

**Report of the Working Group  
on  
Natural Resources Management**

**Eleventh Five Year Plan  
(2007-2012)**

**Volume I : Synthesis**



*Government of India*  
**Planning Commission**  
*February 2007*

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# CONTENTS

<b>Chapter</b>	<b>Contents</b>	<b>Page</b>
	<b>Preface</b>	<b>i-ii</b>
	<b>List of Abbreviations</b>	<b>iii-vi</b>
	<b>Executive Summary</b>	<b>vii-xx</b>
<b>I</b>	<b>Introduction</b>	<b>1-5</b>
	Background and Context	1
	Scope	1
	Methodology	2-4
	Structure of the Report	5
<b>II</b>	<b>Natural Resources Scenario: Challenges and Prospects</b>	<b>6-26</b>
	Degrading Natural Resources and the Agrarian Crisis	6-7
	Land and Soil	7-10
	Water	10-15
	Biodiversity and Agricultural Genetic Resources	15-17
	Forests	17-23
	Livestock	23-24
	Fisheries	24-26
<b>III</b>	<b>Natural Resource Management Programmes of Central Ministries and Departments: A Review and Appraisal</b>	<b>27-38</b>
	Overview	27-28
	Watershed Programmes with Ministry of Agriculture	28-30
	Watershed Programmes of Ministry of Rural Development	30-31
	Externally Aided Projects for Watershed Based Development	31
	Watershed Based Programmes with Planning Commission	31-32
	Watershed Programmes Implemented by NABARD	32-33
	Forest Development Programmes by Ministry of Environment and Forests and Managing Forest Lands in Watersheds	33
	Assessment of the Watershed Approach in Managing the Natural Resources	33-38

<b>IV</b>	<b>Farming System Based Natural Resource Management in Rainfed Areas: Towards the Second Green Revolution</b>	<b>39-49</b>
	Sustained Livelihood Security Must be the Thrust in Rainfed Areas	39
	Farming System Approach for Synergising Conservation and Development	40
	Meeting Different Technology and Socio-Economic Needs of Rainfed Areas	41
	Policy Actions	41-49
<b>V</b>	<b>Inclusive and Sustainable Development: Humnising Natural Resource Management</b>	<b>50-61</b>
	Towards Inclusiveness	50-52
	Sustainable Development of Common Property Resources	52-54
	Common Property Resources Rights and their Realization	54-58
	Sustainable Development of Livelihoods	58-61
<b>VI</b>	<b>New Strategies And Approaches For Management of Natural Resources</b>	<b>62-84</b>
	Reliable Database and Soil and Land Mapping	62-64
	Decentralization and Professionalism	65-66
	Organizational and Management Reforms	66-72
	Institutional Arrangements	72-77
	Fostering Convergence and Synergy among Programmes	77-79
	Economic and Financial Incentives and Fund Flow	79-83
	Monitoring and Evaluation	83-84
	Strengthening Information System	84
	Scaling Up of Successful Experiences under Watershed Programmes	84
<b>VII</b>	<b>Research and Technology Integration with Natural Resources Management</b>	<b>85-90</b>
	Research and Technology for Promoting Sustainable Agriculture through Watershed Projects	85-86
	Research Priorities in NRM in Rainfed Areas	86-87
	Some Common Focus Areas Across all Rainfed Areas in the Country	87-89
	Strengthening of Social Science Research and Monitoring	89-90

<b>VIII</b>	<b>Natural Resources Management in the XI Plan</b>	<b>91-105</b>
	Main findings of the NRM Efforts in the Past Plans	91-93
	Shift in the overall Approach for Natural Resources Management	93
	Key Features of the Proposed Comprehensive Approach	94-96
	Project Duration	96
	Cost Norms and Allocation of Funds for Different Components	97-98
	Institutional Framework for Management of Different Components	98-99
	Proposed Area and Requirement of Funds for Natural Resources Development during the XI Plan	100-103
	Financial Allocations for Creation of Database and Soil and Land Use Mapping and Communication	103-105
	Improvement in Fund Flow Mechanism	105

## List of Tables

<b>S. No.</b>	<b>Title</b>	<b>Page</b>
1.	Annual requirement of fresh water (b cu m)	11
2.	Zone-wise Ground Water Resources Availability, Utilization and Stage of Development	13
3.	Water and Fertilizer Use and Crop Production in India and China in 2003	14
4.	Degraded Lands Developed under Various Watershed Development Programmes, since Inception up to the Tenth Five Year Plan	28
5.	Extent of loss in subsidies provided to chemical fertilizers	43
6.	The Status of Soil Survey and Mapping	63
7.	Proposed phases and their duration under watershed programme	70
8.	Existing and proposed allocation of fund for different components and sub-components under watershed programmes	80
9.	Details about major components as well as project duration for sustainable development of natural resources on watershed basis during XI Plan	95
10.	Financial allocation for sustainable development of natural resource on watershed basis during XI Plan	98
11.	Institutional framework for sustainable development of natural resources on watershed basis during XI Plan	99
12.	Details about integrated development of natural resource inside watershed projects during XI Plan	100
13.	Details about situation specific development of natural resources (outside the watershed project area)	101
14.	Development of rainfed farming systems (inside and outside the watershed areas)	102
15.	Tentative Budget Outlay for Data Base Creation	104

## List of Figures

<b>S. No.</b>	<b>Title</b>	<b>Page</b>
1.	Per Capita Water Availability	12
2.	Per Capita Water Storage	13

## List of Annexure

<b>S. No.</b>	<b>Title</b>	<b>Page</b>
1.	Constitution and Terms of References of Working Group on Natural Resource Management for the Eleventh Five Year Plan (2007-2012)	106-109

## **List of Tables and Figures and Annexure**

<b>S. No.</b>	<b>Contents</b>	<b>Page</b>
<b>Tables</b>		
1.	Annual requirement of fresh water (b cu m)	
2.	Zone-wise Ground Water Resources Availability, Utilization and Stage of Development	
3.	Water and Fertilizer Use and Crop Production in India and China in 2003	
4.	Degraded Lands Developed under Various Watershed Development Programmes, since Inception up to the Tenth Five Year Plan	
5.	Extent of loss in subsidies provided to chemical fertilizers	
6.	The Status of Soil Survey and Mapping	
7.	Proposed phases and their duration under watershed programme	
8.	Existing and proposed allocation of fund for different components and sub-components under watershed programmes	
9.	Details about major components as well as project duration for sustainable development of natural resources on watershed basis during XI Plan	
10.	Financial allocation for sustainable development of natural resource on watershed basis during XI Plan	
11.	Institutional framework for sustainable development of natural resources on watershed basis during XI Plan	
12.	Details about integrated development of natural resource inside watershed projects during XI Plan	
13.	Details about situation specific development of natural resources (outside the watershed project area)	
14.	Development of rainfed farming systems (inside and outside the watershed areas)	
15.	Tentative Budget Outlay for Data Base Creation	
<b>Figures</b>		
1.	Per Capita Water Availability	
2.	Per Capita Water Storage	
<b>Annexure</b>		
1.	Constitution and Terms of References of Working Group on Natural Resource Management for the Eleventh Five Year Plan (2007-2012)	

## PREFACE

The Planning Commission, Government of India vide their Order No. M-12043/12/2006 dated 7th June 2006 constituted a Working Group on Natural Resource Management for XI Five Year Plan (2007-2012) under the Chairmanship of Prof. R. B. Singh, Member, National Commission on Farmers, New Delhi. The Working Group composition & Terms of References (ToR) are given in Annexure I.

2. The achievements during the past ten Five Year Plans, particularly during the past four decades in the agriculture – the Green Revolution era, have been phenomenal. Yet, India is home to one-fourth of the world's hungry and poor. The economic growth has generally been non-inclusive during the past 15 years or so. This paradoxical situation has arisen essentially due to the decelerated and sluggish growth of the agriculture sector. Realizing that nearly 70 per cent of our population is still rural with farming as the principal source of livelihood and employment, employing 60 per cent of our labour force, "Faster and More Inclusive Growth", as highlighted in the XI Plan Approach Paper, can not be achieved unless the agriculture sector registers the stipulated growth rate of 4.1 per cent and above.

3. Degradation and erosion of natural resources, namely, land, water, forest, biodiversity (plant, animal and microbial genetic resources), livestock and fisheries along with air and sunlight – those parts of the natural world that are used to produce food and other valued goods and services and which are essential for our survival and prosperity, are one of the root causes of the agrarian crisis in the country. No current or intended use of natural resources should condemn our children to endless toil or deprivation.

4. The report highlights that soil health enhancement holds the key to raising small farm productivity. The Second or Evergreen Revolution is not possible without overcoming the widespread macro- and micro-nutrient deficiencies – the "hidden hunger". It also highlights that it is essential to revitalize the soil system through organic residues and materials. Likewise integrated management of water for maximizing productivity per drop of water has been emphasized.

5. The Working Group, as contained in this Report, critically examined the status and management scenario of the natural resources especially under rainfed conditions, identified the major challenges and issues in watershed based management of natural resources, particularly the equity, sustainability, productivity, income and livelihood issues. New modes of governance and prospects of congruence and synergy among various NRM programmes, and new approaches, strategies and policy options and actions to overcome the challenges have been suggested for the XI Plan.

6. This Report underpins that the stipulated overall GDP and agricultural growth rates during the XI Plan can not be achieved with the ongoing shrinking and degradation of country's natural resources. Interlinked as producers and service providers, the resources must be judiciously conserved, developed and harnessed. The Group has suggested the following four major NRM programmes for the XI Five Year Plan:

- Comprehensive integrated development of multiple natural resources based on watershed approach;



- Situation specific and need-based development of individual natural resources, outside the watershed;
- Integrated farming systems based natural resources management in rainfed areas, inside and outside the watershed; and
- Decentralized food security system based on local crops and commodities from rainfed areas duly backed up by price support, procurement and inclusion in the PDS.

7. Among other things, the Report highlights the importance of governance and the role of National Rainfed Area Authority, National Rural Employment Guarantee Scheme, other relevant national bodies and programmes created in recent years, integration and harmonization of processes and guidelines, databases and resource mapping, information systems and participatory approaches in context of NRM. It is hoped that the proposed budgetary outlays and the expected outcomes will be effected during the XI Plan period.

8. I am grateful to all the members of the Working Group for their thoughtful inputs. The Chairmen and Member Conveners of seven Sub-Groups were instrumental in compilation of Sub Group Reports and, therefore, deserve special mention. In particular, cooperation extended by Dr. S. N. Das, CSSO (AISLUS) and Dr. N. K. Sanghi and Ravindra Babu of WASSAN in finalization of the Report is gratefully acknowledged. The support received from Sh. Shamsheer Singh, ADC (NRM) and Sh. C. M. Pandey, DC (NRM) is also duly acknowledged.

9. I take this opportunity to put on record the valuable contribution made by Shri Prem Narain, Joint Secretary (NRM), Ministry of Agriculture, Government of India, New Delhi, who served as the Member Convener of the Working Group.

10. I am beholden to Prof. Abhijit Sen, Member, Planning Commission, New Delhi, for giving me the opportunity to work on this important assignment. I trust, this Report will be helpful in firming up the policies, actions and budgetary outlays and outcomes towards achieving sustainable and equitable management of our rich natural resources leading to accelerated and inclusive agricultural growth during the XI Plan.

Dated: February 2007, New Delhi

(R. B. SINGH)  
Chairman, Working Group on NRM

## **ABBREVIATIONS**

AISLUS	All India Soil and Land Use Survey Organization
BPL	Below Poverty Level
CAPART	Council for Advancement of People's Action and Rural Technology
CAZRI	Central Arid Zone Research Institute
CBO	Community Based Organisation
CBP	Capacity Building Phase
CFM	Community Forest Management
CIG	Common Interest Group
CPR	Common Property Rights/ Common Property Resources
CRIDA	Central Research Institute for Dryland Agriculture
CPLR	Common Property Land Resources
CSS	Central Sector Scheme
CSWRTI	Centre for Soil and Water Conservation, Research and Training Institute
DAC	Department of Agriculture and Cooperation
DDP	Desert Development Programme
DoLR	Department of Land Resources
DoRD	Department of Rural Development
DPAP	Drought Prone Area Programme
DWC	District Watershed Committee
EAP	Externally Aided Programme
ERR	Economic Rate of Return
FAO	Food and Agriculture Organization of the United Nations
FDA	Forest Development Agency
FDC	Forest Development Committee
FIP	Full Implementation Phase
FPC	Forest Protection Committee
FR	Feasibility Report
FYM	Farm Yard Manure
GIS	Geographic Information Systems
GDP	Gross Domestic Product
GO	Government Organization

GOI	Government of India
GP	Gram Panchayat
GS	Gram Sabha
HADP	Hill Area Development Programme
HYV	High Yielding Variety
IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
ICSSR	Indian Council of Social Science Research
IGWDP	Indo-German Watershed Development Project
IRR	Internal Rate of Return
IRMA	Institute of Rural Management on Agriculture
ISRO	Indian Space Research Organization
ISWD	Information System for Watershed Development
ITK	Indigenous Technology Knowledge
IWDP	Integrated Watershed Development Programme
JFM	Joint Forest Management
KAWAD	Karnataka Watershed Directorate
KVK	Krishi Vigyan Kendra
KWDP	Karnataka Watershed Development Project
LEIA	Low External Input Agriculture
MANAGE	National Institute of Agriculture Extension and Management
MIS	Monitoring Information System
MMA	Macro Management of Agriculture
M & E	Monitoring and Evaluation
MoA	Ministry of Agriculture
MoEF	Ministry of Environment and Forests
MoRD	Ministry of Rural Development
MoWR	Ministry of Water Resources
MSP	Minimum Support Price
NABARD	National Bank for Agriculture and Rural Development
NAP	National Afforestation Programme
NAEP	National Afforestation and Eco-Development Project
NASDORA	National Authority for Sustainable Development of Rainfed Areas

