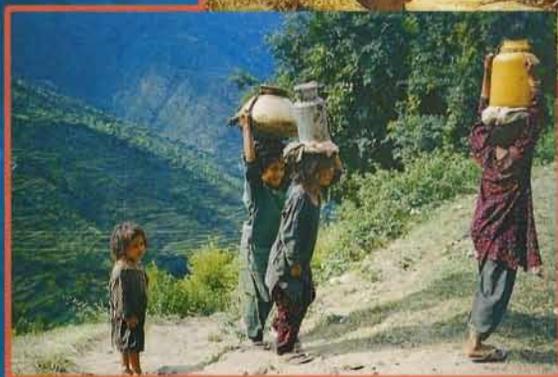
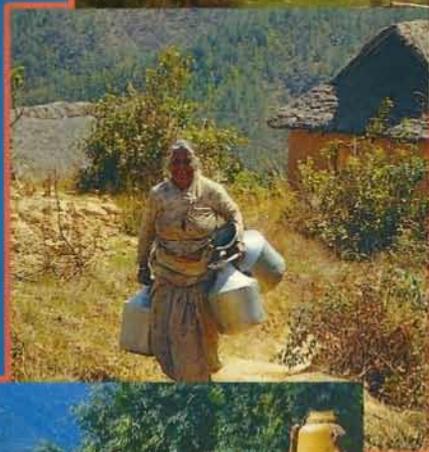


Waters of Life

Perspectives of Water Harvesting in the HKH



Mahesh Banskota
Suresh R. Chalise

Waters of Life

Perspectives of Water Harvesting in the Hindu Kush-Himalayas

Proceedings of the Regional Workshop on Local Water Harvesting for Mountain
Households in the Hindu Kush-Himalayas
Kathmandu, March 14-16, 1999

Editors
Mahesh Banskota
Suresh R. Chalise

International Centre for Integrated Mountain Development
Kathmandu, Nepal
2000

Copyright © 2000

International Centre for Integrated Mountain Development
All rights reserved

Credit: All plates by Suresh Raj Chalise

Cover:

- Background* Waterfall close to Khasa near Nepal-China (Tibet) border
Top Right Water brings life to the cold desert, Ladakh, India
Centre An old lady walking up hill to fetch water, Bajrapare village,
Kabhrepalanchok, Nepal
Bottom right Little girls with a big burden: children fetching daily water
supplies, Tehri Garhwal, India.
Back page Rara Lake, 3,000 masl

Published by

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

ISBN 92 9115 104 1

Vol. I 92 9115 118 1

Editorial Team: Greta Mary Rana (Senior Editor)
Dharma R. Maharjan (Technical Support and Layout Design)
Asha K. Thaku (Cartography and Design)

Typesetting at

ICIMOD Publications' Unit

The views and interpretations in this paper are those of the author(s). They are not attributable to the International Centre for Integrated Mountain Development (ICIMOD) and do not imply the expression of any opinion concerning the legal status of any country, territory, city or area of its authorities, or concerning the delimitation of its frontiers or boundaries.

Foreword

Water is fundamental to the material basis of both life and livelihoods in rural Asia. Water serves a variety of purposes: it is used not only for irrigating the main field crops, but also for domestic needs such as drinking, washing, and bathing and for home gardens, livestock, trees, and other permanent vegetation. Other productive uses include aquaculture, transportation, and small rural enterprises such as brick making. The environmental benefits of water resources include direct uses such as the harvesting of aquatic plants and animals and the immeasurable benefits of biodiversity and maintaining natural ecosystems. Many of the traditional water-harvesting systems have fallen into disuse or have been forgotten, replaced by 'modern' structures and systems that have failed to meet the expectations and demands of growing populations. Water scarcity affects the rural household, economy, and environment in multifarious ways, resulting in hardships such as the necessity of carrying heavy pots of water several kilometres every day to meet household needs; the destitution of farmers and their families who lose their lands, or of the landless who lose their jobs because of lack of water for irrigation; the loss of wetlands and estuaries because of water depletion upstream; and increasing health problems caused by water-borne diseases and pollution. Inequitable access and a distribution system skewed in favour of the urban, rich and powerful further compound the problem of absolute scarcity, especially for the poor and the disadvantaged.

