

Introduction

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from two IFSC funded IFMOB projects

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the link resource dynamic studies in the Thakur (Himalayas) region
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epal and Myanmar, and involved the rehabilitation and re-vegetation of
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The Project

'People and Resource Dynamics in Mountain Watersheds of the Hindu Kush-Himalayas', now more commonly known as PARDYP, is a research for development project that has been operating for three years in five watersheds across the HKH—one watershed in China, one in India, two in Nepal, and one in Pakistan. The locations of the five watersheds are shown in Figure 1.

PARDYP was launched in response to growing concerns regarding the pressures on the resources and the people in the middle mountains of the HKH. Of special concern were, and still are, the marginalisation of the mountain farmer, the use and availability of water, issues appertaining to land and forest degradation and declining soil fertility, and the question: "Are the stresses on the natural resource base exceeding the natural carrying and regeneration capacity?"

PARDYP evolved from two IDRC-funded ICIMOD projects:

- the 7 year 'Mountain Resource Management Project' (1989 to 1996) which undertook resource dynamic studies in the Jhikhu Khola watershed of Nepal, and
- the 'Rehabilitation of Degraded Lands in Mountain Ecosystems Project' (1992-1996), which was undertaken by research institutes in four countries (China, India, Nepal, and Pakistan), and involved the rehabilitation and re-greening of small patches of degraded and denuded land on valley slopes of the HKH.

Much experience and knowledge was gained and several important lessons were learnt from these two projects—viz. geographical generalisations are not appropriate unless long-term results from replicated tests and trials are available, water is as important as soils in terms of both dynamics and sustainability, the institutional and policy setting must be supportive to sustainable development, and common methodologies and scientific rigour are of key importance in monitoring the biophysical parameters at all sites.

The outcome of the successes of these projects was a Planning Workshop in March 1996 at which gathering the PARDYP project was evolved—to be funded by SDC, IDRC, and ICIMOD. Agreements between SDC and ICIMOD, and IDRC and ICIMOD were signed in late 1996.

PARDYP was designed as an integrated research for development project concerned with natural resource dynamics and degradation processes in the middle mountains of the Hindu Kush-Himalayas (HKH). Information was to be gathered in a harmonized fashion on various physical and socioeconomic factors related to natural resources in five different watersheds in four countries of the HKH. The watersheds would represent a number of the different physical and socioeconomic situations in the region. Appropriate techniques for measurement would be developed where necessary, and the approach to data collection and information synthesis harmonized in such a way that the results could be used to develop a picture of the situation in the HKH mid hills region as a whole, to provide a basic

