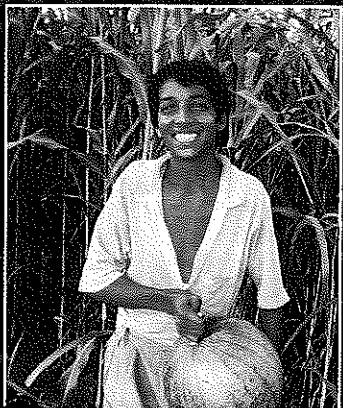


PRINCIPLES AND PRACTICES OF INTEGRATED WATERSHED MANAGEMENT IN INDIA



published by



भारत-जर्मन द्विपक्षीय परियोजना "जलग्रहण प्रबन्ध"
INDO-GERMAN BILATERAL PROJECT "WATERSHED MANAGEMENT"



German Technical Cooperation

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The project focuses on strengthening ongoing government programs while focusing on:

- Collaboration between government and non-governmental organizations
- Impact monitoring using participatory (PRA) and scientific tools (hydrological monitoring, remote sensing and GIS)
- Capacity building and training of junior staff of government and non-governmental organizations

The project is working on a pilot basis in Rajasthan, Uttar Pradesh, Uttaranchal, Himachal Pradesh, Bihar, Jharkhand, Orissa, Chattisgarh, Andhra Pradesh, Maharashtra, Gujarat and Tamil Nadu.

PREFACE

India has long and vast experiences in watershed management. These cover different agro-climatic regions and socio-economic conditions but also include different kinds of implementing organizations such as government agencies, non-governmental organizations, academic institutes and also individuals.

Often, however, these experiences are not documented and lessons learned are thus often forgotten.

This publication attempts to document ongoing efforts in watershed management in India.

For that purpose practitioners from various organizations (governmental agencies, non-governmental organizations, international donors and academic institutions) have been invited to share their experiences.

During the course of this publication new states have been formed, therefore the readers should take care to identify the states properly. These new states are Jharkhand (formerly south Bihar), Uttaranchal (formerly north-west Uttar Pradesh), Chattisgarh (formerly east Madhya Pradesh)

Also the name of some organizations has changed:

- Ministry of Rural Areas and Employment is now the *Ministry of Rural Development*.
- Soil Conservation Division of Ministry of Agriculture is now *Natural Resources Management Division*.

I wish to thank particularly Dr. Kasturi Basu, who spared no effort to streamline and copy edit this publication.

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Guy Honoré
New Delhi
April 2002

CONTENTS

Title	Author / Organization	Page
Development of Land for Sustainable Agricultural Production	Rita Sharma Government of India, Ministry of Agriculture, New Delhi	1
Strategies and Achievements of Centrally Sponsored Schemes of Soil Conservation For Enhancing the Productivity of Degraded Lands	C. M. Pandey Government of India, Ministry of Agriculture, New Delhi	10
Soil Degradation Problems and Management in India	Shamsher Singh Government of India, Ministry of Agriculture, New Delhi	26
Quest for Optimising Soil and Water Conservation Technologies for Reduction of Soil Erosion and Sediment Load in Watersheds	Jose C. Samuel Government of India, Ministry of Agriculture, New Delhi	33
Hydrologic and Sediment Monitoring of Watershed of River Valley Projects and Flood Prone Rivers Programmes	C. M. Pandey Government of India, Ministry of Agriculture, New Delhi	47
Experiences Within the Representative Watershed Programme of the Indo-German Bilateral Project "Watershed Management" (Opportunities, Constraints, Recommendations)	E.M. Tideman Indo-German Bilateral Project "Watershed Management" (IGBP), New Delhi	53
Hydrological Monitoring as a Tool to Evaluate Soil and Water Conservation Activities: Experiences of the Indo-German Bilateral Project "Watershed Management"	Guy Honore Indo-German Bilateral Project "Watershed Management" (IGBP), New Delhi	64
Collaboration Between State Government Department and NGO: A Case Study of Kattery Watershed, Tamil Nadu	Aparna Kanungo Indo-German Bilateral Project "Watershed Management" (IGBP), New Delhi	73
Local Institutions in Watershed Management	Sandhya Chatterji Indo-German Bilateral Project "Watershed Management" (IGBP), New Delhi	82
Evaluating the Impact of Watershed Management Projects: Using Indicators as an Alternative Tool	Michael W. Bollom Indo-German Bilateral Project "Watershed Management" (IGBP), New Delhi	92
Working with Unequal Partners	Guy Honore, P.K. Das and Kasturi Basu Indo-German Bilateral Project "Watershed Management" (IGBP), New Delhi	112
Socio-Technical Concept For Rehabilitation of Degraded Watersheds: Community Forestry in Changar Project	Rajan Kotru Indo-German Changar Eco-Development Project, Palampur, Himachal Pradesh	117
Capacity Building of NGOs and Village Self-Help Groups for Large Scale Implementation of Watershed Projects: The Experiences of the Indo-German Watershed Development Programme in Maharashtra	Crispino Lobo and Marcella D'Souza Watershed Organization Trust (WOTR), Ahmednagar, Maharashtra	132
Going Beyond a Pilot Approach: Some Reflections on Scaling Up a Participative and Integrated Watershed Development Project	Ruedi Baumgartner and N.R. Jagannath Federal Technical University (ETH), Zurich, Switzerland, Swiss Agency for Development and Cooperation (SDC), Watershed Development Project, Bangalore, Karnataka	143
Watershed Approaches for Managing Degraded Lands in India - Challenges for the 21st Century	- Krishak Bharti Cooperative Limited (KRIBCHO), New Delhi	154
Participatory Watershed Development Approach	S.L. Seth and Soren Damgaard-Larsen DANIDA's Watershed Development Programme, New Delhi	168
Evolution of Institutional Framework for Watershed Management in Uttar Pradesh Hills	Anil Berry Watershed Management Directorate, Dehradun, Uttranchal	181