NBSS&LUP	National Bureau of Soil Survey and Land Use Planning
NCA	National Commission on Agriculture
NCF	National Commission on Farmers
NDC	National Development Council
NFDB	National Fisheries Development Board
NDVI	Normalized Difference Vegetation Index
NREGA/P/S	National Rural Employment Guarantee Act/Programme/Scheme
NRM	Natural Resource Management
NGO	Non-Governmental Organization
NIC	National Informatics Centre
NLCB	National Land Use and Conservation Board
NRAA	National Rainfed Area Authority
NRCAF	National Research Centre for Agro-Forestry
NREGS	National Rural Employment Guarantee Scheme
NRSA	National Remote Sensing Agency
NWC	National Watershed Council
NWDPPRA	National Watershed Development Programme for Rainfed Areas
PDS	Public Distribution System
PFA	Project Facilitating Agency
PIA	Project Implementation Agency
PM&E	Project Monitoring and Evaluation
PMU	Project Management Unit
PPP	Public Private Partnership
PRI	Panchayati Raj Institution
PSU	Project Support Unit
PVPFR	Plant Variety Protection and Farmers Rights
RDBMS	Relational Data Base Management System
RIDF	Rural Infrastructure Development Fund
RAS	Reclamation of Alkali Soil
RGMWM	Rajiv Gandhi Mission for Watershed Management
RVP & FPR	River Valley Project and Flood Prone River
SAU	State Agricultural University
SHG	Self-Help Group
SLUB	State Land Use Board

SPS	Sanitary and Phyto Sanitary
SMS	Subject Matter Specialist
SRI	System Rice Intensification
SLWC	State Level Watershed Committee
SPWD	Society for Promotion of Wasteland Developments
SWC	Soil and Water Conservation
TERI	The Energy Research Institute
TFP	Total Factor Productivity
TK	Traditional Knowledge
ToT	Training of Trainers
ToR	Terms of Reference
TRIPS	Trade Related Intellectual Property Rights
UG	User Group
UNDP	United Nations Development Programme
UPA	United Progressive Alliance
VDC	Village Development Committee
VKC	Village Knowledge Centre
VRC	Village Resource Centre
WA	Watershed Association
WASSAN	Watershed Support Services and Activities Network
WB	World Bank
WC	Watershed Community / Watershed Committee
WDF	Watershed Development Fund
WDP	Watershed Development Project
WDT	Watershed Development Technology
WDPSA	Watershed Development Project for Shifting Cultivation Areas
WGDP	Western Ghats Development Programme
WOTR	Water Organization Trust
WSD	Watershed Development
ZP	Zila Parishad

# **EXECUTIVE SUMMARY**

## **Natural Resources Management (XI Five Year Plan, 2007-2012)**

1. This Report, following a detailed analysis of status and management scenario of natural resources, weaknesses and strengths of the various programmes and the future challenges and goals, presents new strategies, programme interventions and policy options and actions, and financial outlays to be adopted in the XI Plan for natural resources management towards the stipulated agricultural growth with a human face.

### **Status and Management Scenario of Natural Resources**

#### **Overview**

2. Natural resources (land, water, biodiversity and genetic resources, biomass resources, forests, livestock and fisheries) – the very foundation of human survival, progress and prosperity, have been degrading fast, and the unprecedented pace of their erosion is one of the root causes of the agrarian crisis that the country is facing. The demographic and socio-economic pressures notwithstanding, the unmindful agricultural intensification, over use of marginal lands, imbalanced use of fertilizers, organic matter depletion and deteriorating soil health, extensive diversion of prime agricultural lands to non-agricultural uses, misuse and inefficient use of irrigation water, depleting aquifers, salanisation of fertile lands and water logging, deforestation, biodiversity loss and genetic erosion, and climate change are the main underlying causes.

3. The stipulated overall GDP growth rate of 9 per cent and agricultural growth rate of 4.1 per cent during the XI Plan can not be achieved with the ongoing shrinking and degradation of the country's natural resources. Interlinked as producers and service providers, the resources must be judiciously conserved, developed and harnessed.

### **Specific Resources and their Management Prospects**

#### **Land**

4. Of the country's total 142 m ha cultivated land, 57 m ha, 40 per cent of the total, is irrigated and the remaining 85 m ha is rainfed. Of the total geographical area of 329 m ha, about 146 m ha is classified as degraded, although varying estimates have been provided by different agencies. As generally agreed, the resources have been degrading fast, costing 11 to 26 per cent of the GDP during the 1980s and 1990s. Land distribution is highly skewed, more than 80 per cent of the farmers are small, marginal and sub-marginal and together own about 40 per cent of the total cultivated land, and increasing proportions of the holdings are becoming uneconomical. The soil health has been deteriorating, especially widespread micro-nutrient deficiencies (hidden hunger) and fast depleting carbon content, resulting in low and decelerated TFP growth rates.

5. Efforts of different Ministries/Departments/Organizations should be integrated to harmonise the delineation, codification and land capability classification. Detailed soil data (physical, biological, chemical and microbial) based on effective soil testing are pre-requisites for all lands under both rainfed and irrigated agriculture to address the issues related to soil health *vis a vis* agriculture production. Such soil data will be vital for setting up Village Resource Centres for benefit of the farming community. Necessary financial and human resources should thus be assigned for the purpose. Central and State Land Use Boards should be reorganized and empowered to lead this work. Further, we must implement the unimplemented agenda of land reform with particular reference to tenancy laws, land leasing, distribution of ceiling surplus land and wasteland, providing adequate access to common property and wasteland resources. Following the conferment of land rights to women under the Hindu Succession Amendment Act (2005), the provision of appropriate support services to women farmers has become urgent. Moreover, as far as possible, agricultural land should not be diverted to non-agricultural use.

## **Water**

6. Water availability at the National level is reaching close to 1700 cubic meter (cu m) per capita – the threshold line, and if things do not improve, it will drop to water scarcity line by 2025. India annually receives about 350 million hectare meter (m h m) rain water, but almost half of it finds its way back to the sea, whereas the per capita water storage in India is only 210 cu m against 1110 cu m in China and 3145 cu m in Brazil.

7. With nearly 60 m ha of net irrigated area and irrigation using over 80 per cent of all fresh water, India ranks first in the world in irrigated acreage. There is huge gap of 14 m ha between irrigation potential created and utilized, and the irrigation intensity is only 135 per cent which should be raised to 175 per cent or more. Besides low water use efficiency, there is high inequity in water use and irrigation development, let alone the fast receding aquifers and blocks after blocks turning “dark” and “grey” in certain parts of the country.

8. The XI Plan aims to give thrust to irrigation expansion. Accounting for the 7 m ha through the trend scenario, the additional 10 m ha irrigated area under Bharat Nirman by the year 2009 and the stipulated additional 14 m ha to be brought under pressurized irrigation, by the end of the XI Plan, the country would have an additional 27 m ha under irrigation. The Planning Commission should urgently firm up these figures and, in consultation with the concerned Ministries, should delineate the areas to be brought under additional irrigation. Considering that 70 per cent of the groundwater in the East Zone is unexploited, and the region has high poverty intensity, larger allocations and technical support should be provided by the Centre to this zone for judiciously developing and utilizing water resources towards increased, sustained and inclusive agricultural growth.

9. The following water management strategies and actions are recommended:

- Undertake scientific and comprehensive assessment of water resources, monitor and evaluate water extraction, storage and use, and enhance income per unit of water consumed.
- Prevent/ discourage unsustainable use of groundwater resources in critical zones, develop the resources in unexploited zones, and increase awareness of farmers and

other stakeholders about the value and scarcity of water and negative fallouts of improper use.

- Develop and adopt water use efficient cost-effective and eco-friendly crops, cropping patterns, farming systems and technologies.
- Integrate rain, surface and ground waters and promote conjunctive use of poor quality and polluted waters.
- Institutionalize participatory management of water (Water Users Associations, including proactive women's participation), rationalize water pricing and operational and maintenance charges and distribution of irrigation water and equitable access to water as a common resource.

### **Biodiversity and agricultural genetic resources**

10. Rampant loss of biodiversity and agricultural genetic resources has greatly enhanced genetic vulnerability of our agricultural systems besides losing invaluable gene pools, such as Tharparker in Western Rajasthan. The two recent National initiatives in this field, namely, National Biodiversity Board and Plant Variety Protection and Farmer's Rights Authority are supposed to address this issue, but there is little coordination between the two. Participatory breeding, integrated germplasm and indigenous knowledge conservation and benefit sharing, particularly involving women and tribals, should be promoted through transparent modes of accessing the National Gene Fund and increasing gene and IPR literacy. Establishment of living heritage of livestock germplasm (mostly at State Farms), village gene banks, offshore quarantine centres for germplasm screening against serious diseases and pests and maintenance and trade of pedigreed animals and elite medicinal and aromatic plant landraces by farm science graduates should be strongly supported.

### **Forests**

11. Forests, the green cover, are the natural resource infrastructure for agriculture/primary production and rural economic growth. India, harbouring 16 major forest types – tropical, temperate, alpine etc., is one of the 17 mega diversity centres and two biodiversity hot spots of the world. Per capita forest area in the country (0.064 ha) is one-tenth of that of the world's average, and 41 per cent of the country's forest cover is degraded. Despite the high importance of forests as source of food, fuel, fodder and fibre, and of linking conservation with community based forestry, allocation to the forestry sub-sector has rather been meager, less than 1 per cent of the Plan size. Moreover, most of the budget has to come from the State Governments which seldom meet their commitments and the forests continue to suffer. The share of the Central Government should be increased to at least 50 per cent of the total requirement, and the Tribal Bill, 2005 should be fully implemented and linked with the NREGA.

12. Through the watershed system, the Joint Forest Management (JFM) should be changed to Community Forest Management (CFM) and the concerned Committees, in collaboration with Watershed Committees, should ensure maintenance of the forest profile through large scale tree plantations deploying the nearly 140 thousand frontline staff trained in natural resource management. State Forest Departments should serve as the



Project Implementing Agencies and Village Panchayats should play the coordinating role. MoRD, MoEF and MoA should jointly invest in agroforestry and bio-energy and biomass plantations covering degraded forest lands, wastelands and common property resources, duly supported with producer-friendly regulations for harvesting, processing, value addition, grazing and marketing.

## **Livestock**

13. Livestock accounts for about 27 per cent of the Agricultural GDP and is positively egalitarian in its distribution and in ownership by women, and is a major pillar of income, food and employment security. Possessing the world's largest livestock population, India ranks first in milk production, fifth in egg production and seventh in meat production. Total livestock output has been growing at a much faster rate of 3.6 per cent per annum against only 1.1 per cent registered for the crops sub-sector during the past decade. The targeted overall agricultural annual growth rate of 4.1 per cent during the XI Plan is stipulated to be achieved through a growth rate of about 8 per cent in the livestock sub-sector. In order to double the current growth rate to achieve the XI Plan target, constraints to increased livestock production and productivity (which is one-third of that of the world average) must be properly identified and addressed. Institutional supports and policy actions such as livestock insurance, market and price support, Livestock Feed and Fodder Corporation, Fodder Banks, Small Holder's Poultry Estates, etc. are needed towards achieving the rapid and inclusive growth.

## **Fisheries**

14. Fisheries (53 per cent of the production from aquaculture) contribute significantly to food, nutrition, economic and employment securities, and fortunately are one of the fastest growing agricultural sub-sectors during the last three decades. Currently, fisheries contribute 4.6 per cent of the agricultural GDP, provide employment security to about 11 million people and annually earn foreign exchange worth Rs. 7,300 crore – about one-fifth of the value of the National agricultural export. The overall growth rate of fish production could be doubled to about 8 per cent towards achieving the overall agricultural growth rate of 4.1 per cent during the XI Plan. The following constraints should, however, be addressed to harness the potential: siltation and pollution of water bodies, poor management of production-processing-distribution chain, poor quality control of fish seed and feed, under-exploitation of available species such as cold water fishes like trout and Mahseer and air-breathing fishes like Mangur. Weak infrastructure for landing and marketing and inadequate access to water bodies/tanks, multi-user conflicts and inappropriate leasing policies are other important constraints. Suitable leasing policies, reduced duties on feed and lower power tariffs can help accelerate production of scampi (prawn) in inland saline waterlogged areas, brackish water areas and other aquaculture systems, thus greatly contributing to employment, income and food security. The newly established National Fisheries Development Board, among other things, should strongly support Integrated Coastal Zone Management and Aquarian Reforms, as also suggested by NCF.

## **Major Strengths and Weaknesses of the Past NRM Programmes**

15. During the last two decades, primarily through the watershed programmes, considerable emphasis has been placed on natural resources management. Up to the X Plan, nearly 51 m ha has been developed through integrated approach (i.e. simultaneous development of multiple natural resources on watershed basis) with an investment of Rs. 19,251 crore. Besides, 1.6 million ha has been developed through situation specific approach (i.e. development of one type of natural resource at one time) with an investment of Rs. 9,500 crore. The Ministry of Rural Development accounted for 63 per cent of the “treated” area spending nearly 50 per cent of the total funds and the Ministry of Agriculture “developed” the remaining 37 per cent of the area, but used slightly more than 50 per cent of the total funds. The Ministry of Forest and Environment and the National Planning Commission had only limited involvement.

16. Often, the treated areas have reverted back to the original status and the impact of the development on productivity, equity and sustainability is generally invisible at larger scales. This was ascribed primarily to the lack of focus on productivity enhancement and on livelihood component under the watershed programmes. Sustaining people and their interest in conserving the natural resources for their livelihood, and not merely in land and water conservation, is a necessary precondition for management of natural resources, particularly in rainfed areas.

17. Participatory approach has been promoted through JFM, PIM and PWM etc. for the last 10 to 15 years, but more than 30 per cent of NRM programmes continue to be under top-down approach even at this stage. Institutionalization of participatory approach has thus not yet taken place on large scale even in programmes where participatory guidelines are used. This has resulted not only in continued over exploitation of the natural resources due to low emphasis on proper management of the resources, but also in non-inclusive growth and greater inequity.

18. Post project sustainability continues to be a challenge. This appears to be mainly due to: (i) inadequate delivery mechanism at National, State and District levels, (ii) low capacity building at Community level, (iii) lack of sustainability of CBOs, (iv) low attention towards allocation of users’ right over CPR, (v) lack of payment of genuine contribution by actual users, (vi) delay in fund flow particularly under those programmes which are funded by MoA and (vii) lack of proper modality for carrying out repair and maintenance of CPR, etc.