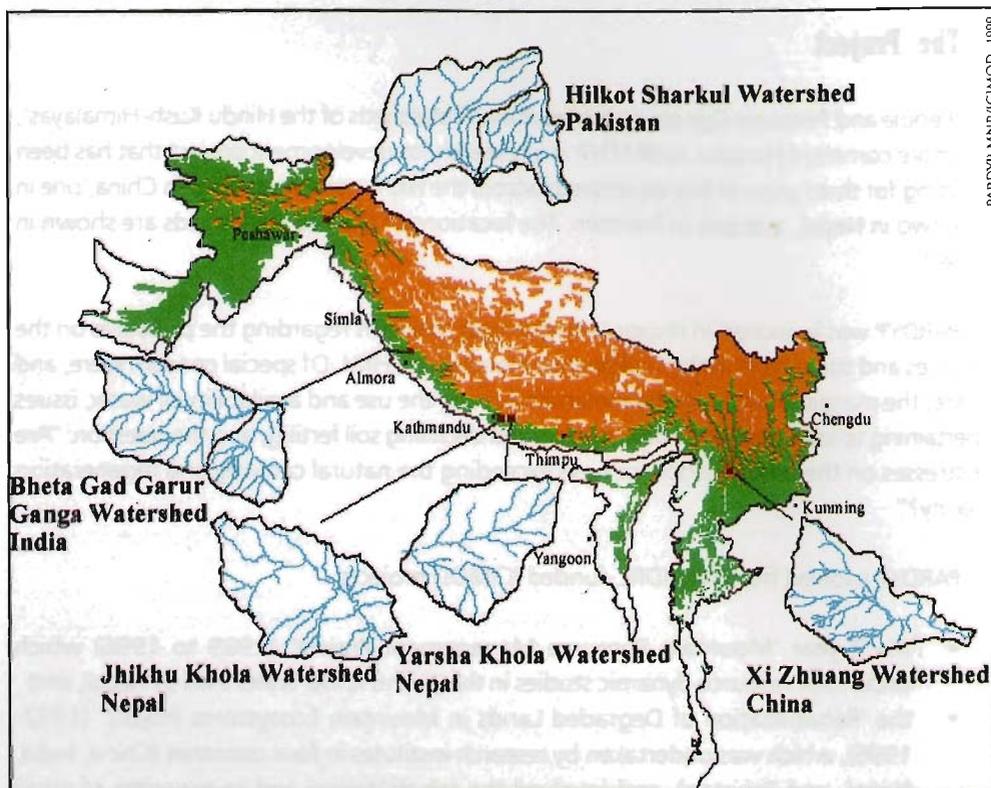


Figure 1: Location of the Five Watersheds in the HKH Region

understanding of the nature resource degradation processes, and to develop and recommend proven strategies and programmes appropriate to the greater part of the mid hill areas of the HKH for rehabilitation and improved management.

The key goals and objectives for Phase 1 of PARDYP, defined by the planning workshop participants, are shown in Table 1. There were seven components each with a specific objective:

- water balance and sedimentation,
- soil fertility improvement and soil erosion control,
- socioeconomic factors in terms of resource management,
- natural resource management strategies,
- capacity building of project partners,
- dissemination of knowledge, and
- effective and efficient management.

The modus operandi of the project was as follows:

- establishment of national institutional teams to undertake the prescribed activities along with required national partners in selected middle mountain watersheds in four countries,

Table 1: The Objectives of PARDYP Phase 1

Goal

To further improve the understanding of the environmental and socioeconomic processes associated with the degradation and rehabilitation of mountain ecosystems, and to generate wider adoption and adaptation of proposed solutions by stakeholders in the HKH

Project Objective

To provide a basic understanding of natural resources' degradation processes and to recommend proven strategies and programmes for community and farm-based prevention of degradation and rehabilitation of natural resources in the HKH region

Specific Objectives

- to generate relevant and representative information about, and technologies for measuring, water balance and sediment transport related to degradation on a watershed basis
- to identify technologies and strategies to improve soil fertility and to control erosion and degradation processes in a farming system approach
- to generate socioeconomic information on resource management and degradation
- to systematically apply community-based participatory generation, testing, and evaluation of natural resources' management strategies and technology
- to strengthen the capacity of project partners
- to make accessible to stakeholders relevant information on project outputs
- to effectively and efficiently manage the project as a regional collaborative R & D undertaking

Important Aspects

- Research agenda of the original IDRC-ICIMOD projects to be widened
- New local and non-local partners to provide specific contributions
- Wherever possible, all activities to be implemented under a unified methodology
- A common framework for socioeconomic and biophysical interventions to be developed over the long term and implemented systematically
- Field research and monitoring systems to be carefully designed and established for long-term data generation
- Well-defined watersheds to be used as the study sites
- A second watershed to be included in Nepal (Yarsha Khola) to validate some of the results from Jhikhu Khola
- Study team members to be exposed to participatory data collection and action research through appropriate training programmes

- establishment of research and community networks,
- linkages with appropriate local partners,
- common and rigorous methodologies wherever appropriate,
- on and off-farm participatory action research,
- capacity building of project staff and collaborative training of local farmers,
- specialist expertise and consultancy services from Canadian and Swiss universities,
- administered from ICIMOD in Kathmandu through a Regional Coordinator and four Country Coordinators.