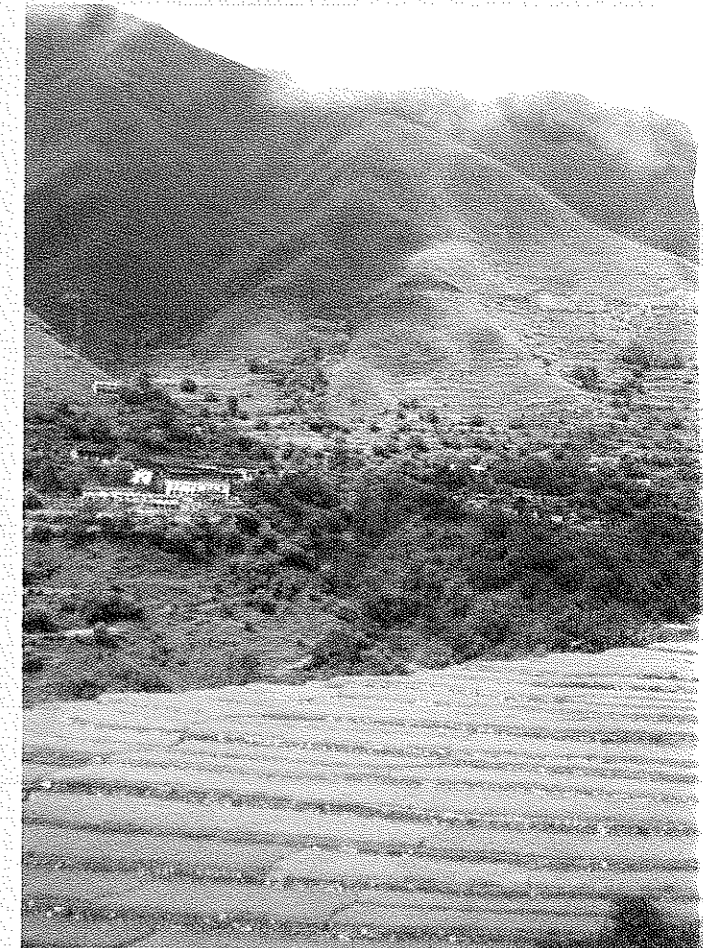
Title	Author / Organization	Page
Rehabilitation of the Degraded Shivalik Eco-System through Integrated Watershed Management	T.C. Jain, S.S. Grewal and A.S. Dogra World Bank, New Delhi, Punjab Agricultural University, Takarla, Punjab, Integrated Watershed Development Programme (Hills), Chandigarh	190
Soil and Land Resource Database For Integrated Watershed Management	S.N. Das All India Soil & Land Use Survey (AISLUS), New Delhi	202
Integrated Watershed Management in the Indian Arid Zone	K.D. Sharma and A.S. Faroda Central Arid Zone Research Institute (CAZRI), Jodhpur, Rajasthan	214
Watershed Management as a Basis for Land Development and Management in India	K.G. Tejwani Land Use Consultants (International), New Delhi	226
Catalyzing Voluntary Participation of Farmers - Integrated Watershed Management in a Dryland Farming System	H.P. Singh Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad, Andhra Pradesh	239
Appropriate Technologies for Soil and Water Conservation	A. Singh Water Technology Centre, Indian Agricultural Research Institute (IARI), New Delhi	252
Jaldhar Model of In-Situ Rain Water Conservation	Dinabandhu Karmakar Professional Assistance for Development Action (PRADAN), New Delhi	266
Indigenous Soil and Water Conservation in India's Semi-Arid Tropics	John M. Kerr and N.K. Sanghi International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, Andhra Pradesh and National Institute of Agricultural Extension Management (MANAGE), Hyderabad, Andhra Pradesh	276
Enlisting People's Participation in Soil and Water Conservation Programmes: The Indian Experience	Katar Singh Institute of Rural Management, Anand, Gujarat	297
NGO-GO Interactions in Watershed Development: Experiences from Gujarat	Amita Shah Gujarat Institute of Development Research, Ahmedabad, Gujarat	305
Organisational and Human Resources Development Aspects of Enhancing Cooperation between People and Institutions	James Mascarenhas OUTREACH, Bangalore, Karnataka	318
Socio-Economic Aspects of Watershed Management Programmes in India	Ram Babu and B.L. Dhyani Central Soil and Water Conservation Research and Training Institute, Dehradun, Uttranchal	330
Watershed Condition Assessment: Indicators and Indices for Monitoring and Evaluation of Impacts	Alok K Sikka and J.S. Samra Central Soil and Water Conservation Research & Training Institute, Ooty, Tamil Nadu and Dehra Dun, Uttranchal	343
Monitoring and Evaluation of Soil and Water Conservation Programmes	B.K. Mukherjee and K.G. Tejwani Land Use Consultants (International), New Delhi	355
Watershed Management Programmes: An Evaluation of Alternative Institutional and Technology Options	Kanchan Chopra Institute of Economic Growth, New Delhi	364
Natural Resource Management: Lessons from Indian Experiments	R.K. Mukherji Society for the Promotion of Wastelands Development, New Delhi	397
Participatory Watershed Management for Sustainable Development: A Case Study of U.P. Hills	B.L. Dhyani, J.S. Samra and Ram Babu Central Soil and Water Conservation Research and Training Institute, Dehradun, Uttranchal	413
A Successful Case of Participatory Watershed Management at Ralegan Siddhi Village in District Ahmednagar, Maharashtra	B. Mishra AVARD, New Delhi	424