19. Development of farm production systems as well as off-farm livelihoods continue to receive low attention under natural resource development programmes. Likewise, convergence between inter-related schemes of different development departments could not take place due to various reasons. Poor implementation of the watershed programme at field level may partly be ascribed to the differences in guidelines of different Ministries/ Departments.

20. The scientific concept of watershed based development could not be properly adopted in majority of cases due to scattering of 500 ha micro-watershed units over the entire block / district. It is now being recognized that though a unit of 500 ha may be

adequate for development of land resources, it is quite inadequate for development of water resources as well as management of common lands / forest department lands.

21. The space for NGOs has been gradually reducing (particularly in govt. funded watershed programmes) inspite of the fact that good results have been obtained by several of them. Likewise many of the innovative experiences generated under the externally funded projects could not be up-scaled even in the concerned States. These maladies must be remedied towards sustained and humanistic development of natural resources.

### **Farming System Based Natural Resources Management in Rainfed Areas: Towards the Second Green Revolution**

22. Agro-ecologically and socio-economically, rainfed (rain-dependent) areas are very different from irrigated areas. High natural resource fragility and risk, low and highly oscillating productivity, production, and farmers' income, poor investment and capital formation, high vulnerability and volatility of product markets, poor access to credit, insurance and markets, and higher concentration of poverty and hunger are characteristic features of the rainfed areas. Accounting for 60 per cent of the country's cultivated acreage, their developmental complexities, challenges and potential notwithstanding, rainfed areas have suffered neglect in the past in having not received differentiated technological, institutional, infrastructural and investment support. A holistic approach is, therefore, essential for management of natural resources in rainfed areas through simultaneously addressing conservation and development of natural resources as well as increased and sustained productivity, production and profitability, livelihood security, equity and stability of the people – the making of the Second Green Revolution.

23. An integrated crop-livestock-fish-biomass farming system approach to synergise natural resources conservation, development and management must become the foundation for future growth of rainfed agriculture rather than making only incremental changes in the existing framework of area based development under the watershed programme. This programme is to be embedded in the community based organizations and is to offer a new package of incentives, services, and technological options as well as labour support for group of farmers willing to adopt sustainable farming systems. The package of measures include comprehensive soil health improvement, conservation, harvesting and efficient use of water, integrated farming system with multi purpose biomass production and utilization, including trees, rainfed fodder, livestock and fishery, and should support protective irrigation to stabilize rainfed crops and farming systems, collective utilities like seed bank, grain bank, biomass shredders, fodder bank, procurement and collective marketing, and differentiated flow of credit, insurance and other risk-proofing mechanisms. System Rice Intensification (SRI) should be launched as a National movement.

24. The farming system programme should fully utilize indigenous knowledge system and locally available inputs. Additional labour support can be allocated to group of farmers for a specific period of 4-5 years under NREGA for purposes like common grazing, protection of plantation, critical watering of trees, vermicomposting, green manuring, and preparation of bio-pesticides and biofertilizers. "Livelihood Forestry", horticulture-led agricultural and rural transformation (the National Horticulture Mission), biomass utilization and bioenergy, agroprocessing, value addition, and post harvest management

deserve high priority, particularly for synergizing on-farm and non-farm employment integration and income generation.

25. A decentralized food security system should be promoted by strengthening farming systems based on drought tolerant rainfed crops like millets, pulse, oilseeds and other commodities, duly backed up by price support, procurement and inclusion in the Public Distribution System.

26. An effective rural knowledge society and ICT system involving various stakeholders – farmers, development agents and agencies, knowledge generators and distributors (universities and public and private institutions) should be established for steering a knowledge-based NRM. Village Knowledge Centres (*Gyan Chaupals*) with extensive rural connectivity, including use of cell phones, should be established in each Gram Panchayat for bridging the information and knowledge gap and thus empowering the farmers by latest knowledge on NRM, diagnostics and input and natural resources use.

### **Proposed Strategies and Interventions for NRM in the XI Plan**

27. The “business as usual” will not do. NRM, particularly through the watershed approach, needs major adjustments and shifts in the strategies and approaches. The programme should be divided into three components:

- Comprehensive integrated development of multiple natural resources on watershed basis;
- Situation specific and need-based development of individual resources (out side the watersheds); and
- Integrated crop-livestock-fish-biomass farming system based management of natural resources, especially in rainfed areas (inside and outside the watershed programmes).

28. A differentiated and need-based approach with substantial investment in natural resource management both in irrigated and rainfed areas in watershed as well as beyond watershed programmes is called for. The following programmatic interventions are suggested separately for each component:

#### **Comprehensive management of natural resources**

29. The major steps are:

- Delineation, codification and prioritization of sub-watersheds for the preparation of perspective plan at the State level.
- Separation of capacity building phase from main implementation phase.
- Consideration of sub-watershed as a geo-hydrological unit at Programme Implementing Agency level and revenue village as a management unit at Watershed Committee level.
- Gram Panchayat to play governance role while stakeholders groups (UG / SHG etc.) should carry out execution of their own works and be accountable to Gram

Sabha. Panchayatas should help to create durable assets in watersheds by linking the programme with NREGS.

- Preparation of State specific process guidelines to build upon their strengths and experiences.
- Integration of small size forest areas under watershed programmes through CFM in place of JFM as being successfully practiced in Andhra Pradesh.
- Enhancement in project duration from 5 to 10 years for adoption of comprehensive approach.
- Organisation of CBOs into sustainable bodies as a pre-project activity through complementary funding.

### **Location specific management of natural resources**

30. The following need-based treatments, outside of watersheds, are priority actions:

- Reclamation of problem soils (saline, alkaline, acidic etc.); greater attention is called for acidic soils as the acidification is spreading fast.
- Comprehensive development of degraded lands assigned to resource poor families under land distribution programmes.
- Development of common land with revenue department through adequate investment.
- Revival of small size indigenous water harvesting structures.
- Investment on community borewells to retain ground water as a common property resource.

### **Farming systems based management of natural resources**

31. Keeping in mind the above paragraphs 22 to 26, the following steps are essential:

- Development of farming systems through new paradigm consisting of (i) sustainable management of natural resources through social regulations, (ii) diversification of farming systems, (iii) major emphasis on improving soil health and use of inputs based on internal raw materials, (iv) emphasis on protective irrigation, (v) extension system managed by CBOs, (vi) financial support through revolving funds and (vii) adequate facilitation through experienced resource organizations.
- Convergence of different production related programmes, namely, agriculture, horticulture, livestock, fisheries etc as per the new paradigm.
- Labour incentives for preparation of organic inputs from internal raw materials (to cut down the costs as being done for chemical inputs from external raw materials).

## **Policy Options and Actions**

### **Towards inclusiveness**

32. Special attention should be paid towards inclusiveness and gender mainstreaming within the context of natural resource management. For this purpose, the following specific steps may be taken: (i) introducing special package for the communities which received land through distribution of surplus land, (ii) cultivation of fallow land for food crops through women SHGs, (iii) increased emphasis on tribal dominated forest based economy, (iv) resolving legal complications in treating CPR, (v) provision of drinking water to all households, (vi) equitable distribution of harvested water for irrigation and other livelihoods, (vii) provision of additional fund as seed money to women SHGs for development of livelihoods of only resource poor families, and (viii) equitable distribution of the additional resource that has been created in the watershed, even as prior right to previously existing resources are recognized and left largely undisturbed within a positive sum game framework.

33. During the X Plan no concrete steps were taken to formalize users' rights over the developed CPR under watershed programmes, resulting in un-sustainability of investment on these resources. The situation may be corrected by formulating and implementing National and State level policies accompanied by a Model Bill on Common Property Resources and creating a set of clearly identified rights in favour of Local Communities. At the District level, an administrative instrument of MoU may be used for formal allocation of user rights to different stakeholders.

34. Social regulations against over-exploitation of groundwater should be promoted through: (i) advance commitment from the community about social regulations before finalization of watershed site and (ii) treating ground water as a common property resource. Appropriate 'water reform' on the pattern of 'land reform', as detailed in paragraphs 5.3.8, 5.3.9 and 5.3.10, may be considered for initial testing on pilot basis.

### **Ensuring sustainability**

35. Emphasis should be placed equally on three major components: (i) institution and capacity building at different levels, (ii) management of natural resources and not merely development of natural resources and (iii) diversification and intensification of farming system as an integral part of natural resource management programme. The NREGS, both supporting skilled and unskilled jobs, should be integrated with the watershed programmes particularly for supporting the activities in the "post-treatment" phase. The PRIs should ensure this integration at the grassroot level. Experienced NGOs should also be involved in facilitating bottom-up planning and operations.

36. A ladder based approach, as detailed in paragraph 8.2.2, may be adopted for carrying out comprehensive management of natural resources. In order to ensure timely and non-duplicative actions at the field level, the various Ministries should converge their efforts through constituting a single empowered committee each at State and District level which should be authorized to periodically issue govt. orders/ office orders for improving quality of the programmes.

## **Partnership, congruence and synergy**

37. Public-private participation should be strengthened for fostering business dimension through corporate sector and upscaling of successful experiences through innovative NGOs. About 20 m ha area may be taken up for treatment with private partnership and another 20 m ha with innovative NGOs. New role for NGOs may include (i) working as project facilitation agency, (ii) focusing on software components i.e. community organisation, capacity building, preparation of demand driven plans, process monitoring and (iii) upscaling of successful experiences, including those gained from projects implemented by externally aided agencies.

38. Common guidelines at National level for all NRM related programmes irrespective of source of funding are necessary. In view of the serious disconnect between forest and watershed lands and programmes, it is crucial to develop common agreed guidelines. The latest approach of Community Forest Management in place of Joint Forest Management, as adopted in Andhra Pradesh, may be considered at least on pilot basis in the watershed areas.

## **Management and institutional reforms**

39. At present different States are at different levels with regard to management of watershed programmes and also differ in their experiences regarding organization of CBOs, particularly SHGs and their federations. The existing guideline at the National level is too broad which is not able to build upon local strengths and requirements unless suitably modified. It may thus be made mandatory to formulate State specific process guidelines (within the overall framework of National guidelines) before starting the watershed programme in a particular State.

40. Using modern techniques, delineation and codification alongwith prioritization of watersheds (see paragraph 5) for all the States should be a high priority. Real time data on degraded lands using remote sensing techniques should be generated to settle the issue of variation in the extent of degraded land assessed by different organizations. The Central agencies dealing with soil survey and mapping should undertake the work, with NRSA coordinating the activity. A series of Farm Schools and Soil Testing Laboratories should be strategically located to facilitate large scale adoption of suitable technology packages.

41. The newly established National Rainfed Area Authority (NRAA) should be duly strengthened and empowered to coordinate and direct the National NRM programmes in rainfed areas, in close collaboration with the National Fisheries Development Board and other relevant bodies identified by the NCF. It should ensure that all the activities move from project mode to programme mode, and livelihood development should be the pivotal and integral part of all watershed programmes. Reforms in the institutional mechanism at National, State and District levels are necessary towards this cause. Subsidiary units of NRAA at State and District levels for providing overall direction towards the new approach related to farming systems based management of natural resources should be created so that sustainability is achieved. Further, the NRAA may relieve the Planning Commission of the implementation of the Western Ghats Development and Hill Area Development Programmes.

42. Institutional and administrative reforms, especially decentralization, coordination and monitoring are needed to improve the outcomes, as detailed in Chapter VI Sections 2, 3 and 4. Natural Resource Management Missions both at State and District levels, PIAs at watershed level, redesigned CBOs, and women SHGs should particularly be empowered. The Hariyali Guidelines should be changed to delineate the roles of Gram Panchayats for governance and of UGs and SHGs for implementation of works. For promoting participatory democracy, revival of Gram Sabhas as a decision making body is very crucial. In this connection, the Gram Swaraj Act of Madhya Pradesh may provide an initial lead to achieve the above objective.

### **Research and technology for knowledge-led NRM**

43. Based on agro-ecologically and socio-economically differentiated integrated farming system approach, R&D in rainfed areas should be delineated for three settings, namely, areas receiving <500 mm rainfall, those receiving 700 to 1100 mm and forest-hilly areas with >1100 mm rainfall. Participatory research should be strengthened for identifying varieties of high value and low water requirement, cost-effective technology for water conservation and efficient use, innovative ways of improving soil health, improving agro-processing and value addition and risk reduction and mitigation. NRAA may organise a consortium of organizations to promote participatory research and technology transfer. Farming systems research in rainfed areas should, unlike in the past, be funded adequately.

### **Monitoring, evaluation and communication**

44. The lack of regular and unbiased comprehensive monitoring and evaluation of the programmes must have contributed to the persisting weaknesses and shortcomings. National database on NRM strengthened through the measures suggested in Chapter VI, Section 1, coupled with socio-economic indicators, must be dynamically updated and used for preparing action plans and participatory monitoring and evaluation (PM&E). Necessary trained human resources and financial support should be marked exclusively for the purpose which must assess not only fulfillment of physical targets but also assess the processes, products and social impacts and suggest necessary mid-course correction(s). PM&E should be an integral part of NRM in the XI Plan and should be effectively linked with Village Knowledge Centres and Village Resource Centres.

## **Financial Implications**

### **Enhancement of overall area under watershed programme**

45. Planning Commission has prepared a 25 years perspective plan to develop 88.5 m ha under watershed programme in the country up to XIII Plan. The tentative target for the X and XI Plans were worked out as 15 m ha and 20 m ha, respectively.

46. During the X Plan the programme could be easily implemented over an additional area of 5.0 m ha. In view of this, as well as keeping in mind the urgency of development in rainfed areas, it is proposed to cover about 45 m ha under watershed related programmes over a period of 10 years starting from the first year of the XI Plan, but the time span for completing the comprehensive watershed treatment is 10 years. The area is approximately 50 per cent higher than the original target of 30 m ha for the XI Plan. Besides this, the



rainfed farming systems programme is proposed to cover an additional area of 30 m ha outside the watershed projects.

### **Revision in cost norms**

47. Average cost norm under the watershed programme during the X Plan varied between Rs.4,500 to Rs.12,000 per ha depending upon the degree of slope and number of components. Keeping in view (i) comprehensive approach for management of NRM, (ii) enhancement in project duration from 5 to 10 years to emphasise the management and livelihood security aspects and (iii) normal escalation in costs, etc., it is proposed that the cost norm may be enhanced to Rs. 15,000 per ha.