The expected impacts were

- an increase in knowledge about the causes and results of degradation in the HKH in terms of a broad range of biophysical and socioeconomic aspects;
- identification of appropriate technologies to combat degradation and promote improved resource management across the region;
- the establishment of a regional database on key aspects of both the dynamics and management of middle mountain watersheds; and
- improved capacity of both institutional and watershed partners in many fields—from the undertaking of research to participatory management of natural resources.

Phase I of PARDYP began on October 1st 1996 and ended on September 30th 1999. Through cooperative rural participation, Phase I has been involved in research and investigations within the fields of hydrology and meteorology, water availability and management, soil erosion and fertility, on-farm and off-farm conservation and rehabilitation, community forestry, agronomic and horticultural initiatives, and social and economic issues. The main characteristics of the five watersheds in which PARDYP Phase I was active are summarised in Table 2.

This document constitutes some of the results and findings of the activities carried out after two complete monsoon seasons, and is based on the papers presented at the Final PARDYP Phase I Workshop held in Baoshan, China, in May 1999.

Since the project started, the dynamics of the middle mountain situation have accelerated. Populations have continued to increase; out-migration of the young has continued in some watersheds, in-migration has swelled numbers in others; and farming systems and society have continued to develop and transform in terms of cash crops produced, the use and misuse of agrochemicals, the need for and extraction of water, aspirations of the young and middle aged, and the need for cash. As a number of the following papers report, new burdens are being placed on both the residents of the middle mountain watersheds, especially the women, and on the environment.

The thinking and reasons behind PARDYP have strengthened not diminished in recent years, and as a result of this the three donor agencies that supported PARDYP during Phase I have agreed to fund a continuation of the project to the end of 2002. New components in Phase II include

more emphasis on farmer and community-led research, gender and equity issues, and stakeholder participation in planning, undertaking, monitoring, and evaluating the programmes.

The Achievements of PARDYP Phase I

Many of the research programmes and development initiatives undertaken during Phase I are described in detail in the papers included in this document. The main achievements of PARDYP's first three years are summarised very briefly below.

- Establishment of core field R&D teams, and of strong links with national institutions and groups
- Upgrading of skills of the young scientists and technicians through training and experience in many different fields
- Establishment and subsequent upgrading of the basic biophysical research networks in the five watersheds
- Continuous monitoring at 27 hydrological stations and 43 meteorological sites, and recording of data by trained watershed residents and project employees in the five watersheds
- On-going establishment of hydrometeorological databases, production of the Yearbooks for 1997 to 1999, and initial analysis of the results
- Collection, recording and analysis of erosion plot data relating to runoff and soil loss from 23 sites under 7 different types of land use
- Training of field teams and local residents in PRA in all five watersheds, participatory field exercises in all countries, and subsequent documentation of farmer and community needs and aspirations
- Collection of much basic social and biophysical data through investigation and survey, and subsequent integration through use of a GIS—for example, in the fields of household socioeconomics, marketing, demographics, gender, geology, water chemistry, soil fertility and nutrient dynamics, land use, and community forestry
- Further generation of awareness and understanding of the project and its objectives in the watershed communities, and at local government offices, NGOs and relevant projects
- Beginnings of a more farmer-orientated approach to research for development
- Establishment of a workable management, administrative, and financial system for a regional research and development project working in five watersheds and four countries

Small but significant steps forward have been made in certain areas of research for development that are of direct benefit to people, and in policy change at the local level. Examples include:

- community forestry and social fencing in the Bheta Gad watershed, India;
- energy studies and policy change in the Yarsha Khola watershed, Nepal;
- significant gender studies in the Nepal, India, and China watersheds;