ABBREVIATIONS

AED	- Agricultural Engineering Department	FPR	- Flood Prone Rivers	KYSU	- Kshetria Yuva Sangharsh Vahini	PIA	- Project Implementing Agency
AFC	- Agricultural Finance Corporation (Bombay)	FSR	- Farming System Research	LANDEP	- Landscape Ecological Planning	PIDOW	- Participatory Rural Appraisal
AFPRO	- Action for Food Production (New Delhi)	FYM	- Farm Yard Manure	LCC	- Land Capacity Classification	PRADAN	- Professional Assistance for Development Action
AGY	- Adarsh Gaon Yojana	GAREMA	- Gram (village) Resource Management Association	LFA	- Logical Framework Approach	PTD	- Participative Technology Development
AKRSP (I)	- Aga Khan Rural Support Programme (India)	GDP	- Gross Domestic Product	M & E	- Monitoring & Evaluation	RRA	- Rapid Rural Appraisal
amsl	- Above Mean Sea Level	GGP	- Gram Gaurav Pratishthan (NGO, Pune)	m	- Metre	Rs.	- Rupees
AP	- Andhra Pradesh	GLDC	- Gujarat Land Development Corporation	MCA	- Multi-Criteria Analysis	RTDC	- Research Training and Development Centres
ASCI	- Additional Staff College of India (Hyderabad)	GO	- Government Organization	MCM	- Mega Cubic Metres	RVP	- River Valley Project
AVARD	- Association of Voluntary Agencies for Rural Development	GoI	- Government of India	MMWS	- Mini Micro Watershed	RWS	- Representative Watershed Programme
BCR	- Benefit Cost Ratio	GoK	- Government of Karnataka	MMWSC	- Mini Micro Watershed Committee	SAT	- Semi Arid Tropics
BSNSS	- Baba Srinath Siksha Sansthan (NGO, Sultanpur)	GOPP	- Goal Oriented Project Planning	MoA	- Ministry of Agriculture	SCRDTC	- Soil Conservation Research Demonstration and Training Centers
CAPART	- Council for the Advancement of People's Action in Rural Technology	GTZ	- German Agency for Technical Cooperation	MoRaE	- Ministry of Rural Areas and Employment (changed to MoRD)	SCWD	- Soil Conservation & Watershed Programme
CAZRI	- Central Arid Zone Research Institute	GVM	- Gram Vikas Mandali	MoRD	- Ministry of Rural Development	SDC	- Swiss Development Cooperation
CBA	- Cost Benefit Analysis	ha	- Hectare	MoV	- Means of Verification	SEC	- Socio Economic Class
CEC	- Cation Exchange Capacity	HASD	- A Project in Thailand	msl	- Mean Sea Level	SGD	- State Government Department
CMD	- Centre for Management Development (Trivandrum)	HP	- Himachal Pradesh	mt	- Metric Tonne	SHG	- Self Help Groups
COREMA	- Cluster of Resource Management Associations	HPEDS	- Himachal Pradesh Eco-Development Society	MWS	- Micro Watershed	SHRMS	- Society of Hill Resource Management School
CPLRS	- Common Properly Land Resources	ICAR	- Indian Council for Agricultural Research	MYRADA	- Mysore Resettlement and Development Agency (NGO, Bangalore)	SIDA	- Swedish International Development Agency
CSWCRTI	- Central Soil & Water Conservation Research & Training Institute	ICRISAT	- India Council for Research in Semi-Arid Tropics	NATP	- National Agricultural Technology Project	SLUB	- State Land Use Board
CVP	- Chakriya Vikas Pranali	ID	- Institutional Development	NBA	- Narmada Bachao Andolan	SMS	- Silt Monitoring Stations
CWRDM	- Centre for Water Resource Development & Management	IFPRI	- International Food Policy Research Institute	NCAP	- National Centre for Agricultural Economics Policy	SUTRA	- Social Upliftment Through Rural Action
DA	- Development Agencies	IGBP	- Indo-German Bilateral Project	NCHSE	- National Centre for Human Settlement & Employment	SWC	- Soil & Water Conservation
dia	- Diameter	IGCEDP	- Indo-German Changar Eco-Development Project	NGO	- Non Governmental Organization	TG	- Target Group
DM	- Deutsche Mark	IGFRI	- Indo Grassland and Fodder Research Institute	NKR	- Net Present Investment Ratio	UNDP	- United Nation Development Programme
DoA	- Department of Agriculture	ILO	- International Labour Organization	NLUCB	- National Land Use Conservation Board	UP	- Uttar Pradesh
DPAP	- Drought Prone Areas Programme	IPR	- International Property Rights	NLUCB	- National Landuse and Conservation Board	VCD	- Vented Checkdams
DPD	- Deputy Project Director	IRR	- Internal Rates of Return	NLRMS	- National Natural Resources Management	VDC	- Village Development Committee
DRDA	- District Rural Development Authority	ISPWD (K)	- Indo-Swiss Participatory Watershed Development (Karnataka)	NPW	- Net Present Worth	VIRMP	- Village Integrated Resource Management Plan
DST	- Department of Science & Technology	ITK	- Indigenous Technical Knowledge	NRM	- Natural Resource Management	VPKAS	- Vevekananda Parvatya Krishi Anusandhan Shala
DVC	- Damodar Valley Corporation	IWDP (Hills)	- Integrated Watershed Development (Hills)	NSEB	- National Afforestation & Economic Development Board	VWCS	- Village Watershed Committees
DVP	- Doon Valley Project	JFM	- Joint Forest Management	NWDB	- National Wasteland Development Board	WA	- Watershed Association
DWDP	- District Watershed Development Programme	JPO	- Junior Project Officer	NWDPRA	- National Watershed Development Project for Rainfed Areas	WALMI	- Water and Land Management Institute
EAS	- Employment Assurance Scheme	JRY	- Jawahar Rozgar Yojana	OD	- Organizational Development	WC	- Watershed Committee
ESP	- Exchangeable Sodium Percent	KAWAD	- Karnataka Watershed Development Project	OFR	- On Farm Research	WDT	- Watershed Development Team
EV	- Extension Volunteers	KIGS	- Kumarappa Institute of Gram Swaraj	PD	- Project Director	WMP	- Watershed Management Programme
FAO	- Food & Agriculture Organization	km	- Kilometre	PEO	- Programme Evaluation Organization	WSD	- Watershed Development
		KRIBP	- KRIBHCO Rainfed Indo-British Project	pH	- A measure of the acid or alkali level of a solution	WUA	- Water Users Association
				PI	- Principal Investigator	yr.	- Year

