Water Quality in South Asia: Issues and Status

Workshop Proceedings

June 29 – July 2, 2004, Kathmandu, Nepal

CMC

ICIMOD Partnership Platforms 1/05

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.

CMC

The Cooperative Monitoring Center (CMC) is located at Sandia National Laboratories in Albuquerque, New Mexico, USA and is primarily sponsored by the US Department of Energy. CMC promotes collaboration among scientists and researchers as a means of helping secure a peaceful world through technology. In order to promote regional cooperation on environmental research, CMC has initiated a project to measure and monitor environmental parameters in South Asia. This project is primarily funded by the US Department of State and the US Department of Energy. CMC and Sandia National Laboratories have significant technical expertise that can be applied to cooperative environmental monitoring projects, including high-resolution remote sensing, data transmission and security, computer modeling, data management, and decision support tools, and the infrastructure to support cooperative monitoring efforts. CMC works with other entities including the US Geological Survey, the Environmental Protection Agency, the Bureau of Reclamation, and numerous universities, as well as local and state governments.

USDS/REOSA

U.S. Department of State's Regional Environmental Office for South Asia
The Regional Environment Office for South Asia (REO, or "hub") promotes regional environmental cooperation by working with governments, public sector agencies, international organizations, business, NGOs, and others, to support transboundary efforts to address environmental problems that transcend national boundaries. Environmental degradation is a major cause of poverty and instability in South Asia. Political tensions have impeded regional cooperation to deal with it. The U.S. State Department established the Regional Environment Office (REO, or "Hub") in 1997 to work with the countries of the region – Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka. Regional stability and confidence building are key goals.

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with support from
US Department of State, Regional Environment Office for South Asia, Kathmandu, Nepal
and
US Department of Energy, Sandia National Laboratories, Albuquerque, New Mexico, USA

Published by
International Centre for Integrated Mountain Development
G.P.O. Box 3226
Kathmandu, Nepal

ISBN 92 9115 076 2

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Printed and bound in Nepal by
Jagdamba Press
Kathmandu

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

foreword

The mountains of the Greater Himalayan region are one of the largest storehouses of freshwater in the world and the source of many mighty rivers including the Indus, Ganges, Bramhaputra, 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. Average annual rainfall is high over much of the area, and these rivers and their tributaries carry a huge volume of water annually – but access to clean water, and sufficient water, has become one of the major challenges for the people of the Himalayas and their downstream neighbours.

Surface water in the region is often contaminated with untreated industrial waste and domestic sewage, as well as other pollutants discharged directly into the rivers. Population growth, urbanisation, unplanned development, land degradation, and lack of infrastructure for waste disposal have all contributed to the rapid deterioration in water quality in the majority of rivers, streams, and lakes in South Asia. Poor water quality poses a threat both to the environment and to the health of the people in the region. Water is needed for the economic development of a country and is important for maintaining a healthy ecosystem. Nevertheless, the issue of water quality is generally neglected, efforts to counteract the problem are minimal, and the volume of pollutants draining into the rivers is increasing. Furthermore, the major rivers flow vast distances and the water they contain crosses major national and international boundaries, but there is little research into or study of the downstream impacts on water quality resulting from upstream activities.

The International Centre for Integrated Mountain 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. Through the water quality group of HKH-FRIEND, ICIMOD has organised many training events including some on water quality monitoring. At the global level, the World Meteorological Organization (WMO) has been promoting regional cooperation in sharing hydrometeorological data and information leading towards the establishment of a regional flood information system, an activity that ICIMOD is furthering in the countries of the Greater Himalayas.

In 2004, ICIMOD joined with the Cooperative Monitoring Center (CMC) located at Sandia National Laboratories in the USA, in an initiative for collecting and sharing regional water quality information in South Asia – the South Asia Water Analysis Network (SAWAN). The initiative was started by CMC in 1999 under the name South Asia Transboundary Water Quality Monitoring (SATWQM) with the aim of focusing on activities that foster the regional sharing of water quality data along transboundary

sections of the Ganges and Indus rivers, and building confidence among the partners. Basic water quality parameters are monitored along selected stretches of the Ganges and Indus rivers and their major tributaries in Bangladesh, India, Nepal, and Pakistan using standardised techniques and equipment. The collaboration with ICIMOD is intended to broaden the scope of the cooperation in the Himalayan region and help extend the partnership of the project to government-level institutions.