### **Overall financial implications**

48. As per the new strategy and approach, the proposed area and the financial requirement for each type of programme under NRM are given below:

#### **Proposed outlay for different NRM programmes in the XI Plan**

<b>S. No.</b>	<b>Type of Programme</b>	<b>Proposed Area (million ha)</b>	<b>Unit Cost (Rs. Per/ha)</b>	<b>Total Amount (Rs. crore)</b>
1.	Comprehensive NRM under watershed programme	36.6	15,000/-	54,900
2.	Location specific NRM outside the watershed area	8.4	15,000	12,100
3.	Farming systems based NRM outside the watershed area	30.0	5,000	15,000
4.	Decentralized food security through dryland crops from rainfed areas	200 blocks	3.0 crore per block	600
5.	Development of National database and information system for NRM related aspects*	-	-	798*
	<b>Total</b>			<b>83,398</b>

\* This is for carrying out 10 types of data generation as per the details given in the main report.

### **Improvement in fund flow mechanism**

49. The existing fund flow under watershed programme varies from Ministry to Ministry. In the case of MoA schemes the fund flows from Govt. of India to State Governments through Macro Management mode, while in MoRD schemes it flows directly from Central Government to an autonomous organisation at the District level. In fact, at District level all sources of funding should converge at one nodal agency which must ensure smooth flow of funds to the implementers, facilitators and other stakeholders at the field level.

50. The fund flow through the Macro Management System has suffered a severe set back in terms of delay in release of funds as well as diversion of funds to other schemes where non participatory approaches were adopted. Under the participatory approach in watershed programme, the people are expected to implement the programme without the involvement of contractors. Hence, it is crucial that the fund flow mechanism is improved in case of schemes of the MoA on the pattern of the mechanism with the MoRD schemes.

### **Revised allocation of funds for different components and sub-components**

51. In view of the comprehensive approach, new components and sub-components are added under the watershed programme and hence the revised allocation of fund may be considered as per the details given below:

### **Existing and proposed allocation of funds for different components and sub-components under watershed programmes**

S. No.	Components/ sub-components	Financial allocation ( per cent)		
		Existing		Proposed
		MoRD	MoA	
<b>A.</b>	<b>Administrative component</b>			
	At community and PIA level	10.0	10.0	10.0
	At District and State level	-	-	2.0
	<b>Sub Total (A)</b>	<b>10.0</b>	<b>10.0</b>	<b>12.0</b>
<b>B.</b>	<b>Management component</b>			
	Integrated capacity building (including community organization)	5.0	12.5	10.0
	Planning, monitoring and evaluation	-	-	3.0
	<b>Sub Total (B)</b>	<b>5.0</b>	<b>12.5</b>	<b>13.0</b>
<b>C.</b>	<b>Development component</b>			
	Development of natural resources	85.0	50.0	50.0
	Development of farm production system and micro enterprises	-	27.5	25.0
	<b>Sub Total (C)</b>	<b>85.0</b>	<b>77.5</b>	<b>75.0</b>
	<b>Total (A+B+C)</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

### **Improvement in management of funds**

52. The following specific improvements may be considered in overall management of funds under the watershed programme:

- Enhancement of contribution from 5-10 per cent to 15-30 per cent.
- Development of farming systems mainly through revolving fund.

- (c) Release of funds in annual instalments on sub-watershed basis as compared to half-yearly instalments on micro-watershed basis.
- (d) Social auditing of programme through community based financial committee.

53. Division of funds between Centre and States varies from programme to programme. Some schemes require State government to contribute 10 per cent while others require more. One or two schemes do not require any contribution from the State. Naturally, State Governments have a tendency to choose only those schemes which are free for them. In view of this, it is crucial that all schemes on NRM should have the same share from the State so that same preference could be given to all schemes by the State (the amount of share actually does not matter much).

54. Use of WDF with NABARD should be promoted on full grant basis provided (i) it is used in mitigating the distress in the 31 endemic Districts, (ii) interest earned through RIDF will continue to be added in the corpus as a matching contribution by NABARD and (iii) the funds are used to create innovative approaches in natural resource use and management. The WDF guidelines need to be suitably revised in this context.

## **Chapter I**

### **INTRODUCTION**

#### **1.1 Background and Context**

1.1.1 The Planning Commission, Government of India, vide their order No. M 12043/12/2006-Agri. dated the 7<sup>th</sup> June, 2006 constituted a Working Group on “Natural Resource Management for the Eleventh Five Year Plan (2007-2012)” for the formulation of Eleventh Five Year Plan (2007-2012) under the Chairmanship of Prof. R. B. Singh, Member, National Commission on Farmers. Shri Perm Narain, Joint Secretary, Ministry of Agriculture was the Member Secretary. The constitution of the Working Group along with Terms of Reference (ToR) is at Annexure I.

1.1.2 In line with the ToR and the challenges and prospects discussed in the this Report, the Working Group had reviewed performance and impact of the on-going programmes executed by the various Central Ministries/Departments for the development of natural resources, re-generation of degraded lands and wastelands, land reclamation and soil and water conservation. The Group was also entrusted with the responsibilities of suggesting measures for decentralization, integration and convergence of various watershed programmes, with special reference to equity. It was requested also to examine sustainability of the institutions/ mechanisms and efficacy of the users rights over Common Property Resources (CPRs), land, water and other natural resources and role of Gram Panchayats to access funds under National Rural Employment Guarantee Act (NREGA) for development of rainfed agriculture. The ToR also included review of soil and land degradation mapping and making suggestions for integration of research and technology inputs in watershed programmes. Finally, keeping the above in mind, the Group was required to suggest the programmes for Natural Resources Management (NRM) for the XI Five Year Plan including new policy elements and prioritized fund requirements.

#### **1.2 Scope**

1.2.1 The ToRs assigned to the Working Group centred primarily around watershed-based management of land and water under rainfed areas. No doubt, while congruence of the physical, biological and socio-economic dimensions of land and water management in rainfed areas is the crux of the NRM, additional resources such as bio-diversity and genetic resources and livestock, fishery and forest resources within watersheds are also important. Likewise, management of natural resources beyond watershed areas, particularly in irrigated areas, is equally important. In fact, all the natural resources and the veritable water regimes – irrigated and arid, semi-arid and wet rainfed areas, are all interlinked and interdependent. Therefore, as per the ToR, while this report focuses on watershed-based management of land and water, it also underscores the synergy among all natural resources and between watershed and outside-watershed areas. For instance, the links among water conservation, aquifer recharge and pre-sowing and life-saving irrigations using the conserved water in rainfed areas and overall integration of surface and underground water in irrigation command areas have been highlighted. Such synergies in NRM planning and programming processes have also been discussed in this Report.

## **1.3 Methodology**

1.3.1 The Working Group had two meetings, first on July 11, 2006 and the second on December 7, 2006. As per the decisions of the first meeting, seven Sub-Groups were constituted and the members of the Working Group along with co-opted members were assigned with the responsibility of the respective Sub-Groups. Detailed compositions of the Sub-Groups along with their respective Terms of Reference are given below. Each Sub-Group was required to suggest measures/ programmes for Natural Resource Management for XI Five Year Plan and required funds, as well as area to be covered under the programmes of various Ministries/Departments. The second meeting reviewed progress of each Sub-Group and charted the path for preparation of the report of the Working Group.

### **Sub-Group – I**

- **Chairman:** Shri Bhaskar Chatterjee, Additional Secretary, MoRD, Deptt. of Land Resources.
- **Coordinator:** Shri L. K. Tewari, Additional Commissioner (Rainfed Farming System), Department of Agriculture and Cooperation.

#### **Terms of Reference**

- To critically review the performance and impact of ongoing programmes executed by the various Central Ministries/Departments for the development of natural resources, regeneration of degraded lands and wastelands, land reclamation and soil and water conservation.
- To evaluate whether the benefits of such programmes have been equitable and whether the needs and interests of small and marginal farmers and other vulnerable sections have been met and to suggest a strategy to ensure equity for resource poor farmers.

#### **Other Issues**

- National Level Organization for Land Use (revival of National Lands Use Conservation Board and its responsibilities).

### **Sub-Group – II**

- **Chairman:** Dr. N. K. Tyagi, Member Agricultural Scientists Recruitment Board, New Delhi.
- **Coordinator:** Shri B. Rath, Deputy Commissioner (Rainfed Farming System), Department of Agriculture and Cooperation.

#### **Terms of Reference**

- To suggest measures for decentralization of the programmes and improvement in the delivery mechanism through greater professionalism.
- To suggest how best to integrate and converge various watershed based programmes of different Ministries/Departments under one umbrella, so as to bring about synergy in their implementation.

### **Sub-Group – III**

- **Chairman:** Prof. P. S. Ramakrishnan, UGC Emeritus Professor, School of Environmental Sciences, JNU, New Delhi.
- **Coordinator:** Shri S. K. Dalal, Additional Commissioner (Crops), & Shri R. K. Tiwari, Assistant Commissioner (NRM), Department of Agriculture and Cooperation.

#### **Terms of Reference**

- To examine whether the institutions and mechanisms/structures created under the NRM programmes have been sustainable and to make suggestions for enhancing their sustainability.
- To study the feasibility for the involvement of public-private partnership in Natural Resource Management and Watershed Development Programmes.

#### **Other issues**

- The matter relating to organic farming, soil health etc.

### **Sub-Group – IV**

- **Chairman:** Dr. N. K. Sanghi, former Director, National Institute of Agricultural Extension & Management (MANAGE), Hyderabad.
- **Coordinator:** Shri C. M. Pandey, Deputy Commissioner (NRM), Department of Agriculture and Cooperation.

#### **Terms of Reference**

- To examine the issue of user rights over common property resources and equitable use of such resources (including water). Also, to suggest measures for dovetailing water-use regulation as an important and integral part of the watershed programme.
- To suggest economic and financial incentives for sustainable land and water development programmes.
- To suggest modalities to enable Gram Panchayats to access funds under National Rural Employment Guarantee Act for development of Rainfed agriculture.

### **Sub-Group – V**

- **Chairman:** Dr. K. Radhakrishnan, Director, National Remote Sensing Agency, Hyderabad.
- **Coordinator:** Dr. S. N. Das, Chief Soil Survey Officer, All India Soil & Land Use Survey, New Delhi.

#### **Terms of Reference**

- To suggest mechanism for creation of a data base on Natural Resource Management including on degraded wastelands and dryland/rainfed areas and to develop common guidelines for collecting baseline data for monitoring purposes by a common inter-ministerial office.

- To review the soil and land mapping programmes and to prioritise them as well as to suggest improvements.

### **Other Issues**

- The matter relating to National Rainfed Area Authority (NRAA) with thrust on rainfed farming.

### **Sub-Group – VI**

- **Chairman:** Dr. J. S. Samra, Deputy Director General (NRM), Indian Council of Agricultural Research, New Delhi.
- **Coordinator:** Shri Shamsheer Singh, Additional Commissioner (NRM), Department of Agriculture & Cooperation.

### **Terms of Reference**

- To suggest appropriate integration of research and technological inputs in watershed programmes.

### **Sub-Group – VII**

- **Chairman:** Shri A. K. Mukherjee, Ex-Director General, Ministry of Environment & Forest, New Delhi.
- **Coordinator:** Shri Shamsheer Singh, Additional Commissioner (NRM), Department of Agriculture & Cooperation, New Delhi.

### **Terms of Reference**

- To address Natural Resource Management issues related to Forestry Sector.

### **1.3.2 Other Consultations**

1.3.2.1 An interaction was held by the Member (Agriculture) Planning Commission on 20<sup>th</sup> October, 06 with the Chairmen and Member Secretaries of all the Working Groups of Agriculture. Prof. R. B. Singh, Chairman of the Group and Shri Prem Narain, Member Secretary participated in the meeting and a presentation was made in the Planning Commission.

1.3.2.2 As per the suggestion of the second meeting of the Working Group, a Core Discussion and Drafting Committee, comprising Dr. N. K. Sanghi, Prof Amita Shah, and Dr. Ravindra Babu, under the Chairmanship of Prof. R. B. Singh was constituted which held several meetings and maintained constant communication. Shri Prem Narain, Dr. S. N. Das, Dr. Renu Parmar, Mr. Shamsheer Singh and Mr. C. M. Pandey participated in several meetings of the Committee and made substantial contributions.

1.3.2.3 In drawing up its conclusions and recommendations, the Working Group had benefited particularly from the Parthasarathy Committee Report entitled “ From Hariyali to Neeranchal,” 2006 and from the Report of the Working Group of the Sub-Committee of the National Development Council on Agriculture and Related Issues on Dryland / Rainfed Farming System including Regeneration of Degraded / Waste Land, Watershed Development Programme, 2006, chaired by the Hon’ble Chief Minister of Gujarat, besides other wider consultations.

## **1.4 Structure of the Report**

1.4.1 The Report is set out in two Volumes. The First Volume includes Executive Summary, Introduction, Natural Resource Scenario, Natural Resources Management Programmes, Farming System Based NRM in Rainfed Areas, Inclusive and Sustainable Development through NRM, New Strategies and Approaches for NRM, Integrated Research and Technology Development for NRM and, finally, Natural Resources Management in the XI Plan. The Second Volume is a compilation of the reports of the seven Sub-Groups.



## **Chapter II**

# **NATURAL RESOURCES SCENARIO: CHALLENGES AND PROSPECTS**

## **2.1 Degrading Natural Resources and the Agrarian Crisis**

2.1.1 The achievements during the past ten Five Year Plans have been phenomenal. Yet, the human development indicators such as child and adult malnutrition, poverty, illiteracy, infant and maternal mortality rates and access to sanitation and clean drinking water are India's major concerns. The approach paper for the Eleventh Five Year Plan (XI Plan) mentions "economic growth has failed to be sufficiently inclusive, particularly after the mid-1990. Agriculture lost its growth momentum from that point on and subsequently entered a near crisis situation, reflected in farmer suicides in some areas".

2.1.2 The persisting low income of farmers (the majority of the Indian people) and their intensifying indebtedness, increasing rural unemployment, dangerously widening rural-urban and other veritable divides, the stubbornly high incidence of hunger and poverty, declining agricultural productivity and profitability (a 15 per cent drop during the past 10 years), decelerating Total Factor Productivity (TFP) growth rate and highly aggravated cost-risk-output (income) imbalances are the other manifestations of the agrarian crisis.