GLOSSARY OF INDIAN TERMS

Andolan	- Movement	Mahila Mandals	- Women's group
Ashrams	- Residential schools	Mahila Mangal Dal	- Women's welfare groups
Balwadi	- Schools for infants / small children	Masala	- Spices
Bandhara	- Underground structure across a stream bed to function as a check to groundwater movement	Matt	- Ashram
Bhajan	- Religious songs	Mitra Krishak	- Friends of Farmers
Block pramukh	- Head of the Block (Administrative division within a district)	Mukti	- Liberation
Bowadi	- Spring heads	Matti-system	- Bullock driven system for drawing out water practiced in south India
Bund	- Embankment	Nala	- Stream
Bunds	- Low embankments around fields	Panchayati Raj	- Water User's Group
Choe	- Hill torrent control	Pani Parvatha Mandal	- Water Supply Associations
Choes	- Torrent beds	Papad	- A food item made from pulses
Dalits	- Lower castes	Rabi	- Winter crop
Desi	- Local	Sahayogi samaj	- Community based on cooperation and sharing
Gauchar	- Pasture lands	Sahmati Patra	- Deed of agreement
Ghools	- Contour channels diverting hill streams	Sahukars	- Money lenders
Gramdan	- Donating villager	Sewa	- Self employed women's association
Gramin Bank	- Rural lead bank	Shramdaan	- Voluntary labour
Guzzars	- Nomadic graziers	Taand	- A type of land
Jaldhar	- Structure to hold water	Tarun mandal	- Youth association
Jowar	- A type of millet	Van panchayat	- Village forest councils
Kazi	- Governors	Yuwak mandal dals	- Youth groups
Kharif	- Summer crop	Zamindars	- Landlords
Mahila Kisan	- Woman farmer	Zilla Parishad	- District level administrative body



DEVELOPMENT OF LAND FOR SUSTAINABLE AGRICULTURAL PRODUCTION

Rita Sharma • Government of India • Ministry of Agriculture • New Delhi



INTRODUCTION

Among the major resources available in the country, the most important is land comprising soil, water, associated flora and fauna involving the total eco-system. The demand for food, energy and other human requirements depends upon the preservation and improvement of the productivity of land. Land resources are limited. In the last few decades, land in India has been subjected to ceaseless pressure leading to serious degradation. Increasing human and animal population, diversion of land in fragile eco-systems for dams and roads, indiscriminate felling of trees, expansion of irrigation without adequate concern for the treatment of catchment and provision of drainage and improper agricultural practices on marginal lands have caused a serious level of degradation.