As part of the collaboration, a 'Regional Integrated Workshop on Water Quality' was held in Kathmandu in June 2004 by ICIMOD and CMC with support from the US Department of State, Regional Environment Office for South Asia and the United States Department of Energy, Sandia National Laboratories, to build better understanding on water quality issues in the region. The participants included representatives from SAWAN's project partners; key government organisations; the HKH-FRIEND water quality group; international organisations; donor organisations; academicians; and non-government organisations from Bangladesh, India, Nepal, Pakistan, and the USA. ICIMOD now also hosts the project website which is linked to a database that houses the water quality data provided by partners.

This publication provides a detailed report of the meeting held in June 2004 with summaries of the technical papers and country reports. The full text of the papers will be published in a separate volume. The integrated workshop expanded the network, and data collection partners were trained to improve their data sharing capabilities, especially data transfer. The workshop identified priority areas for water quality in South Asia and four specific areas of long-term focus.

We hope that this initiative will both profit from and contribute to the other regional initiatives of ICIMOD, and contribute towards attainment of ICIMOD's vision of prosperous and secure mountain communities. The proceedings will be of interest to all those interested in transboundary activities and information sharing processes in the Greater Himalayan region in general, and water quality issues in particular. We hope that this publication will also help to stimulate interest in this particular project.

Dr. J. Gabriel Campbell
Director General
ICIMOD

acknowledgements

The authors would like to express their thanks to the US Department of Energy, Sandia National Laboratories, Albuquerque, New Mexico, USA; and the US Department of State, Regional Environment Office for South Asia, Kathmandu, Nepal for supporting the SAWAN project and the workshop. We extend our sincere gratitude to Dr. J. David Betsill, Dr. Gaurav Rajen, and other members of the Cooperative Monitoring Center, Sandia National Laboratories, for collaborating with ICIMOD on the SAWAN project.

We would also like to thank our partners in data collection for their steady support of this project – the Bangladesh Unnayan Parishad (BUP), Bangladesh; the Centre for Environment and Development (CED), India; the Environmental Biology Laboratory (EBL), Patna University, India; the Aquatic Biology Laboratory (ABL); Guru Nanak Dev University, India; the Environment and Public Health Organisation (ENPHO), Nepal; and the World Wide Fund for Nature-Pakistan (WWF-P).

This publication would not have been possible without the support of our colleagues from ICIMOD's Information and Knowledge Management (IKM) programme, in particular Dr. A. Beatrice Murray, Senior Editor, Mr. Dharma Ratna Maharjan, layout and design specialist, and Mr. Asha K. Thaku cartographer and artist. Our sincere thanks go to our colleagues Mr. Basanta Shrestha and Mr. Sushil Pandey, of IKM-MENRIS for their contribution to the development of the SAWAN project and their support during the workshop, and to Mr. Ritesh Gurung and Ms. Sardu Bajracharya, the workshop rapporteurs. Ms. Sarita Joshi, secretary in ICIMOD's Water, Hazards and Environmental Management (WHEM) programme deserves particular thanks for her patience and secretarial support.

Special thanks are also due to all the participants of the workshop for their invaluable contributions and active participation. We are grateful to all who have contributed directly or indirectly to the development of the SAWAN project and to the preparation of this report.

executive summary

The Hindu Kush-Himalayan (HKH) region is one of the largest storehouses of freshwater in the world, and its mountains are the source of major river systems that serve some 500 million people in South Asia. The theoretical water availability in these rivers is high, however access to clean water remains one of the major challenges for the region. Overall, inland surface water quality in the monsoon season is within tolerable limits with respect to the standards set by the countries concerned, but deteriorates during the dry season. Rapid growth of population, urbanisation, unplanned development, land degradation, and lack of infrastructure for waste disposal are common reasons for the rapid deterioration of water quality in the majority of rivers, streams, and lakes in the region. This poses a threat to both the environment and to people's health.

To address these issues a regional initiative called South Asia Transboundary Water Quality Monitoring (SATWQM), later renamed South Asia Water Analysis Network (SAWAN), was begun in 1999 to share regional environmental information as a means of building confidence and promoting regional cooperation in South Asia. The aim of the project is to focus on activities that foster the regional sharing of water quality data along transboundary sections of the Ganges and Indus rivers. Project partners have initiated the collection of basic water quality parameters from 18 stations in the Ganges and Indus rivers and their major tributaries. In April 2004, the Cooperative Monitoring Center (CMC), which is located at Sandia National Laboratories in Albuquerque, New Mexico, USA, started collaboration with ICIMOD to broaden the scope of cooperation in the HKH region and extend the partnership of the project to government-level institutions.