2.1.3 The approach to the XI Plan therefore focuses on faster and more inclusive growth, aiming for 9 per cent overall GDP growth rate, with a 4.1 per cent growth rate in agriculture. Considering that the annual agricultural growth rate had decelerated from 3.2 per cent in 1980s to only 1.5 per cent subsequently, attaining and maintaining an agricultural growth rate of 4 per cent and above during the XI Plan, more than double of the rate realized during the past two Plans, is certainly a major challenge, but not insurmountable. Realizing that nearly 70 per cent of our population is still rural with farming as the principal source of Livelihood and employing 60 per cent of our labour force, "Faster and More Inclusive Growth" can not be achieved unless the agriculture sector registers the stipulated growth rate.

2.1.4 Degradation and erosion of natural resources – those parts of the natural world that are used to produce food and other valued goods and services and which are essential for our survival and prosperity, are one of root causes of the agrarian crisis. No current or intended use of natural resources should condemn our children to endless toil or deprivation. Land, water, soil, forest, livestock, fish, biodiversity (plant, animal and microbial genetic resources), along with air and sunlight, are our natural resource upon which human life is dependent.

2.1.5 But, the natural resources and ecological foundations essential for sustained advances in the agricultural productivity are rapidly shrinking and declining under anthropogenic and socio-economic pressures, climate change, monsoonal disturbances, increasing frequencies of floods and droughts, sea level rise and glacial melting. The ecosystem's capacity to support the human and livestock population has been exceeded in many parts of the country. Overuse of marginal lands, imbalances of fertilization

and deteriorating soil health, extensive diversion of agricultural land to nonagricultural uses ( such as the fast multiplying Special Economic Zones and expansion of current fallows), misuse of irrigation water depleting aquifers and irrigation potential and causing salinization of fertile lands and waterlogging continue apace.

2.1.6 The natural resources are interlinked as producers and service providers to maintain environmental health, augment agriculture production and ensure economic development. One of the major concerns in this endeavour is to rehabilitate the degraded and vulnerable land and water resources suffering from soil erosion, soil acidity, salinity, alkalinity, water logging, water depletion, water pollution etc and to ensure livelihood support to the rural population in the country. Soil and water conservation practices through engineering and vegetative measures need to be more indigenous, innovative and eco-friendly and those which are maintainable by farming community. The existing soil and water conservation practices to arrest soil erosion and reclamation measures for other soil degradation processes also need to be re-looked. Soil buffering system and land use policy are also vital components of NRM to attain sustainability that needs to be activated

2.1.7 The need for a larger relief package for an unprecedented agriculture crisis in the rainfed areas of Vidarbha, Andhra Pradesh and other states shows the impact of inappropriate use of natural resources on livelihoods of farmers. The National Commission on Farmers (NCF) recognized net income to farmers as an important factor to sustain their interest in farming. The same concern was also echoed in the Prime Minister's speech "we need to think about how we can provide a decent livelihood to our farmers".

2.1.8 The NRM-specific policy and action challenges notwithstanding, equally formidable other challenges directly impacting sustainability and productivity of natural resources are: technology fatigue, huge technology transfer/adoption gaps, collapse of the extension system and serious knowledge deficits and gaps, poor institutional credit and insurance supports, non-remunerative prices and highly inadequate marketing infrastructure and regulations, huge post-harvest losses and negligible value addition, worsening input-risk-output imbalance, non-existent and/or ineffective enabling mechanisms and regulatory frameworks, and capital stock depletion and inadequate investment.

## **2.2 Land and Soil**

2.2.1 Land conservation, soil health and access to land for livelihood are the main challenges. World's biological productivity, meeting our food, energy and other requirements, depends on soil health, especially its water, nutrient and carbon balance. Unfortunately, it is this mother resource which is depleting the fastest. Estimates of the cost of soil degradation during 1980s and 1990s ranged from 11 to 26 percent of GDP. The cost of salinity and waterlogging is estimated at Rs.120 billion to Rs.270 billion, and if the cost of environmental damage is taken into account, India's economic growth comes to minus 5.73 percent per annum as against plus 5.66 percent estimated otherwise.

2.2.2 Out of the 328.7 million hectare (m ha) of geographical area, 142 m ha is the net cultivated area in India. Of this, about 57 m ha (40 per cent) is irrigated and the remaining 85 m ha (60 per cent) is rainfed. The Working Group on Watershed Development, Rainfed Farming and Natural Resource Management for the Tenth Plan

constituted by the Planning Commission had assessed that 88.5 m ha degraded wasteland including rainfed areas would need development. The Working Group report envisaged to cover the entire 88.5 m ha land in four successive Five Year Plans, commencing from the Tenth Plan up to the Thirteenth Plan at an estimated cost of Rs. 72,750 crore (on 1994 prices). Approximately, 20.00 m ha of degraded land was likely to be treated during the Tenth Plan period and therefore, about 68.50 m ha of degraded lands will require development after the Tenth Five Year Plan.

2.2.3 By the end of the X Plan, nearly 51 m ha are supposed to have been “treated” under watersheds jointly by the Ministries of Rural Development, Agriculture and Environment and Forests and by the Planning Commission, costing nearly Rs. 20,000 crore. The XI Plan is hoping to treat additional 38 m ha, costing about Rs. 28,000 crore. Although positive outcomes of watershed based developments are reported from several locations, little is known of the impact of the past “treatments” on the national production, productivity, farmers’ income and equity indicators. Cases of reversal to the “untreated” original situation are commonly encountered. Obviously, the “business as usual” will not do. Several major weaknesses continue and must be corrected in the XI Plan.

2.2.4 Soil health enhancement holds the key to raising small farm productivity. The Second or Evergreen Revolution is not possible without overcoming the widespread macro- and micro-nutrient deficiencies – the “hidden hunger”. Every farm family should be issued with a Soil Health Passbook, which contains integrated information on the physics, chemistry and microbiology of the soils on their farm. More laboratories to detect specific micronutrient deficiencies in soils are urgently needed. Soil organic matter content will have to be increased by incorporating crop residues in the soil. Proper technical advice on the reclamation of wastelands and on improving their biological potential should be available. Pricing policies should promote a balanced and efficient use of fertilizers.

2.2.5 An estimated 146.00 m ha land is classified as degraded land in the country. The existing practice of soil reclamation and nutrient management using chemicals could be supplemented through various organic means, i.e., application of FYM, compost, vermi-compost, green manuring with an objective to regenerate the wasted potential in eco-friendly manner. It is essential to revitalize the soil system through organic residues and materials. The soil energy system would enhance once soil biosphere is activated. The microbial activity in soil system would not only enhance the organic matter content but also improve the soil physical condition that ultimately enables the availability of more nutrient and moisture to the plants.

2.2.6 The benefits of maintaining optimal level of organic matter in soil are many that would be instrumental in enhancing agriculture production, restoring fragile eco-system and environmental security. The role of organic matter for rehabilitation of degraded land could be gauged through improvement of the soil characteristics such as soil binder, soil physical condition, soil buffer, soil respiration, soil water, retention of plant nutrients and drainage condition. In this context, conservation farming should be developed and adopted as per location-specific settings.

2.2.7 The land use should be compatible to the land capability otherwise it will induce degradation process that may be detrimental to the watershed development programme. The land use policy needs to be developed as per land capability that is to be derived out of soil survey data. In this context, it is necessary to revive the State

Land Use Boards (SLUBs) which should be the nodal agencies to implement land use policy as per the capability to strengthen the mechanism to adopt optimal land use planning in the states. Soil survey department would provide the requisite technical support to SLUB in this respect. The networking of all SLUBs needs to be established through reviving National Land Conservation Board (NLCB) for proper implementation of land use policy in the country. The existing data base on soils available in the country on 1:50000 scale would help to develop the land use policy to a great extent.

2.2.8 The activities of SLUB also need to be defined for effective functioning. SLUB should carry out land budgeting and crop planning as per state's requirements of various food crops, vegetables, pulses, oilseeds, etc., that will enable to adopt proper planning for crop production, delivery system and marketing for the benefit of farming communities and rural people. Agriclincs, Village Knowledge Centres, Village Resource Centres and Farm Science Managers in each Village Panchayat (NCF Draft Policy, 2006) should help use the soil test results in soil-plant-nutrient management. Computerized modules for soil-crop care should be prepared for distinct sites.

2.2.9 The ownership of land is highly skewed, nearly 65 per cent of the rural households owning less than one ha. The landless population amounts to over 12 per cent of rural households. Fragmentation of farm holdings continues unabated. Per capita land availability has also dropped from 0.48 ha in 1951 to 0.16 ha in 1991 and is projected to drop to 0.08 ha in 2035. Enhancing and sustaining productivity and income of small forms through crop-livestock-fish integration and multiple opportunities through agro-processing, value addition and biomass utilization must be a high priority. On the other hand, Land Use Planning is highly ineffective and the Land Use Boards have been rendered nonfunctional.

2.2.10 The first and foremost task should therefore be to implement the unimplemented agenda of land reform with particular reference to tenancy laws, land leasing, distribution of ceiling surplus land and wasteland, providing adequate access to common property and wasteland resources, and the consolidation of holdings. Following the conferment of land rights to women under the Hindu Succession Amendment Act (2005), the provision of appropriate support services to women farmers has become urgent. Joint Pattas for both houses and agricultural land are essential for women to get access to credit with alternative collateral till the pattas are issued. The Land Acquisition Act needs review and revision, with particular reference to the formula for calculating compensation so that the existing farmers, particularly the small and marginal ones are duly compensated and are able to have viable alternative livelihood options.

2.2.11 As far as possible, prime farmland must be conserved for agriculture and should not be diverted for non-agricultural purposes and for programmes like the Special Economic Zone. Such special programmes should be assigned wastelands and / or land affected by salinity and other abiotic stresses that reduce the biological potential of land for the purpose of farming. "Every State should constitute a Land Zonation Team consisting of soil scientists, agronomists and remote sensing specialists to earmark soils with a low biological potential for farming such as wastelands, lands affected by salinity, etc., for industrial activities and construction. It is in our national interest that agriculture and industry both prosper in a mutually reinforcing manner" (NCF, 2006).

2.2.12 The United Nations has designated 2008 as the International Year of Planet Earth and is celebrating it during the Triennium 2007-2009. Subtitled as Earth Science for Society, its science programme has ten themes: Groundwater – reservoir for a thirsty planet; Hazards – minimizing risks, maximizing awareness; Earth and Health – building a safer environment; Climate Change – the stone tape; Resources – towards sustainable use; Megacities – our global urban future; Deep Earth – from crust to core; Ocean – abyss of time; Soil – Earth’s living skin; and Earth and Life – origins of diversity. These themes show a strong focus on addressing societal needs and mustering science and technology to efficiently harness the natural resources and to protect the environment in a sustainable manner. The event coincides with the XI Plan and India must actively participate in this movement.

## **2.3 Water**

2.3.1 Irrigation expansion has been one of the three input-related driving factors (the other two being seeds of modern HYVs and fertilizer) in the Green Revolution process. Gross irrigated area went up by over 300 per cent, from 22.6 m ha in 1950-1951 to 57 m ha (gross irrigated area over 75.1 m ha) in 2000-2001, rendering India as the country having the largest irrigated area in the world. The ultimate irrigation potential for the country has been estimated at about 140 m ha (59 m ha through major and medium irrigation projects, 17 m ha through minor irrigation schemes and 64 m ha through groundwater development). So far, the irrigation potential of nearly 100 m ha has already been created, but only about 86 m ha is being utilized, thus leaving a gap of 14 m ha between created and utilized potential.

2.3.2 Serious gaps also exist between the stipulated and realized productivity and income gains in the irrigated areas. The irrigation intensity is also around 135 per cent which should be raised to 175 per cent or more. The intended productivity increases were, however, not realized and clearly the past policies have been inadequate and had low pay off, let alone the irrigation associated environmental and natural resource related degradations and low water use efficiency and inequity. In brief, the following issues should be addressed for conservation and efficient utilization of water resources:

- Assessment and judicious use of water resources.
- Slow and poorly monitored progress of irrigation infrastructure and water storages.
- Ineffective utilization of irrigation potential developed.
- Unsustainable use of ground water resources in some zones and underutilization of the resources in other zones.
- Pricing and distribution of irrigation water.
- Environmental and ecological considerations.

2.3.3 Irrigation expansion rate in recent years has been about 1.4 m ha per annum. Should the trend scenario be maintained, by the end of the XI Plan, additional 7 m ha of irrigated land should be available. Further, under Bharat Nirman, creation of 10 m ha additional assured irrigation is planned during 2005-2009 through major, medium and minor irrigation projects complemented by groundwater development. A total of about 13 m ha of additional irrigated land should be consequently available during the XI Plan, annually adding about 2.6 m ha. The GOI’s Task Force on Micro-irrigation

(2003) had reported that almost 70 m ha can be brought under drip and sprinkler irrigation. The target is to cover 14 m ha by the end of XI Plan, which indeed is a huge target especially in view of the coverage of hardly 2 m ha during the past 15 years or so. The main constraints encountered include (i) poor quality of the system supplied to the farmers, (ii) unreliable and spurious spares and non-availability of standard parts, (iii) ignorance of the users regarding the maintenance and operation of the system, and (iv) non-availability and uncertainty of power/energy supply.

2.3.4 Based on the above, it can safely be presumed that an additional 27 m ha could be brought under irrigation by the end of the XI Plan. The National Planning Commission, in consultation with the concerned Ministries and the National Rainfed Area Authority, may firm up these figures and benchmark the areas to be brought under additional irrigation. This will facilitate judicious allocation of resources and prove helpful in monitoring, evaluation and impact assessment.

2.3.5 While it is a welcomed possibility to add 27 m ha to our irrigated acreage during the next five years, lessons must be learnt from the past experiences, and the past mistakes and shortcomings must be avoided and corrected through: (a) replenishing the decayed and decaying irrigation infrastructures, (b) completing the unfinished projects, (c) creating well-planned new irrigation projects and (d) increasing cropping intensity, productivity and crop diversification and promoting conservation farming. A nationally debated and accepted strategy should be developed for bringing the additional 27 m ha under irrigation through the various programmes. Only dialogue and consensus building can reconcile different viewpoints regarding the development of large scale irrigation projects, particularly keeping in view the prevalent conflicts in water sharing.