Table 2: Summary of Watershed Characteristics

	Xizhuang (China)	Bheta Gad Garur Ganga (India)	Jhikhu Khola (Nepal)	Yarsha Khola (Nepal)	Hilicot-Sharkul (Pakistan)	Total
Physiography						
Total area (ha)	3,456	8,481	11,141	5,338	5,230	
Elevation range (masl)	1700-3075	1090-2520	800-2200	1000-3030	1448-2911	
Climate	Wet and dry seasonal variation	Marked wet and dry seasonal variation	Humid sub-tropical to warm temperate	Humid sub-tropical to warm temperate	Humid sub-tropical to cool temperate	
Dominant Geology	limestone and sandstone	Schists and Gneiss	Mica schist and calcareous schist	Gneiss and slate+graphitic schist		
Monitoring						
Meteorology	11	5	10	11	6	43
Hydrology	5	6	5	6	5	27
Erosion plots	6	4	6	4	3	23
Rehabilitation	3	2	4	4	1	14
Population						
Total population	4,016 (1997)	14,524 (1998)	48,728 (1996)	20,620 (1996)	11,322 (1998)	
Population density (people/sq.km.)	116	171	437	386	243	
Average family size	4	7	6	5	11	
Dominant ethnicity	Han Chinese	Brahmin, Rajputs, Scheduled castes	Brahmin, Cheftiri, Tamang, Danuwar	Brahmin, Cheftiri, Tamang,	Gujar, Swati, Syeds	

Table 2: Summary of Watershed Characteristics (cont'd)

	Xizhuang (China)	Bhela Gad Garur Ganga (India)	Jhikhu Khola (Nepal)	Yarsha Khola (Nepal)	Hilkot-Sharkul (Pakistan)	Total
Land use						
Land tenure						
Land use types in per cent	All land owned by the state Forest 41 Grass 32 Rainfed 16 Tea garden 5 Paddy 2 Shrub 1 Settlement 1 Other 2	All farmland privately owned Khet 15 Bari 27 Forest 56 Barren 1 Other 1	All farmland privately owned Khet 17 Bari 38 Forest 30 Grass 6 Shrub 7 Other 3	All farmland privately owned Khet 14 Bari 37 Forest 32 Grass 6 Shrub 5 Other 6	All farmland privately owned Forest 19 Agriculture 51 Other 30	
Farming system						
Major cash crops	tea, tobacco, fruit	winter vegetables, fruit, tea, fodder	potatoes, tomato, rice, fruit, vegetables	seed potatoes, some fruit	fruit, fodder	
Main staple crops	maize, wheat, beans, potato, rice	maize, rice, wheat	rice, maize, wheat, potato, millet	potatoes, rice, millet, wheat	wheat, maize, rice	
Khet = irrigated rice land; Bari = rainfed cultivated land						

- innovative agronomic initiatives in Nepal (e.g., zero-tillage in winter wheat, alternative systems of pest management);
- fresh historical perspectives on development in China;
- a start on water harvesting investigations in Nepal and India;
- new soil fertility management studies in terms of biofertiliser use in India, and nutrient dynamics in Nepal;
- training in compost management in India and Nepal; and
- efforts at increasing cash generation potential for farmers through market studies, use of polyhouses, vegetable production, and on-farm introduction of new varieties in all four countries.

The Workshop

The Workshop began on March 2nd and closed on March 5th 1999, and was attended by those listed in Table 3. The participants came from nine countries. The workshop was held in the Lan Du Hotel in Baoshan, Yunnan Province, China.

Table 3: Participants at the Final Phase I Workshop in Baoshan, Yunnan Province, China

From the Indian Watershed—GB Pant Institute of Himalayan Environment and Development (GBPIHED)

Dr Bhagwati P. Kothyari	Country Coordinator
Mr Sanjeev Bhuchar	Social Forester

From the Pakistani Watershed—Pakistan Forest Institute (PFI)

Mr Mohammed Khan	Country Coordinator
Ms Mamoona Malik	Social Forester/PRA/Gender

From the Chinese Watershed—Kunming Institute of Botany (KIB)