Land-cover/land-use changes occur both as a result of natural forces - wind and water erosion, changes in drainage, floods and droughts as well as due to human induced changes. Large-tracts of land have been cleared for agriculture, collection of fuelwood and for urban and industrial growth. Eco-systems have been transformed both in response to land-cover changes as well as a result of plants and animals brought from outside their native habitats, thereby introducing new pests, diseases and competitive species. Just as human activities have a profound impact on land-cover so also human activities lead to significant changes in marine eco-systems and in the productivity of fisheries. Land uses influence the flow of water, nutrients and sediments in coastal areas, thereby directly linking human populations with the nature and quality of marine eco-systems.

As the pace of development accelerated, land-cover and eco-system changes have become especially pronounced. More than ever before, there is need for a comprehensive understanding of the complex interactions among human and natural processes. There is an urgent need to understand the processes, both natural and human-induced that lead to changes in land cover, land-use and eco-system health, including those resulting in deforestation, desertification and loss of global resources, such as biological diversity and reductions in the productivity of farms and fisheries.

POLICY ISSUES

Land use classification in India

Of the total geographical area of 329 m ha, the cultivated acreage, is about 156 m ha (49%). This includes 143 m ha of net sown area and 14 m ha of current fallow. Of the cultivated land, about 53 m ha (35%) is irrigated. The remaining 90 m ha is rainfed. The forest area is about 68 m ha (22%) and area not available for cultivation is about 41 m ha which includes urban land. The land use pattern is at Annexure-I.

The per capita availability of land declined from 0.89 ha in 1951 to 0.37 ha in the mid 1990s and is estimated to reduce further to 0.19 ha by 2035. As far as agricultural land is concerned, the per capita availability of land is 0.48 ha

There are clear indications that the pattern of growth in the crop sector has had adverse consequences for rural ecology directly as well as indirectly through its impact on livestock development and poverty

Land degradation has deteriorated the quality of land and it is now estimated that about 174 m ha (53%) of the total area suffers from degradation in some form such as water erosion (107.12 m ha), wind erosion (17.79 m ha), ravines (3.97 m ha) salt-affected areas (7.61 m ha), water logging (8.52 m ha), shifting cultivation (4.91 m ha), degraded forests (19.49 m ha) and special problems (2.73 m ha). Data on degradation of land by state is given in Annexure-II. Today, nearly two-thirds of the area requires special treatment to restore such lands to productive and profitable use.

Degradation of land and the rural biosphere in general arises from two major sources. First, from the deforestation and degradation of land on account of the loss of vegetative cover, resulting in a low water-table and loss of top soil. These have a direct bearing on the productivity of soil, its vulnerability to rainfall variation, the scarcity of drinking water, fodder, fuel-wood causing hardships to the rural poor, particularly women and children. Crop production, livestock economy, rural poverty and the environment are highly inter-related. There are clear indications that the pattern of growth in the crop sector has had adverse consequences for rural ecology directly as well as indirectly through its impact on livestock development and poverty.

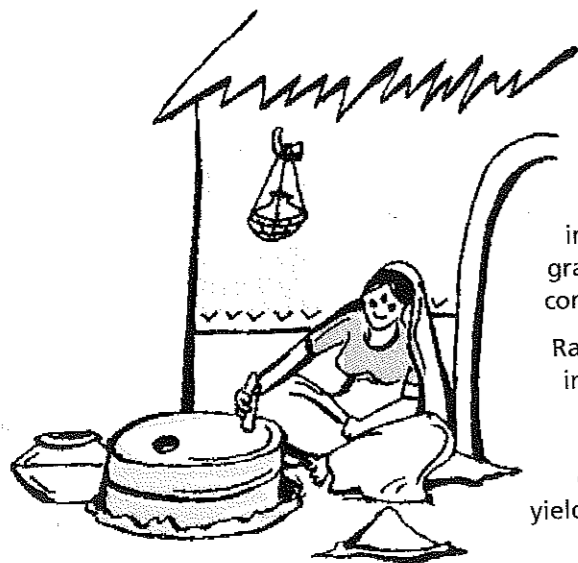
The second major source of environmental degradation is the misapplication of yield-increasing inputs like water, chemical fertilizers and pesticides, causing water-logging and salinity and pollution of drinking water, loss of fish, etc. The expansion of irrigation without adequate concern for the treatment of the catchment or for the dangers of water-logging and salinity in the command areas, improper agricultural practices on marginal land all lead to land degradation.

Agricultural land: thrust on rainfed farming

The Green Revolution, initiated in the mid-1960s has been the cornerstone of India's agricultural growth and has been instrumental in taking the country from food deficiency to one of self-sufficiency. From a production level of 51 m metric tons in 1950-51, food-grain production has quadrupled to almost 200 m metric tons in 1996-97. While in the early years increases in production came from area expansion, for the past three decades the net cultivated area has remained almost constant and additional production has come about as a result of productivity increases. The latter has been the result of expansion of acreage under irrigation, spread of high yielding varieties, increased use of fertilizers and other modern inputs. It is essential that for obtaining optimal response from modern inputs such as seeds, fertilizers, insecticides, water etc. adequate and responsive land must be available.