2.3.6 Irrigation consumed 541 billion cubic meter (b cu m) of the total available 634 b cu m fresh water i.e. 85 per cent (in 2000). By the year 2025, the projected annual requirement for irrigation is 910 b cu m, 83 per cent of the total requirement of 1092 b cu m. By the year 2050, the total requirement is estimated to rise to 1447 b cu m, of which 1072 b cu m, 74 per cent will be required for irrigation (Table 1).

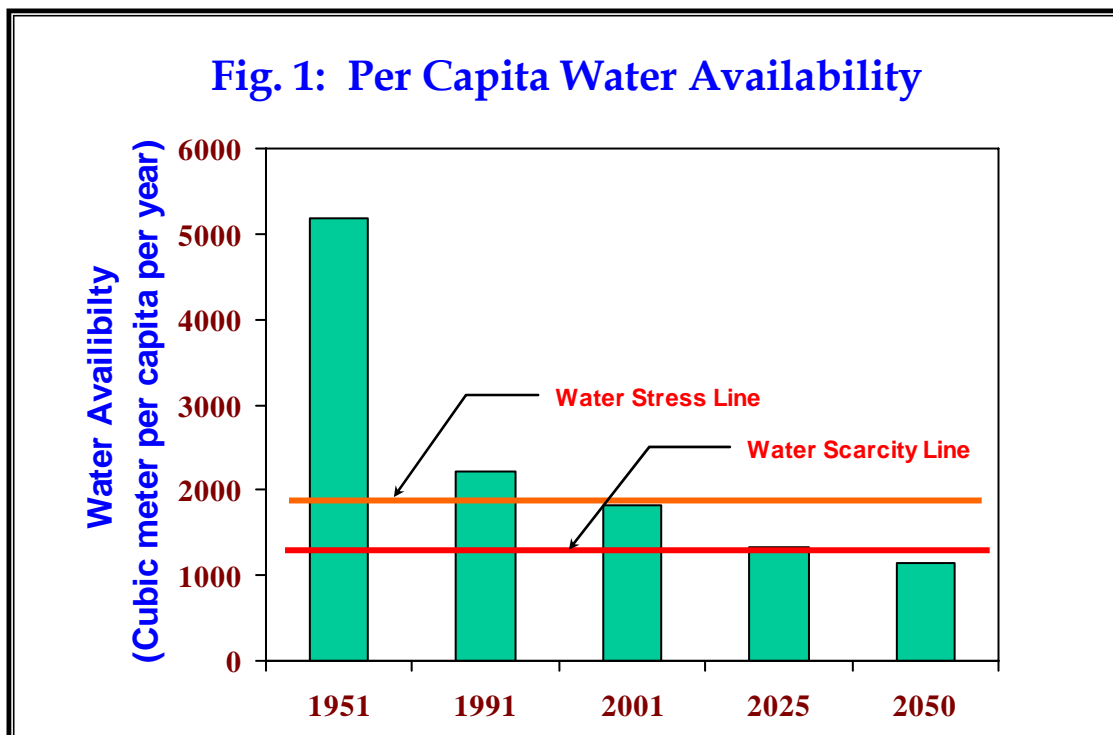
**Table 1: Annual requirement of fresh water (b cu m)**

<b>Under Sector</b>	<b>2000</b>	<b>2025</b>	<b>2050</b>
Irrigation	541	910	1072
Domestic	42	73	102
Industries	8	22	63
Thermal Power	2	15	130
Others	41	72	80
<b>Total</b>	<b>634</b>	<b>1049</b>	<b>1447</b>

**Source:** Central Water Commission (2000)

2.3.7 Our per capita water availability at the national level has declined rapidly, from 1986 cu m (cu m) in 1998 to 1731 cu m in 2005, rendering India dangerously close to the threshold of 1700 cu m and being declared as a water scarcity region of the World (Figure 1). Of our estimated some 350 million hectare meter (m ha m) annual renewable water resources, around 160 mhm find their way back to the sea as river flow. On the other hand, over 29 per cent of the blocks in the country are in the

category of over exploited areas of groundwater use. Nearly 60 percent of the blocks in Punjab and 40 percent of the blocks in Haryana have turned “dark” and over exploited - the heartland of the green revolution.



**Source:** Central Water Commission (2000)

2.3.8 Table 2 gives zone-wise groundwater resources availability, utilization and stage of development. While the North Zone has already developed 87 per cent of its groundwater, the East Zone has over 70 per cent of its groundwater unexploited for irrigation purposes. Thus, larger investments in irrigation should be made in the East Zone. In doing so, the past mistakes and shortcomings of irrigation development should be avoided. Such a move will be a move towards inclusive growth, as the East Zone has higher concentration of the poor people.

2.3.9 Privatization of water has caused unequal social bargain. National water policy has failed to address the issues of integration of surface water and groundwater conservation and use and equitable and efficient management of water supply, demand and use, thus putting the rice/bread bowl – the Indo Gangetic Plains in acute distress. Action Plans should be developed for the Swaminathan Committee Report on “More Income per Drop of Water” and implemented on a location and farming system basis. The Working Group fully agrees with the recommendations of the NCF and supports their implementation during the XI Plan.

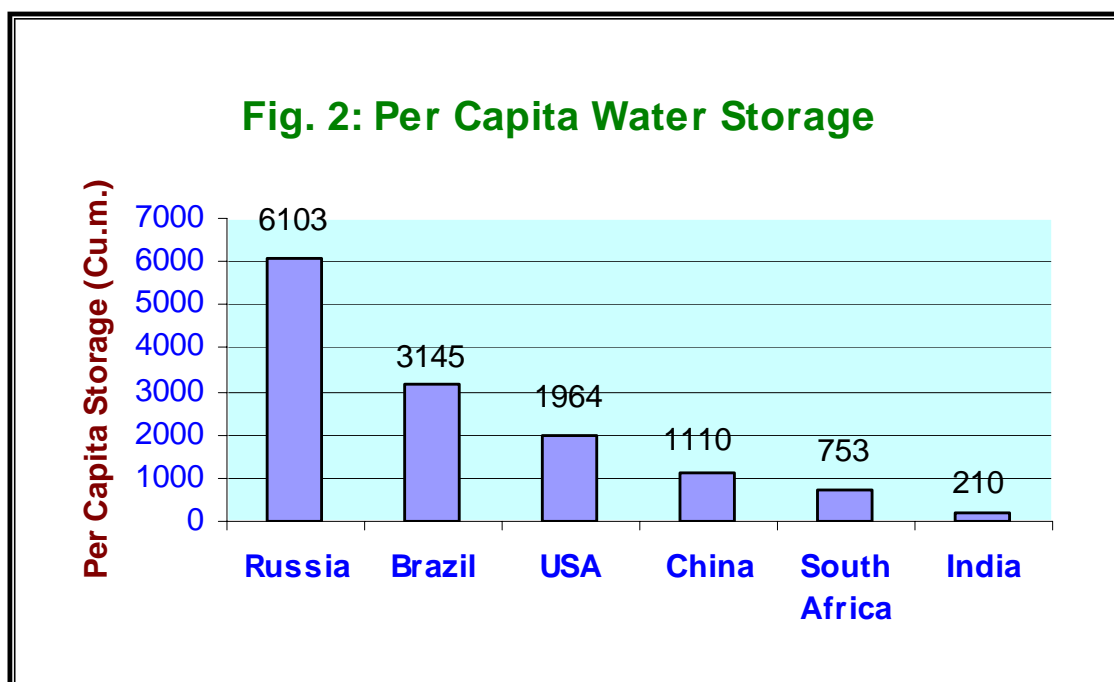
2.3.10 Water is a public good and social resource and not private property. Priority should be given to evolving just and equitable mechanisms to give access to water and to include local people in management of water resources. Women must have a significant role in both access and management, as water users and managers.

**Table 2: Zone-wise Ground Water Resources Availability, Utilization and Stage of Development**

S. No.	State/ Union Territories	Net Ground Water Availab- ility	Annual Groundwater Draft			Projected Demand for Domestic & Industrial Uses upto 2025	Ground Water Availability for Future Irrigation	Stage of Groundwater Development ( per cent)
			Irrigation	Domestic & Industrial Use	Total			
1.	North	105.45	86.55	5.19	91.71	8.01	11.43	87
2.	South	75.71	42.34	4.01	46.34	6.43	30.58	61
3.	East	112.12	28.87	4.31	32.99	6.52	76.66	29
4.	West	105.93	54.77	4.79	59.58	8.21	43.62	56
<b>Total</b>		<b>399.20</b>	<b>212.53</b>	<b>18.29</b>	<b>230.62</b>	<b>29.16</b>	<b>162.28</b>	<b>56</b>

**Source:** Central Ground Water Board, Annual Report, 2005-2006

2.3.11 Though the total rainfall in our country is satisfactory, its distribution is highly skewed, with most of the rainfall occurring in 100 hours in a year. It is also important to note that the majority of farmers depend on groundwater for irrigating their crops. This resource, in which farmers have invested their hard-earned savings, is today increasingly depleted with groundwater tables decline. Therefore rainwater harvesting and aquifer recharge have become essential for ensuring the stability of supply. All existing wells and ponds should be renovated. Per capita storage of water in India is one-fifteenth of that in Brazil and one-fifth of that in China (Figure 2). Hence, considering the huge annual renewable water resources in the country, there is tremendous scope for increasing the storage.



**Source:** Sunday Express, 27<sup>th</sup> August, 2006



2.3.12 There is considerable scope for improving the efficiency of water use. It has been calculated that even a 10 per cent increase in the present level of water use efficiency in irrigated projects may help to provide crop life saving irrigation in large areas. Higher efficiency can be achieved by promoting conjunctive use of water and by generating synergy among water, variety, nutrients (macro and micro) and farm implements. The concept of maximizing yield and income per unit of water should become internalized in all crop production programmes. Synergistically high use efficiency of irrigation and fertilizers is the main cause of high yield and production as reflected in China's and India's performances (Table 3).

**Table 3: Water and Fertilizer Use and Crop Production in India and China in 2003**

Particulars	India	China	World
Population (million) @	1049.50	1302.30	6225.00
Area under food grain production (m ha) @	120.10	81.30	745.60
Irrigated Area (m ha) @	57.20	54.90	276.70
per cent of arable land under irrigation @	33.62	35.68	18.03
Fertilizer consumption (kg/ha)	99.7	276.20	100.80
Rice Yield (t/ha)	2.70 (b)	6.10	3.80
Wheat Yield (t/ha)	2.60	3.90	2.70
Maize Yield (t/ha)	2.10	4.90	4.50
<b>Total Production of cereal and Pulses (m t)</b>	<b>244.00</b>	<b>383.00</b>	<b>2132.00</b>

**Sources:** Fert. Stat. (03-04); Various issues of FAO, Production year book, (2) FAO, Rome.

Figures related to Fert. Cons are for year 2001-02.

(@) Relates to the year 2002; (b) Relates to the year 2002-03

2.3.13 Water quality also needs attention since water often gets polluted at source with fertilizers, pesticide residues and toxic chemicals. For example, the problem of arsenic poisoning in ground water continues because people residing in regions blessed with abundant surface water such as West Bengal increasingly depend on the groundwater for drinking and irrigation purposes. This dependency can be removed by making available other safe drinking water options. Effective management of surface water including rivers, canals, water bodies, lakes, ponds and rainwater can reduce groundwater dependency (NCF, 2006).

2.3.14 Besides problems relating to adequacy and quality, there are serious issues concerning equity in water distribution. The privatization of water supply distribution is fraught with dangers and could lead to water conflicts in local communities. A Pani Panchayat in every village can help in getting the available water distributed on an equitable basis.

2.3.15 Demand management through improved irrigation practices, including sprinkler and drip irrigation, should receive priority attention. A water literacy movement should be launched and regulations should be developed for the sustainable use of ground water. Crop planning and large scale adoption of proven technology can greatly mitigate the problem of excessive use of irrigation water. For instance, one crop of irrigated rice in India consumes more than 40 per cent of all the irrigation water in the season. Believing (wrongly) that continuous submergence/flooding of rice field

throughout the crop life cycle is essential, nearly 4,500 litres of water is required for production of one kg of rice. On the other hand, it is conclusively established that irrigating rice only one to three days after disappearance of ponded water can save 20 to 30 per cent of irrigation water applied without any significant effect on the yield, let alone the environmental benefits. The irrigation water thus saved could be used to bring additional area under irrigation. The package of management options, contained in the System Rice Intensification (SRI) offer still greater eco-friendly and economic opportunities. Development of irrigation responsive varieties cultivated under limited water availability and non-puddled conditions (aerobic rice) is another highly viable complementary component of integrated on-farm water management strategy.

2.3.16 Water Users' Associations may be encouraged to gain expertise in maximizing the benefits of the available water. The National Rainfed Area Authority could help in promoting scientific water harvesting, sustainable and equitable use and the introduction of efficient methods of water use. There should be symbiotic interaction between the National Rainfed Area Authority, the National Horticulture Mission, the Technology Missions in oilseeds and pulses and the National Rural Employment Guarantee Programme.

2.3.17 Monsoon behaviour is often erratic. As highlighted by NCF, in drought prone areas, a Drought Code may be introduced which details the action needed to minimize the impact of an adverse monsoon and maximize the benefits of a good season. Similarly, in areas prone to heavy rainfall, a Flood Code may be introduced which will again mitigate distress and help convert the flood-free season into a major agricultural production period. In the arid areas of Rajasthan, a Good Weather Code may be introduced for taking advantage of occasional heavy rainfall for strengthening the ecological infrastructure essential for sustainable livestock production, drinking water security and sand dune stabilization. The National Rainfed Area Authority could provide technical leadership in the integrated preparation and application of Drought, Flood and Good Weather Codes.

## **2.4 Biodiversity and Agricultural Genetic Resources**

2.4.1 Biodiversity refers to the abundant wealth of flora and fauna including soil micro-flora and micro-fauna and constitutes the genetic wealth for farmers' livelihood security and welfare. The aim should be to conserve as well as enhance these natural resources, to provide equitable access and lead to sustainable use with equitable sharing of benefits.