A Regional Integrated Workshop on Water Quality was held in Kathmandu from 29 June to 2 July 2004. The main objectives were to broaden the partnership and to build better understanding of water quality issues among the institutions involved in water quality in the region: SAWAN's project partners; key government organisations; members of the water quality group from HKH-FRIEND (Hindu Kush-Himalayan Flow Regimes from International Experimental and Network Data); international organisations; donor organisations; academic establishments; and non-government organisations (NGOs), from Bangladesh, India, Nepal, Pakistan, and the USA, participated in the workshop.

The participants discussed the progress of transboundary water quality monitoring in the Ganges and Indus rivers and their major tributaries; country-specific water quality issues in the participating countries of Bangladesh, India, Nepal, and Pakistan; the development of partnerships; and ideas for the further development of SAWAN.

Untreated industrial and municipal wastewater, runoff pollution from chemical fertilisers and pesticides used in agriculture, and high seasonal variability of flow are the major reasons for the degrading of water quality in the majority of the streams,

rivers, lakes, and other water bodies in the region. Many attempts have been made to protect the water sources. The Governments of Bangladesh, India, Nepal, and Pakistan have all formulated environmental legislation to address water quality issues, however, implementation lags far behind. All these countries have formulated quality standards for industrial effluents and municipal waste, but treatment facilities are inadequate.

A strong need was expressed at the meeting for a regional-level water quality monitoring protocol to ensure uniformity in water quality assessment and the validity of the data compiled. Participants also expressed their continued interest in and commitment to fostering regional cooperation through water quality monitoring and data sharing. Improved monitoring and data collection along transboundary rivers, and ensuring the reliability and authenticity of data, were given a high priority.

acronyms and abbreviations

ABL	Aquatic Biology Laboratory (Guru Nanak Dev University, India)
ASSESS-HKH	Development of Assessment System to Evaluate the Ecological Status of the Rivers in the Hindu Kush-Himalayan Region
BOD	biochemical oxygen demand
BUP	Bangladesh Unnayan Parishad (Bangladesh)
BUET	Bangladesh University of Engineering and Technology (Bangladesh)
BWDB	Bangladesh Water Development Board (Bangladesh)
CBO	community-based organisation
CED	Centre for Environment and Development (India)
CMC	Cooperative Monitoring Center (USA)
COD	chemical oxygen demand
DHM	Department of Hydrology and Meteorology (Nepal)
DO	dissolved oxygen
DoE	Department of Environment (Bangladesh)
EIA	environmental impact assessment
ENPHO	Environment and Public Health Organisation (Nepal)
FRIEND	Flow Regimes from International Experimental and Network Data
GAP	Ganga Action Plan
GIS	geographic information system
GLOF	glacial lake outburst flood
GoI	Government of India
HKH	Hindu Kush-Himalayas
HKH-FRIEND	Hindu Kush-Himalayan Flow Regimes from International Experimental and Network Data
HMG/N	His Majesty's Government of Nepal
IAHS	International Association for Hydrological Sciences
ICIMOD	International Centre for Integrated Mountain Development
IHP	International Hydrological Programme
IWM	Institute of Water Modelling (Bangladesh)
IUCN	International Union for the Conservation of Nature
KU	Kathmandu University (Nepal)
MoPE	Ministry of Population and Environment (Nepal)

NGO	non-government organisation
NRCD	National River Conservation Directorate (India)
ORP	oxidation reduction potential
PARDYP	People and Resource Dynamics Project
PCRWR	Pakistan Council for Research in Water Resources (Pakistan)
RCM	regional climate model
RHDC	Regional Hydrological Data Centre
RO	reverse osmosis
SAGARMATHA	Snow and Glacier Aspects of Water Resources Management in the Himalayas
SAWAN	South Asia Water Analysis Network
SATWQM	South Asia Transboundary Water Quality Monitoring
SODIS	solar water disinfection
SNL	Sandia National Laboratories, USA
TDS	total dissolved solids
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UVR	ultraviolet radiation
WHEM	Water, Hazards and Environmental Management Programme (ICIMOD)
WQI	water quality index
WWF-P	WWF-Pakistan (formerly World Wildlife Fund, World Wide Fund for Nature)

contents

Participants in the Regional Integrated Workshop on Water Quality, 29 June - 2 July 2004, Kathmandu, Nepal