It is important to recognize that the Green Revolution was largely confined to the irrigated areas which account for about 35% of the total cultivated area. Rainfed areas account for two-thirds of the total cultivated land of 142 m ha. In fact, the rainfed region at around 90 m ha is almost twice that of the irrigated tract. Yet, the irrigated area, about 52 m ha (34%) accounts for 55% of total food-grain production whereas the rainfed region, nearly 90 m ha (66%) contributes only 45%.

Rainfed agriculture is characterized by low levels of productivity and low input usage. Being dependent on rainfall, crop production is subjected to considerable instability from year to year. More than 200 million of the rural poor live in the rainfed regions. These risk prone areas exhibit a wide variation and instability in yields. The gaps between yield potential and actual yields are very high compared to the irrigated



areas. The rainfed regions of eastern India have the potential to achieve higher yields. Indeed, with the development of infrastructure and improvement of access to inputs, agricultural growth in parts of the eastern region has exhibited higher trends than in the traditional regions such as Punjab, Haryana and western Uttar Pradesh. All areas where rainfed farming is predominant whether in the central plains, hills, semi-arid or coastal lands will need to contribute more to poverty alleviation and augment food security by producing marketable surpluses more reliably.

India's agriculture has now entered a post-Green Revolution stage of development that requires new strategies to enhance agricultural growth and reduce rural poverty. A move to an intensive diversified agriculture with strong forward and backward linkages is the next evolutionary step in the country's future agricultural development. Economic liberalization and adjustments to the market economy are placing new demands on the agricultural sector. Agricultural technologies, agromanagement practices and public institutions will need to respond to emerging market demands and export opportunities together with addressing the issues of poverty alleviation, nutritional security needs and environmental concerns. However, the speed and extent of such a change and its impact on rural development through multiplier effects would depend on the availability and adoption of improved technologies, restructuring of public institutions, supporting infrastructure and developing an appropriate policy environment.

Watershed approach to rainfed farming

The Government of India has accorded the highest priority to the holistic and sustainable development of rainfed areas through integrated watershed management approach. The current strategy of various ongoing national, bilateral and internationally-aided projects for development of rainfed areas is based on the concept of conservation of rainwater for integrated development of watersheds, promotion of diversified and integrated farming systems approach, management of common property resources, and augmenting family income and nutritional systems. Sustainable institutional arrangements at various levels (e.g. state, district, watershed, village) constitute an integral component of these projects for promoting peoples' participation and ensuring sustainability.

Resorting to the watershed approach is central to the development of rainfed areas, inclusive of various special problem areas, namely, saline and waterlogged lands, ravines, hill areas, coastal and desert eco-systems. A large number of national, bilateral and externally-funded projects are in operation. Some of the broad-based development objectives under these projects are

- Attainment of targeted level of foodgrain production in a given time-frame in a sustainable manner.
- Restoring ecological balance in the degraded and fragile rainfed eco-systems by greening these areas through appropriate mix of trees, shrubs and grasses.

- Reducing regional disparity between irrigated and vast rainfed areas.
- Creation of sustained employment opportunities for the rural poor.

The 25-year perspective plan

A 25-year Perspective Plan on sustainable rainfed agriculture through Watershed Development has been prepared by the Planning Commission. Considering the average unit costs estimated at the rate of Rs 5,000, Rs 7,500, Rs 11,000, Rs 15,000 and Rs 20,000 per hectare, the approximate cost involved in treating 63.50 million hectares rainfed areas (predominantly arable land) during five forthcoming Plan periods, will be as follows:

Plan Period	Area Proposed for Treatment (million ha)	Per Ha. cost (Rs in thousands)	Total cost of Treatment (Rs. in crore)
IX Plan	10.00	5.00	5,000
X Plan	12.00	7.50	9,000
XI Plan	15.00	11.00	16,500
XII Plan	15.00	15.00	22,500
XIII Plan	11.40	20.00	22,800
Total	63.40		75,800

Development programmes

For development of degraded areas various schemes are being implemented under Central and State Sector programmes. Under Central Sector programme various schemes are being implemented by different departments namely; Department of Agriculture and Cooperation, Department of Wasteland under the Ministry of Rural Areas and Employment, Ministry of Environment and Forests and Ministry of Water Resources. The working group on Soil and Water Conservation, constituted by the Planning Commission estimated that about 37.4 million hectare has been treated by 1993-94.

The Department of Agriculture and Cooperation implements several centrally sponsored land-based conservation-cum-production schemes. These include National Watershed Development Project in Rainfed Areas (NWDPA), Soil Conservation in the Catchments of River Valley Projects (RVP) and Flood Prone Rivers (FPR), Watershed Development Project in Shifting Cultivation Areas (WDPSA) and Externally Aided Projects on Watershed Development. The main principle in these schemes is in-situ moisture conservation with the objective of increasing production and productivity of these areas on a sustainable basis. Besides these, schemes on reclamation of salt-affected areas are also in operation.