2.4.2 But, degradations and erosions are rampant in our biodiversity, forests and agro-ecological production systems. The loss of land races, wild species and local breeds have greatly enhanced genetic vulnerability of our major crops, livestock and fish, besides losing invaluable gene pools. Synergy and congruence is also missing between the two newly created biodiversity related national bodies, namely, National Biodiversity Board and Plant Variety Protection and Farmers' Rights Authority.

2.4.3 The Plant Variety Protection and Farmers' Rights (PVPFR) Act was enacted in 2001. The Act recognizes the multiple roles of farmers as cultivators, conservers and breeders. Detailed guidelines should be developed for ensuring that the rights of farmers in their various roles are safeguarded. For example most farmers who are cultivators are entitled to "Plant Back Right". This implies that they can keep their own seeds and also enter into limited exchange in their vicinity. Farmers as breeders have

the same rights as professional breeders and they can enter their varieties for registration and protection.

2.4.4 Farmers as conservers are entitled to recognition and reward from both the National Gene Fund and the National Biodiversity Fund. Quite often, the conserved material of great value is the contribution of a community and not an individual. Therefore the procedures adopted should be such that community contributions can be recognized and suitably rewarded. The Gene and Biodiversity Funds should be used exclusively for recognizing and rewarding the contributions of tribal and rural women and men and for supporting the revitalization of the in situ on-farm conservation traditions of such communities. The provisions in the Biodiversity Act (2002) for prior informed consent and benefit sharing are equally important for tribal and rural women and men.

2.4.5 As recommended by the NCF, and endorsed by the Working Group, the following should be promoted:

- (i) Documentation of Traditional Knowledge (TK) should be done through Community Biodiversity Registers with the involvement of women, who hold much of this knowledge.
- (ii) Tribal and rural women and men should get support in revitalizing their in situ on-farm conservation traditions.
- (iii) Participatory breeding procedures involving scientists and local conservers would be particularly helpful in improving the productivity of landraces.
- (iv) Genetic engineers working in public good institutions should perform the role of pre-breeding, i.e. development of novel genetic combinations for important economic traits, such as resistance to biotic and abiotic stresses. They should then work with farmers in participatory breeding programmes, so that genetic efficiency and genetic diversity can be integrated in an effective manner.
- (v) Genetic homogeneity enhances genetic vulnerability to pests and diseases, so the integration of pre-breeding and participatory breeding would help insulate small farmers from the risks of pest epidemics.
- (vi) A genetic and legal literacy movement must be launched in areas rich in agro biodiversity such as the North East, Western and Eastern Ghats and the Arid Zone.
- (vii) Genome Clubs can be organized in rural schools and colleges for imparting an understanding of the importance of genetic resources conservation.
- (viii) Legal literacy would help tribal and rural families understand the provisions of the PVPFR and Biodiversity Acts with reference to their entitlements.
- (ix) Farm and tribal families should be trained in methods of preventing gene erosion.
- (x) Coastal biodiversity, including coral reefs and sea grass beds is also in urgent need of conservation.
- (xi) Traditional methods of conservation like Sacred Groves need to be supported and encouraged.

- (xii) Herbal Biovalleys can be organized in the Western Ghats, Eastern Ghats, Vindhyas and Himalayan region for the conservation and sustainable use of medicinal plants. In such Biovalleys, young farm women and men could be assisted through a form of venture capital and other support to take to the conservation, selection and multiplication of medicinal plants of value to health security.
- (xiii) A nation wide programme needs to be launched for the *ex situ* and *in situ* conservation of plant genetic resources at the field/farmer level. Farmer level Gene / Seed banks need to be setup in areas where traditional varieties are in danger of extinction. Some State Governments are promoting a “Seed Exchange Programme” under which farmers are given hybrid rice in exchange for their traditional rice varieties. There is need to ensure that in this process, the traditional rice gene pool is not lost. Participatory management of National Parks, Biosphere Reserves and Gene Sanctuaries should be promoted.

2.4.6 As regards livestock germplasm, the burden of conservation of genetic resources cannot be allowed to fall on the largely impoverished communities which maintain animal genetic diversity. A system of rewards and incentives must be developed to enable and motivate people to conserve their breeds under the Biodiversity Act. The Biodiversity Fund should be used for such purposes. Livestock keeper’s inherent rights to continue to use and develop their own breeding stock and breeding practices should be acknowledged. The government must recognize these rights, acknowledge livestock keepers’ contribution to the national economy, and adapt its policies and legal frameworks accordingly. This is particularly important to pre-empt attempts to use the intellectual property system to obtain control over animal resources which are an important components of the country’s food and livelihood security systems.

2.4.7 Apart from conserving genetic diversity and acknowledging the vital role of livestock keepers, there is a need to document the indigenous knowledge of pastoral communities about animal maintenance and breeding. Community-based conservation and development of indigenous livestock breeds and species should be encouraged, with a special focus on both hot and cold and semiarid areas where the genetic diversity and associated indigenous knowledge are particularly well developed. State Farms could be used to promote *in situ* conservation of animal breeds, even those that are amenable to *ex situ* conservation. Grazing lands must be earmarked to enable the conservation of animal genetic resources. Documentation of special traits should be done in the context of the new biology and new nutritional needs or for other economic traits like hide / leather quality. Offshore Quarantine Centres should be developed for screening germplasm for resistance to serious diseases like the H5N1 strain of avian influenza virus.

2.4.8 There is demand for Indian breeds of cattle and buffaloes in several countries. Animal Science Graduates and SHGs may be encouraged to maintain pedigree animals of these breeds for the purpose of developing export opportunities. However, export of all biological material including animals should be done in strict accordance with the provisions of the Biodiversity Act.

## 2.5 Forests

2.5.1 Forests form the basic resource for maintaining the soil/water regimes and ecological services, hence optimizing productivity of forest means augmenting resilience of soil, water and agriculture, which are the pillars of rural livelihood security. Green cover is indicator of resilience of the natural resources and a primary requirement for sustainable agriculture production. Thus forest cover needs to be recognized as the “Natural Resource Infrastructure for agriculture / primary production / rural economic growth”. Good density forest will thus provide required ecosystem services, but also material products in plenty for communities. Thus investment in forest estate is an investment for growth. With the above backdrop, the Group recommends the following steps for sustainable management of forests through a watershed system.

- In the areas where the forests are situated in the catchment of watersheds, the representation of the JFM Committee and Forest Department may be ensured in the planning for watershed management and other similar schemes. Maintenance of the normal profile of forests should be a primary concern of the watershed management plan. Moreover, this will ensure both technological and extension inputs to encourage provision of tree planting in the schemes.
- Forestry personnel are the only group of government employees formally trained in natural resource management. This grass-root level network of about 1.35 lakh executive and front line staff has been underutilized in natural resource management of the country due to lack of investment in forestry. Investment in this sub-sector provides scope for strengthening NRM and Human Development equally. Involvement of the state forest establishment may be insisted for providing technical assistance in planning and implementation of watershed management activities by nominating them as Project Implementing Agencies (PIAs).
- For rural economic evolution, all the available land resources need to be brought under production systems of one or other kind. For rainfed areas, forestry or perennial crops are the most cost effective means of doing this in terms of requirement of investment, manpower and inputs. The development of such areas into common property resources with responsibilities of community groups for planning and looking after such resources will reduce pressure from forests and also provide needed biomass for value addition/rural jobs. This will need state assistance and investment as rural groups are involved. State social forestry establishment can be made to work with the communities and Panchayati Raj Institutions (PRIs) for revival of natural resources.
- Agro forestry has immense potential in adding value to subsistence as well as commercial farming, gives insurance to the farmers against crop and market failure and keeps the farmers free from intensive labour of low return farm practices in sub productive areas. It needs, apart from significant investment, strong statutory support, facilitated market by rationalizing restrictions on trade and providing credible networking support and treating tree cultivation as agriculture for incentives.
- Nearly one fourth of the land resources are underproductive basically due to more withdrawal than production. It is known that the poverty map of the country coincides with the forest map. As the resilience of these habitats is the

function of productivity, which in turn is a function of the growing stock, in the circumstances mentioned above, productivity can be optimized only by augmenting growing stock (by afforestation, conservation, participatory management, optimum utilization). We should grow more than we consume.

2.5.2 India is one of the 17 mega diversity countries in the world having vast variety of flora and fauna, supporting 16 major forest types, comprising from Himalayan Alpine pasture and temperate forest, sub-tropical forest, tropical evergreen to mangroves in the coastal areas. India also has two biodiversity hot spots in the northeastern states and the Western Ghats.

2.5.3 Per capita forest area is only 0.064 ha - one-tenth of the world average. Under the heavy pressures of human and animal populations, about 41 per cent of forest cover of the country is degraded. Dense forests are losing their crown density and productivity continuously, the current productivity being one-third of that of the world average. The use of forests beyond their carrying capacity, compounded with the loss of nearly 4.5 m ha to agriculture and other uses since 1950 and nearly 10 m ha of forest area being subjected to shifting cultivation, is the main cause of continuous degradation of forests.

2.5.4 The 2003 Report of the Forest Survey of India indicates that the country now has only 67.83 m ha of forest (tree canopy) cover i.e. 20.64 per cent of the land area against the Forest Policy requirement of 33 per cent. Out of this, 5.28 m ha is very dense forest, 33.39 m ha of moderately dense forests and 28.78 m ha of open forests. Moreover, there are 4.02 m ha of scrub forests, bringing the total to 71.80 m ha or 21.87 per cent of the geographical area of the country. Further, nearly 10 m ha is under tree cover outside the recorded forest area, thus the total forest and tree cover comes to 77.83 m ha or 23.68 per cent of the land area of the country. The report also indicates that though over the last few years the forest cover has stabilized, the matter of concern is the rapid loss of good forest cover in the northeastern states.

2.5.5 The objectives of the New Forest Policy, 1988, include the following aspects:

- (i) Maintenance of environmental stability and restoration of ecological balance, soil and water conservation.
- (ii) Conservation of natural heritage and genetic resources.
- (iii) Increasing substantially forest/tree cover (33 per cent of land mass and 66 per cent in hills).
- (iv) Increasing productivity of forest to meet first the local and then national needs.
- (v) Creating massive peoples movement to increase and protect forest and tree cover to achieve the main objective to reduce pressure on existing forests and meeting people's need sustainably.
- (vi) Deriving economic benefit must be subordinated to the principal aims.

2.5.6 In 1999 the MOEF adopted (UNDP-FAO sponsored) the National Forestry Action Programme (NFAP) for a period of 20 years (4 five year plans from X Plan onwards). It recommended an annual need based target of 3 m ha for regeneration (0.775 m ha), plantations (0.775 m ha), and agro and social forestry (1.450 m ha) programmes, requiring an investment of Rs. 27,260 crore under the X Plan. Unfortunately, the total fund allocation was only Rs. 14,344 crore, and the rate of

afforestation could only be around 1.5 m ha per annum through forestry and social forestry programmes.

2.5.7 The recent Green India Project focuses on three functions of forests, namely, 1) soil conservation (prevention of soil erosion), 2) water augmentation, and 3) avoidance of flood damage.

2.5.8 The Common Minimum Programme of the UPA Government states that “UPA administration will take all measures to reconcile the objectives of economic growth and environmental conservation, particularly as far as tribal communities dependent on forests are concerned.” The recent World Bank report “Unlocking Opportunities for Forest-Dependent People” (2006) also argues for linking conservation with community based forestry.

2.5.9 Among the many demands placed on the forest resource of India the most important, both in terms of value and volume are timber, fuel and fodder. Of these, while timber is required by all sections of society, demand of fuel and fodder basically comes from rural areas and that too from the underprivileged section of the society. Thus, these two demands receive added significance.

2.5.10 As regards timber, the domestic supply increased from 53 million cubic meters (m c m) in 1996 to 65 m cu m in 2006. During the same period the demand increased from 64 to 82 m cu m, the gap being met through import, valued at Rs. 9,000 crore during the year 2003-04. While natural forests are unable to meet the requirement, non forest areas, which include farm forests, could play a significant role in fulfilling the demand.

2.5.11 As regards fuel wood, these constitute an important basic need of about 40 per cent of the population of India. The fact remains that India may have sufficient food to eat but not sufficient fuel wood to cook it. Demand of fuel, which basically comes from rural areas, depends on various factors such as availability of other fuels, climate, living standards, size of the family, food habits, etc. It has been estimated that average annual per capita fuel wood consumption in the country works out to about 0.35 tones. The domestic supply through normal means generally meets hardly 50 of the demand, mostly through over exploitation of forests beyond their productive capacities leading to degradation of growing stock.

2.5.12 Regarding fodder, forests meet about one-third of the requirement in India. The forests form a major source of fodder supply and it increases during drought years when the crops fail and therefore natural forests remain the only source of fodder. Grasslands are biomass wise among the most productive ecosystems of the world. In an agrarian nation so dependent upon range grazing of its moving stock, they are the most important component of country's animal husbandry. Yet, they are the most neglected, most devastated and most diverted ecosystems of the country. Agriculture and Animal Husbandry have also ignored the grasslands. Fodder supply coming from lopping and grazing in forests, like fuelwood collection, constitutes a non-monetized free supply and is being over utilized, leading to severe soil erosion and ecological degradation. This is a matter of serious concern, as these areas are the main source of biological diversity, wildlife habitat and various types of natural ecosystems, which are the base for all life support systems, especially in rural India.

2.5.13 The demand supply scenarios of timber, fuelwood and fodder thus clearly indicate the urgent need for initiating effective policies and adequately funded programmes for a new people oriented forest management approach for conservation, regeneration, and sustainable use of forests as well as a massive farm/agro forestry effort under all natural resource development oriented programmes.