Concomitantly with growing scarcity, competition over water among various uses and users is intensifying, both within and between sectors. Demands for water supplies for agriculture, households, and industry have escalated dramatically in recent decades. Increasingly, wetlands, rivers, and estuaries that support wildlife and vegetation are being threatened by water transfer and shortage. While water for irrigation remains critical for food production and rural incomes, farmers must compete for the resource among themselves and with rapidly growing industrial, domestic, and urban demands for water. In the competition for water, industrial and urban needs typically receive priority over agriculture and irrigation, which in turn are favoured over domestic uses (generally considered the domain of women) or ecosystem needs. 'Environment versus development' dilemmas over water have led to conflicts and struggles related to large dams, industrial pollution, chemical runoff from agriculture, and aquaculture, among other issues. Often, as water resources have fallen under centralized and state control through bureaucracies, policies, and legal instruments, communities have had to struggle to maintain their rights, customary local practices, and livelihoods. With towns and industries making more and more claims on the water currently used in rural areas, the rural poor and marginalised groups have little means to defend their rights to water and are unlikely to even gain a seat at the table in discussions about the best way to manage diminishing water resources.

Simultaneously, a better understanding by the public and policy-makers of resource limits and the urgency of taking effective action to meet the challenge is needed. In the face of increasing water scarcity and competitive demands on water, water security will be increasingly linked to poverty eradication, governance, and conflict resolution. In the meantime, rapidly evolving water markets are establishing their own means of rationing water in many parts of Asia. Water is increasingly being treated as a commodity to facilitate mobility between competing demands and purchasing capacities; in short, going to those who have the ability and willingness to pay. But treating water as a commodity may

only further marginalise the weaker sections of society who have minimal purchasing capacity and are unable to defend their prior use of water. Water is imbued with deep cultural significance all over the world, especially in rural Asia. Conflicts over water evoke meanings and images that go beyond the physical attributes of water. After all, denial of access to water is ultimately denial of life itself.

ICIMOD must be commended for bringing out these two volumes on the significance and the diversity of water-harvesting technologies and institutions governing them. Apart from the publication of these volumes, ICIMOD has been instrumental in bringing people and institutions from different countries together to share their experiences of the dynamics of policies and practices revolving around water-harvesting structures and the local economy. In pursuing this interest on a vital resource for livelihoods in the Hindu Kush mountains, we hope that the further research and programme activities of ICIMOD will seek to enhance and sustain the role and voice of local communities in governing these community assets and also continue to identify policies, practices, movements, and institutional capacities that increase disadvantaged people's access and control over water resources.

Ujjwal Pradhan
New Delhi

March 2000

G.P.U. Box 322b,
Kathmandu, Nepal

Preface

A commonly held notion about mountain areas is that these are all plentifully endowed with water, and mountain communities should not be facing too much difficulty in accessing needed water supplies. These two volumes, discussing efforts by local communities to harness water resources for drinking and agriculture, show clearly that plentiful endowment does not necessarily mean it is readily available. Water for the settlements and fields of mountain households had become increasingly scarce. Tapping more distant sources has many technical, environmental, and socio-institutional implications as the discussions in these two volumes indicate.

ICIMOD's main objective in bringing out these two volumes is first to close some of the continuing knowledge gaps about the use of resources by mountain communities. It is hoped that by a better understanding of prevailing practices it will contribute towards the development of sustainable systems in the future. Another important reason is that this is also the year of the World Water Vision and it would be a gross oversight if mountain communities did not have a place in this vision. We hope this small contribution will help in this direction.

ICIMOD is very grateful to the Ford Foundation for supporting the water harvesting programme of the Centre which has made this review work possible. The contributions of all the national and local organizations, including the authors of the various papers and case studies, are also highly appreciated. Dr. M. Banskota, Deputy Director General and Professor S.R. Chalise, Water Resources' Specialist, planned the outline and contents of these documents and ensured that all critical issues were covered. Obviously much more can be said about important topics like water and mountain communities. This is only a small step forward towards improving our understanding about water harvesting at community level in the Hindu Kush-Himalayas. ICIMOD is looking forward to taking the next steps that should include, in particular, capacity building in local planning and management of water-harvesting systems.