CONSTRAINTS TO MORE OPTIMAL UTILIZATION OF RESOURCES AND PROPOSED FUTURE STRATEGIES

While it is evident that the national and externally aided projects have achieved significant results in the area of watershed management for sustainable agricultural development in both potential and problematic rainfed areas, these projects, nonetheless, are still confronted with several constraints. Some of the strategies to address these constraints are as follows:

● Strengthening people's participation in watershed development

People's participation and beneficiary involvement is mandated in almost all project designs but it has not proved very significant in practice. Most interventions usually focus on the physical environment and upon measures to solve technical problems. Project work – including on-farm activities – are generally carried out by State Government Departments using hired labour. As a result, some activities have not been sustained for lack of beneficiary ownership as evidenced by the unwillingness of village communities to operate and maintain completed structures and plantations on community property. The beneficiaries are too often merely passive recipients rather than active participants. There is need for further strengthening institutional arrangements through NGOs and Panchayats which will ensure the active involvement and participation of user communities in the planning, execution and monitoring of watershed projects.

● Focus on appropriate technologies for watersheds

Experience suggests that farmers' own innovations with low cost technologies contribute to increasing input efficiency and is a valuable resource. This local knowledge, reposed with farm households and communities in rainfed areas includes indigenous or traditional knowledge. Only a fraction of local knowledge reaches development agencies or is formally documented; most is transferred orally between families, communities and generations. Efforts need to be made to document and use this rich knowledge base. Some measures have already been initiated, but a much larger effort is required. Also, very strict and rigid adherence to guidelines regarding use of watershed technology, often does not take into account farmers preferences, locally available material and local innovations. Because watershed management involves both physical and social processes, a compromise needs to be struck in the choice of technology that is both reasonably technically efficient and socially workable. There is need to provide greater flexibility in terms of using low cost traditional technologies together with a package of advanced agronomic practices in a location-specific manner.

● Research aspects of watershed technology and management

In the field of agricultural research, our most spectacular successes have been in evolving high yielding varieties of wheat and rice. There is need for greater research in rainfed crops as well as in watershed technology. The Farming Systems Approach needs to be followed both for technology generation and dissemination for rainfed regions. Mechanisms need to be devised so that funds earmarked for watershed technology research are utilized effectively.

● Resource mobilization for watershed development

There is need for a much larger and expanded programme in Watershed Development. The 65 million ha of rainfed area which will need to be treated as estimated in the 25-Year Perspective Plan has a very long gestation period and will require heavy investments. Resources for such an expanded programme will be mobilized largely through public funds. However, possibilities also need to be explored of funding watershed projects through institutional finance. A much larger quantum of rural credit needs to flow into land development and land reclamation activities than has been the case hitherto. Similarly, a larger contribution from external funding agencies will be needed to have a greater impact. The contribution of Watershed Communities, both in terms of cash and kind, will also need to be considered.

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● Capacity building and human resource development

There is a far greater need for capacity building and human resource development in rainfed areas than envisaged hitherto. Community of watershed users should be provided training and taken on exposure visits to successful watershed projects. Farmers learn best by observing success stories of other farmers. Similarly, capacity building, skill up-gradation and knowledge update of both public extension functionaries as well as NGOs and para-extension workers need to be undertaken. There is also a need to strengthen training infrastructure to conduct more quality training.

● Financial sustainability of projects

Several projects have incorporated the system of cost sharing with the beneficiaries either in cash or in the form of labour. The procedures vary from project to project, with some projects requiring the beneficiary share to be collected at the commencement of the project. Once the project has ended, the maintenance of community assets becomes the responsibility of the watershed community. A corpus fund is provided into the watershed community bank account as a revolving fund. This fund needs to be periodically replenished by the beneficiaries. The self help groups organized as part of the project activities can also play a role in sustaining the activities. Recovering costs of the planting material developed in the composite nurseries is also a means of making the project financially viable.

● Monitoring evaluation and impact assessment

There is need for more effective and thorough M&E mechanisms to be put in place. A concurrent monitoring and evaluation system through independent agencies in the field will improve the quality of feedback regarding the programme. Similarly, development of realistic performance indicators to assess the impact of the programme also need to be developed with professional help.

● Strengthening linkages between land conservation and production systems

There is considerable scope to improve the linkages between the land and water conservation component of the project and the consequent production system. Although rainfed areas are treated in terms of arable land, non-arable land and drainage lines for soil and water conservation, in most cases, the linkages between the eco-restoration and the production systems remain weak. Technology transfer in a scientific manner for appropriate crop husbandry, dryland horticulture, fodder cultivation etc. remains inadequate despite provisions for farmers' training, crop demonstrations etc. There is a need for dovetailing of existing production programmes of both the national and state levels in agriculture, horticulture, minor irrigation, pisciculture, agro-forestry and marketing with the watershed programme.

● Reclamation of other problem soils

There are in the country significant areas of lands categorized as problem lands such as 8 m ha of waterlogged areas, 4 m ha of ravines, 4.5 m ha of acidic soils and an equal area of saline lands. There is need to address these problem lands also and prevent their further degradation as well as enhance their productivity. Necessary resources, both public and private will need to be mobilized for the purpose.

