document:<br>Conceptual and technical aspects .....  | 25        |
| Session 3: Discussion of the Draft Project Document:<br>Network Design, and Organisational, Managerial,<br>and Funding Aspects of the Project ..... | 28        |
| Session 4: National Consultations, Project Endorsement and Action<br>Plan .....   | 30        |
| The Mekong River project .....  | 30        |
| Objectives and organisation of national consultations for the<br>implementation of the project Professor Suresh Chalise .....                       | 31        |
| Endorsement procedure for the project and project implementation .....  | 31        |
| Action plan .....   | 31        |
| Closing remarks by the participants .....   | 32        |
| Chair's concluding remarks .....  | 32        |
| <b>conclusions and key achievements .....</b>   | <b>33</b> |
| Key Achievements .....  | 33        |
| <b>annexes .....</b>  | <b>35</b> |
| Annex 1: Executive Summary of the First Meeting of the<br>Consultative Panel .....  | 35        |
| Annex 2: Executive Summary of the First Consultative<br>Meeting .....   | 37        |
| Annex 3: Programme .....  | 41        |
| Annex 4: List of Participants .....   | 45        |
| Annex 5: Keynote Address .....  | 51        |
| Annex 6: Comments of the Representative from India .....  | 55        |
| Annex 7: Summary of Comments on the Draft Project<br>Document Received Prior to the Meeting .....   | 57        |
| Annex 8: National Consultation Meetings on the<br>Establishment of a Regional Flood Information<br>System in the HKH .....                          | 61        |
| Annex 9: Action Plan for the Feasibility Study and<br>Infrastructure Testing Phase .....  | 67        |



**Participants of the 2<sup>nd</sup> High Level Consultative Meeting on Establishment of a Regional Flood Information System in the HKH Region, Kathmandu, Nepal, 10-13 March 2003**

# The Hindu-Kush Himalayan Region RIVER SYSTEMS



**Legend**

- The HKH Region Boundary
- River Basin Boundary
- Main River
- River
- Water Body
- The HKH Region



Source: USGS, DCW and ESRI Data & Map 2001.