Contents

Chapter 1: Introduction	1
BACKGROUND	1
ROLE OF COMMUNITY INSTITUTIONS	2
THE WORKSHOP	3
SUSTAINABLE WATER HARVESTING AND MANAGEMENT AND ICIMOD	4
WATER HARVESTING IN THE MOUNTAINS: PRIORITY AREAS AND ISSUES FOR ACTION	5
POLICY REVIEWS	6
CASE STUDIES	7
CONCLUSION	9
Integrating Indigenous Knowledge and Technology with Modern Practices	9
Interdisciplinary Research and Increased Interaction among Stakeholders	9
Empowerment and Institutional Development	9
Regional Institutions and Cooperation	10
Chapter 2: Water Resource Management in the HKH: An Overview	11
— <i>Suresh R. Chalise</i>	
BACKGROUND	11
OVERVIEW OF WATER RESOURCE MANAGEMENT ISSUES	15
Water and Climatic Variability and Climate Change	15
Transboundary Nature of Major River Systems and Problems in Information/ Data Exchange	16
Regional Cooperation in Sustainable Development and Management of Water Resources	17
Ecohydrology of the Region and Water-induced Disasters	18
Water for Mountain Households	18
Human Capacity and Status of Research	18
REGIONAL TRENDS	19
Water as 'Hope' for the Future	19
Water, Women and Basic Rights of the People	20
Water as an Economic Commodity	20
Integrated Development and Management of Water	21
The 'Big' versus 'Small' Debate	21
Transboundary Water Issues	22
CONCLUSION	22
REFERENCES	24
Chapter 3: Water Policies and Local Water Harvesting in the Hindu Kush-Himalayas	27
— <i>Prachanda Pradhan</i>	
INTRODUCTION	27
FOCUS OF THE AREA AND DESCRIPTION	28
POLICY ASPECTS	28
TECHNOLOGIES FOR WATER HARVESTING	30

FINANCING FOR IMPLEMENTATION OF WATER HARVESTING SCHEMES	32
IMPLEMENTATION OF WATER HARVESTING SCHEMES	34
IMPACTS AND IMPLICATIONS	36
CONCLUSIONS	37
REFERENCES	37

Chapter 4: Water Harvesting Practices in Mountain Areas 39

— *Mahesh Banskota*

INTRODUCTION	39
BACKGROUND TO THE CASE STUDY AREAS	40
OVERVIEW OF WATER-HARVESTING SYSTEMS	42
The Demand for Water	43
The Supply Side	45
Water Harvesting Technologies	47
Institutional Dimensions	49
Water Policies and Development Interventions	52
Productivity	52
Equity Aspects	53
Gender Dimensions	53
Environmental Aspects	53
CONCLUSIONS	54
Strengthen Local Water-harvesting Organizations	54
The Changing Role of Government	55
Improving Environmental Management and Preventing Loss and Damage to Renewable Natural Resources	55
Appropriate Technology	56
Demand Management	56
REFERENCES	57

Chapter 5: Social Aspects and Local Water-harvesting Systems: A Review of the Prevailing Systems in Hindu Kush-Himalayan Communities 59

— *Mahesh Banskota*

INTRODUCTION	59
MUL, KUWA AND KULO (CHA KHOLA WATERSHED IN KABHREPALANCHOK-NEPAL)	60
Tapping Mul (Springs)	60
Operating Kulo (Irrigation Channels)	60
Conflicts about Water	61
NAULA, HAUZI, DHARA AND GUHL (TEHRI GARHWAL UTTAR PRADESH)	62
Drinking Water	62
Irrigation	63
THE PABCHU SYSTEM	64
KUHL, KAREZ AND SAILABA FARMING	66
THE CHYURE SYSTEM	67
CONCLUSIONS	70
REFERENCES	72