● Government programmes and NGO efforts

A comparison is often made between Government run Projects and NGO initiatives in watershed management. The two are, however, not exactly comparable since Government and NGO projects usually operate on very different scales. The scale

of operation of the former is several times that of the geographical coverage and size of staff whereas the N characterized by small scale and higher intensity of hu scale and in isolated pockets, therefore, NGOs tend to arrangements that complement the strengths of and lir Government, NGOs and Panchayats need to be devised.

PROPOSED MODIFICATIONS DURING THE NINTH PLAN

Whereas the overall structure of the Project would continue to remain the same in the Ninth Plan, however, on the basis of experience gained and lessons learnt during the Eighth Plan, some modification and refining, as warranted by the field based feed-back received from implementing agencies (e.g. State/UTs, NGOs, etc.) is being undertaken under the following broad heads:

(A) Policy issues

- Revision of cost norms.
- Introduction of flexibility and revision of componentwise allocation of resources* Further delegation of powers to States.
- Making provision in the schemes for social infrastructure preferably in the shape of Entry Point Programme concept.
- Feasibility of establishing credit linkages with household production systems including agro/bio-processing units and the nature of incentives to be provided.
- Institutional arrangements which will ensure more effective utilization of research funds ear-marked for Projects on Watershed Technology Development which remained grossly under-utilized in the Eighth Plan.
- Making the programme Bankable.

(B) Community participation

- Broad-basing of Watershed Development Team (WDT) for better community mobilization including a community mobilizer/sociologist.
- Greater involvement of NGOs and Panchayats while defining their roles and incentive mechanisms.



- Categories of Institutions at Central, State, District and Watershed levels which can be eligible as Project Implementation Agencies (PIAs), apart from NGOs
- Identification of effective institutions at Central, State, District and Watershed levels for involving in capacity building and community organization. Institutional arrangements which can take over created community assets under the project, beyond the project life - role of Panchayats
- Innovative mechanisms for utilization of research funds earmarked for watershed technology such as a competitive research grant fund.

(C) Technology options

- Strengthening linkages between land and water conservation components of the project and the consequent production systems.
- Use of a mix of Indigenous Technology Knowledge (ITK) and Advanced Technology in conservation and production systems.
- Effective mechanisms for transfer of technology, especially as they relate to on-going production schemes of the Central and State government.
- Improvement in water harvesting technology and micro-irrigation systems.
- Improvement in vegetative conservation technologies relating to contour bunding and field bunding.
- Thrust on transfer of technology - its components clearly earmarked for each project.

(D) Capacity building and human development

- Empowering through training, orientation and awareness generation of the disadvantaged sections (e.g. rural women, landless labourers etc.) of the Watershed Community.
- Strengthening institutional support for GIS-remote sensing application and networking.
- Improvement in quality and quantum of training of both project staff and beneficiaries.
- Identification of new areas of training not hitherto covered, preparation of multi-media programme packages etc.
- Strengthening the training infrastructure.

(E) Sustainability and resource mobilization

- Improvement in existing funds-flow mechanisms
- Mode and extent of project cost sharing
- Linkages and bridge-financing through revolving funds (as need money), raise funds by SHGs/SHTGs and loans from financial institutions keeping in view social equity and financial sustainability.
- Financing watershed project activities cross-cutting issues concerning subsidies (cash, kind/labour etc.), savings, refinancing and reinvestment in and outside the project cycle.
- Management of common property resources and sharing of usufruct rights.
- Maintenance of created community assets under the project.
- Providing suitable incentives to NGOs/Panchayats for project/post-project implementation and management for ensuring long-term sustainability.
- Making Watershed Projects Bankable.

(F) Monitoring and evaluation

- Improvement of monitoring and evaluation through concurrent evaluation.
- Impact assessment through development of realistic performance indicators.

CONCLUSIONS

If agricultural productivity is to increase significantly in the Ninth Plan, there will be need to nearly double the geographical coverage and resource utilization under Watershed Projects. Optimal use of scarce public funds cannot be made unless institutional arrangements are developed and strengthened that empower communities to plan, implement, monitor and maintain their watersheds. With active participation of the communities far greater resources will be mobilized than are normally available to government. Involving communities in the planning, execution and monitoring of the watershed programmes will ensure a demand driven process that automatically identifies priorities and integrates requirements. Strategies for Watershed Development Programmes should address these issues.

Annexure 1: Land use classification

S No	CLASSIFICATION	1994-95	% reported area (94-95)
I.	Geographical Area	328.23	
II.	Reporting Area for Land Utilization	304.87	100
	1. Forests	68.39	22
	2. Not available for cultivation (A+B)	41.28	13
	A. Area under non-agricultural uses	22.51	7
	B. Barren & Uncultivable Land	18.77	6
3.	Other Uncultivated Land (A+B+C)	29.07	10
	A. Permanent Pastures	11.23	4
	B. Land Under Tree Crops	3.63	1
	C. Cultivable Waste	14.21	5
4.	Fallow Lands (A+B)	23.20	8
	A. Fallow Land not current Fallow	9.77	3
	B. Current Fallow	13.53	5
5.	Net Area Sown (6-7)	142.82	47
6.	Gross Cropped Area	188.15	
7.	Area Sown more than once	45.33	
8.	Cropping intensity	131.73	
III.	Net Irrigated Area	53.00	
IV.	Gross Irrigated Area	70.64	