Professor Xu Jianchu	Country Coordinator and Resource Management, KIB
Mr Yang Yongping	Land Use Specialist and Socioeconomist, KIB
Mr Wang Yuhua	Computer Specialist and Database Manager, KIB
Mr Gao Fu	Erosion Plots, KIB
Ms Yang Lixin	Social Forester, KIB
Ms Ai Xihui	GIS Specialist, KIB
Ms Qian Jie	Gender Issues and Workshop Secretary, KIB
Prof. Yang Qixiu	Ecologist, Chengdu Institute of Biology
Mr Sha Liqing	Soils Specialist, Xishuangbanna Tropical Botanic Garden
Mr Fan Lizhang	Meteorologist, Yunnan Climate Centre
Mr Lin Hai	Meteorologist, Yunnan Climate Centre
Mr Li Jinghong	Hydrologist, Baoshan Hydrology Bureau
Ms Ma Xing	Hydrologist, Baoshan Hydrology Bureau
Mr Cheng Deai	Forester, Baoshan Forest Bureau

Table 3: Participants at the Final Phase I Workshop in Baoshan, Yunnan Province, China
(cont'd)

From the Nepalese Watersheds—International Centre for Integrated Mountain Development (ICIMOD)

Mr Pravakar B. Shah	Country Coordinator
Mr Gopal Nakarmi	Hydro-Geologist
Mr Bhuban Shrestha	GIS, Land Use Specialist, Social Issues
Mr Prem Neupane	Agronomist/Site Supervisor

From His Majesty's Government/Nepal

Mr Bal K. Khanal	Deputy Director General, Planning Division, Department of Forest
Mr Prakash Mathema	Head Research Division, Department of Soil Conservation and Watershed Management

From ICIMOD

Mr Richard Allen	PARDYP Project Coordinator
Dr Pradeep Tulachan	Farming Systems and Socioeconomist

From the University of Bern (UoB)

Dr Rolf Weingartner	Hydrometeorology Consultant to PARDYP
Mr Juerg Merz	Research Associate, Hydrology

From the University of British Columbia (UBC)

Professor Hans Schreier	Land Resources Consultant to PARDYP
Dr Sandra Brown	Land Resources Consultant to PARDYP

From FAO, Rome

Dr Thomas Hofer	Officer, Forest Department, Forest Resources Division, FAO
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From ICIMOD

Mr Egbert Pelinck	Director General of ICIMOD
Dr Narpat S. Jodha	Policy Analyst and Review Mission member

From SDC

Ms Christine Greider	Deputy Head Agricultural Service, SDC, and Review Mission member
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From IDRC

Dr John Graham	Senior Regional Program Officer, IDRC-Singapore
Dr Brian Carson	Team Leader of the Review Mission
Mr Ronnie Vernooy	Senior Program Officer, IDRC-Ottawa
Mr Jean Marc Fleury	Publications Department, IDRC-Ottawa

There were five main objectives for the workshop:

- to review the activities and highlight the achievements of the first 2½ years of PARDYP in the four participating countries;
- to finalise the draft work programme for 1999;
- to provide guidance and assistance to the collaborating teams where necessary;
- to assist the three person PARDYP Review Mission in their task of monitoring and evaluation; and
- to look forward to PARDYP Phase II and plan accordingly.

The first two days consisted of presentations of the papers from representatives of the five watersheds and their research associates. The middle day was spent visiting the XiZhuang watershed, observing the research sites that had been established, meeting and lunching with the people of the watershed, and examining the developments that had taken place during the first two and a half years of PARDYP.

During days four and five, the need for a second phase was examined together with the options, the modus operandi, and the direction of future research programmes. This was the start of the planning process for PARDYP Phase II; this process was continued at the Phase II Planning Workshop, held in Kathmandu in May 1999, and culminated in the submission of the Phase II PARDYP Project Proposal submitted by ICIMOD to SDC and IDRC in September 1999.

The Papers

The papers are presented here in four main sections comprising the broad thematic schemes of the people and their relationships to their environment (Part 1), the forests (Part 2), the hydrometeorological, sediment, and water aspects (Part 3), and the geological, and soil dynamic issues (Part 4). A discussion of the relationship to Chapter 13 of Agenda 21 and a concluding paper complete the proceedings.