Annex I: Detailed Workshop Programme Schedule	73
Annex II: List of Participants	75
Annex III: Annotated Bibliography	79

Asian Development Bank (ADB)
 Accelerated Rural Water Supply Disparity
 And Zone Reuse (A-Zone)

Rural Water Supply and Sanitation Fund Development Board
 Bagmati Watershed Management Project

Council for Advancement of People's Action and Rural Technology
 Community Based Organization

Chief District Officer

Corrugated Galvanized Iron

Canadian International Development Agency

Central Soil and Water Conservation Research and Training Institute

District Development Committee

Department of Soil Conservation and Watershed Management

District Water Resources Committee

Joint Water Users' Coordination Committee

Regional Water Conservation Program

Finland International Development Agency

Farmer Managed Irrigation System

Flag Register from International Organizations and Network Data

Five Year Plan

FINNILA

YRIS

IBENL

IPR

Acronyms

ADB/N	:	Asian Development Bank, Nepal
ARWSP	:	Accelerated Rural Water Supply Programme
AZRI	:	Arid Zone Research Institute
BOARD	:	Rural Water Supply and Sanitation Fund Development Board
BWMP	:	Bagmati Watershed Management Project
CAPART	:	Council for Advancement of People's Action and Rural Technology
CBO	:	Community Based Organization
CDO	:	Chief District Officer
CGI	:	Corrugated Galvanized Iron
CIDA	:	Canadian International Development Agency
CSWCRTI	:	Central Soil and Water Conservation Research and Training Institute
DDC	:	District Development Committee
DSCWM	:	Department of Soil Conservation and Watershed Management
DWRC	:	District Water Resources Committee
DWSSC	:	District Water Supply Coordination Committee
DWSS	:	Department of Water Supply and Sanitation
FINNIDA	:	Finnish International Development Agency
FMIS	:	Farmer Managed Irrigation System
FRIEND	:	Flow Regimes from International Experimental and Network Data
FYP	:	Five Year Plan
GIS	:	Geographic Information Systems
GLOF	:	Glacial Lake Outburst Flood
HDPE	:	High density polyethylene
HH	:	Household
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
HYV	:	High Yielding Variety
ICARDA	:	International Centre for Agricultural Research in Dry Areas
ICIMOD	:	International Centre for Integrated Mountain Development
IDE	:	International Development Enterprise
IHP	:	International Hydrological Programme
IIDS	:	Institute for Integrated Development Studies
ILO	:	International Labour Organization
INGO	:	International Non-Governmental Organization
INSAN	:	Institute for Sustainable Agriculture
IP	:	Irrigation Policy
IPCC	:	Intergovernmental Panel on Climate Change

LWHS	:	Local Water Harvesting Systems
MLD	:	Ministry of Local Development
MOWR/DOI	:	Ministry of Water Resources/Department of Irrigation
NGO	:	Non-Governmental Organization
NWFP	:	North West Frontier Province
NWSC	:	Nepal Water Supply and Sanitation Corporation
O and M	:	Operation and Maintenance
PARK	:	Pakistan Agricultural Research Council
PCRWR	:	Pakistan Council of Research in Water Resources
PIM	:	Participatory Irrigation Management
R and D	:	Research and Development
REFRESHA	:	Regional Flow Regime Estimation for Small Hydropower Agreement
RWHU	:	Rainwater Harvesting and Utilisation
RWSSP/F	:	Rural Water Supply and Sanitation Project/FINNIDA,
SAARC	:	South Asian Association for Regional Cooperation
SAPPROS	:	Support Activities for the Poor Producers of Nepal
SAPROS	:	An NGO based in Kathmandu
SWC	:	Social Welfare Council
UDLE	:	Urban Development through Local Efforts
UG	:	User Groups
UNESCO	:	United Nations Educational Scientific and Cultural Organization
VDC	:	Village Development Committee
WARM	:	Water Resources' Management
WECS	:	Water and Energy Commission Secretariat
WHS	:	Water-harvesting Systems
WMO	:	World Meteorology Organization
WUA	:	Water Users' Association
WUC	:	Water Users' Committee