2.5.14 The agro forestry based production systems, namely, agri-silviculture system, silvi-pastoral system, agri-silvi-pastoral system, agro-horti-pastoral system and multipurpose forest tree production system, envisage to conserve and improve the land and also optimize the combined productivity of the trees, agricultural crops and livestock. These systems are being adopted under on-going programmes of Watershed Management being implemented by various Central Ministries. Agroforestry is taken up on and along the field bunds and also along the small river systems and if consented by farmers in block plantations both on private and community lands covering non-forest areas. Although It is a component of package of watershed management, there is no separate monitoring and it does not find adequate thrust both in terms of area coverage and financial allocation during formation of grassroot level plans. Tree planting though ensures multiplier effect in rural job creation, development of rural assets, water harvesting in rain fed area, providing fodder, fuel and manure etc, being a long gestation programme with low visibility, does not find favour for specific inclusion and fund provision in the local level plans. As such, there are no reliable data regarding the number of trees planted or the area covered and investment for this component during the Tenth Plan. This gap should be filled in the XI Plan and beyond.

2.5.15 The management of forest estate with the government is basically handled at State level by the State Governments. While capacity building and research have been the specific mandate of Central Government since beginning, the responsibility of leading the States towards national priorities of environmental integrity came to Government of India with inclusion of this sub-sector into concurrent list. Decision to not convert the natural forests into plantations needs to be balanced by creation of Protected Area Network, on one hand, and provision of socio-economic and livelihood securities to the local communities, on the other hand.

2.5.16 Allocation to the forestry sub-sector has rather been meagre, despite the increasing appreciation of the multi-functionality of forests, although it had increased from 0.37 per cent of the Plan size in the First Plan to an all time high of 1.03 per cent in the Seventh Plan. During the last three Plans it has stagnated at around 0.94 per cent. Moreover, the bulk of the total allocation is to be met by the State Governments which seldom meet their commitments and the forests continue to suffer. The share of the Central Government should be increased to at least 50 per cent.

2.5.17 Social forestry projects during 1980s extended the scope of the sector beyond government forests and external aid was available for this aspect. Second generation external aid has been oriented towards comprehensive forestry, largely focused on technology and participatory systems for government forests. The provisions, however, have often been accompanied by corresponding reduction in the Plan allocation in state plans and no corresponding step ups were ensured after completion of the projects to maintain the momentum.

2.5.18 In order to resolve conflicts between people and the foresters and between environmental and socio-economic demands, Joint Forest Management (JFM) was instituted to develop people centric management agreements with communities which



benefited all the stakeholders and resulted in rapid increase in biomass, genetic diversity, forest productivity and equitable distribution of benefits. Based on the Ministry of Environment & Forest resolution dated 01/06/1990, all States have issued resolutions laying ground rules for placing degraded forest under joint forest management (JFM) system and arrangement for sharing of usufructs and net sale proceeds between the forest department and the local people organized in the form of a Village Forest Development Committee (FDC) or FPC or VDC etc as they are locally called.

2.5.19 In the year 2000-2001, a new pilot scheme of undertaking the integrated village afforestation and eco-development under a new set up named Forest Development Agency (FDA), each covering a group of JFM committees in a forest division, was initiated with the long range objective to cover, through forest development activities, all available areas in and around nearly 1.7 lakh villages, which are situated close to forests and where people are largely dependent on forest resources for sustenance. The basic objectives of the scheme, as also elucidated in the Tribal Bill, 2005, are:

- Arrest and reverse the trend of forest degradation.
- Provide sustainable, assured employment opportunities to tribals and other weaker sections of the society.
- Create durable community assets for socio-economic development.
- Involve the village community to participate in planning and execution of all works.
- Create an effective mechanism in order to ensure that all government departments reach the beneficiaries through FDA. Provide need-based funds for works in all the FDAs in the XI plan.

2.5.20 The Government of India launched a new scheme of eco-development around the protected areas including the tiger reserves, which has two thrust areas : (a) improvement of protected area management to effectively conserve bio-diversity and involvement of local people in protected area planning and protection as well as developing incentive for conservation by supporting sustainable alternatives to the harmful use of natural resources and (b) to strengthen and support the collaboration between the protected area authorities, local people, state development and planning agencies and other stakeholders that will strengthen the participatory management of protected areas in a sustainable manner.

2.5.21 The JFM and eco development programmes elevate the local people from the level of receivers of some benefits from forests to the level of co-managers of a designated area of forest. These also ensure equitable benefit sharing of the usufructs as well as the financial returns from timber harvest and focus the need for development of flexible management approaches for ensuring local need based and sustainable multi-product output from the previously degraded forest area and better NWFP yield from good forest areas.

2.5.22 Since the forests are in concurrent list, it is the responsibility of the Central Government to orient forestry towards national priority of optimizing productivity. Moreover, the circumstances have been such that forestry is seen as a centrally driven subject. This has been reiterated by the Supreme Court and Twelfth Finance

Commission also. In this connection, recommendations made by the National Forest Commission are reiterated, fully endorsed and reproduced below :-

- Felling regulations on private lands may be restricted to ‘Highly Restricted Tree Species’, meaning such endangered and valuable tree species which are almost entirely found in forest areas. Some examples are sandalwood, red sanders, rosewood, khair, sal, deodar, Bhojpatra, taxus, *Quercus semicarpifolia*.
- Under the Land Ceiling Act, no land ceiling shall be imposed on land under plantation of forests tree species. This will motivate the corporate sector and big farmers to invest in plantations.
- There should be appropriate rural development and animal husbandry policies and projects to address issues of grazing and fodder for cattle. The grazing requirements of livestock of villages located in and around forests (within five kilometers) should be addressed within the carrying capacity of forest areas. The practice of unregulated grazing should gradually be replaced by stall-feeding.
- The allocation to the forestry sector must be increased, both in Central and State budgets, and must not be less than 2.5 per cent of the total plan outlays.
- 20 per cent funds of all the Rural Development Programmes should be incurred on forestry and watershed operations.
- All disaster management programmes of the Central and State Governments must have a component of forestry, which should not be less than 5 per cent of the total outlay.
- Programmes under the National Rural Employment Guarantee Act (NREGA) 2005 should also be extended to forestry operations.

2.5.23 Central investment in the Forestry sector through the CSS is not even 15 per cent of the total outlay in the Forestry and Wildlife sector. An increased earmarked outlay within NRM can be used to orient the watershed programmes towards national priorities of strengthening natural resources and eventually optimizing the potential of agriculture for poverty alleviation.

2.5.24 Considering that integration of the land based activities of Agriculture, Animal Husbandry, Rural Development and Forests is essential for holistic and effective natural resource planning and development, it is suggested that the National Rainfed Area Authority may coordinate and monitor the efforts. It may also take up the task of formulating a grazing and fodder policy for addressing the problem of unregulated grazing in forests leading to damage to regeneration and degradation.

## **2.6 Livestock**

2.6.1 Livestock sub-sector, with its annual outputs (milk, meat, egg and wool) valued at nearly Rs. 170,000 crore - about 27 per cent of the agricultural GDP and engaging over 90 million people, is a highly strategic and vital sub-sector for agrarian economy of the country. Unlike the ownership of land, the ownership of livestock is positively egalitarian, especially in the arid, semi-arid and other non-congenial rainfed settings, and is a critical component of livelihood security. Livestock-owning farmers are less prone to committing suicide when compared with the non-owners, as the sub-sector, besides being an important source of income, food and nutrition, helps to spread the risks and provides a more even stream of income to eliminate seasonal hunger. Taken

together, the small and marginal farmers account for over 70 percent of the in-milk bovine stock in the country.

2.6.2 Possessing the world's largest livestock population, India ranks first in milk production, fifth in egg production and seventh in meat production. Total livestock output has been growing at a much faster rate of 3.6 percent per annum against only 1.1 percent registered for the crops sub-sector during the past decade. The targeted overall agricultural annual growth rate of 4.1 percent during the XI Plan is stipulated to be achieved through a growth rate of about 8 percent in the livestock sub-sector. In order to double the current growth rate to achieve the XI Plan target, constraints to increased livestock production and productivity (which is one-third of that of the world average) must be properly identified and addressed. Women play a vital role in the care and management of livestock, hence their access and rights to this resource should be increased, including those through SHGs and cooperatives.

2.6.3 Productivity of our animals is almost one-third of that of the world's average and far lesser when compared with that in the developed countries. On the other hand, India has about 20 percent of the world's animal population, but good grazing lands are practically non-existent, thus exerting enormous pressure on the limited and shrinking land and water resources. The major constraints relate to fodder, feed, healthcare, genetic improvement and conservation (degeneration of the famous Tharparker cattle breed in Western Rajasthan is a sad story), processing and value addition, remunerative pricing and marketing. The problems and prospects of small, poor and underprivileged livestock producers are very different from those of resource-rich industrialized livestock producers.

2.6.4 Recognizing the highly pro-poor features of the livestock industry, as suggested by the NCF, India's livestock policy should emphasize scientific management of livestock by ensuring access to appropriate technologies, inputs like land, feed, water and to risk-coping mechanisms against natural disasters and price shocks. Domestic livestock markets, credit, insurance and extension services, especially for small, marginal and landless farmers, should be ensured. Livestock product quality, food safety literacy and promotion of competitive production systems should have high priority, especially in view of the SPS, TRIPS and other regulatory provisions of the globalised markets.

2.6.5 Livestock Feed and Fodder Corporation at the State level should be established for ensuring availability of quality fodder and feed through production and distribution of seeds of improved varieties and adoption of modern technologies. Feed and Fodder Banks in rural areas can greatly supplement the effort. Agri-clinics could be extremely helpful in promoting livestock nutrition, healthcare and marketing. Crop-livestock-fish integrated farming, particularly in rainfed areas, should be the thrust. Livestock insurance should also be revamped and made accessible to small livestock owners.

2.6.6 A National Livestock Development Council may be established to integrate breeding, nutrition, healthcare, marketing, value addition, biomass utilization, efficient use of animal energy and biosecurity. Keeping in view the widespread reproductive disorders and fast tapering productivity of cross-bred cows, the country must develop a scientific cattle breeding policy both for judicious conservation of our genetic heritage and for enhanced and sustained productivity. Appreciating the trend of poultry development in recent years, the poultry industry should be recognized as an

agricultural activity and appropriate support should be provided to backyard poultry farmers to establish Small Holders' Poultry Estates.

## **2.7 Fisheries**

2.7.1 Fisheries, including aquaculture, contribute significantly to food, nutrition, economic and employment securities, and fortunately are one of the fastest growing agricultural sub-sectors during the last three decades. Currently, fisheries contribute 4.6 percent of the agricultural GDP, provide employment security to about 11 million people and annually earn foreign exchange worth Rs. 7,300 crore - about one-fifth of the value of the national agricultural export. Of the current (2002-03) total production of 6.4 million tonnes (m t) of fish, marine fish production contributed about 3.0 m t and inland fisheries contributed 3.4 m t – 53 percent of the total production. While the marine fish production has been growing at 2.2 percent per annum, the inland production has annually been growing at 6.6 percent, resulting in an overall annual growth rate of 4.12 percent during the nineties.

2.7.2 The overall growth rate of fish production must be accelerated to about 8 percent to achieve the stipulated 4.1 percent growth rate for the agriculture sector as a whole during the XI Plan. And, this is achievable. India's fisheries sub-sector is endowed with large under-utilized areas of fresh water tanks, lakes and derelict bodies, reservoirs, rivers, saline and brackish water resources, Exclusive Economic Zone and a large coastline. India also has diverse agro-climatic regimes, rich fish fauna and genetic diversity, and a large research and technology development infrastructure and extensive processing facilities.

2.7.3 The following constraints should, however, be addressed to harness the potential: siltation and pollution of water bodies, poor management of production-processing-distribution chain, poor quality control of fish seed and feed, under-exploitation of available species such as cold water fishes like trout and Mahseer and air-breathing fishes like Mangur. Weak infrastructure for landing and marketing and inadequate access to water bodies/tanks, multi-user conflicts and inappropriate leasing policies are other important constraints. Suitable leasing policies, reduced duties on feed and lower power tariffs can help accelerate production of scampi (prawn) in inland saline water logged areas, brackish water areas and other aquaculture systems, thus greatly contributing to employment, income and food security.

2.7.4 In order to increase and sustain fish resources and productivity, the following four interdependent steps are required:

- Preserve and realize the gains achieved during the blue revolution,
- Increase potential for fish yields and for value-adding enterprises,
- Facilitate integrated and environment-friendly management of natural resources by introducing integrated Coastal Zone Management and scientific fish rearing, harvesting, processing and marketing, and
- Initiate suitable policies for increasing investment in production and R and D systems, markets, prices, trade, employment, and communication and cooperation.

2.7.5 Integrated Coastal Zone Management and scientific fish rearing, harvesting and processing can greatly help in sustaining and improving income of fisher families. The

NCF had suggested the need for well-planned Aquarian Reforms to provide landless labour families access to village ponds and other water bodies in the public domain for aquaculture and livelihood. In this context, the recently established National Fisheries Development Board (NFDB) aiming to congrue ecology, economics, gender equity and employment generation, is a timely step. The Board should resolve the conflicts between mechanized and artisan fishing enterprises as well as between agriculturists and aquaculturists. It should address also the pollution problems caused by the intensive systems of aquaculture. The Board should help develop well defined policies and guidelines for the allocation of ponds and reservoirs to landless labour and help them in practicing modern aquaculture based on composite fish farming. The NFDB should also address the environmental concerns of seaweed farming and introduction of exotic species, particularly corals and other alien invasive species.

2.7.6 The NFDB should evolve dynamic policies for the management and economic use of the Extensive Economic Zone extending to nearly 2 m sq. km of sea surface, amounting to about two-thirds of the land surface available to India. The capacity and quality literacy of fisher families should be enhanced to render the capture/culture-consumption chain highly efficient through establishing “Fish for All Training and Capacity Building Centres”. Mother ships, particularly for ensuring hygienic handling of the catch in the mid-ocean, deployment of dredgers for increasing the efficiency of fish landing centres and production of niche fisheries viz. ornamental fishes, air breathing fishes, cold water fishes and the use of artificial coral reefs should be promoted for augmenting fish-based income, employment and food security. The Integrated Coastal Zone Management Policy should ensure concurrent management of about 10 km of land surface and 10 km of sea surface from the shoreline particularly to avoid pollution. Learning from the Tsunami, December 2004, non-fish income-earning activities such as poultry farming, fish pickle making, agar production, pearl oyster culture, etc. should be promoted.

2.7.5 The Working Groups on Livestock and Fisheries, established to be handled by the corresponding Departments, based on their comprehensive studies, would separately make detailed recommendations on various aspects of livestock and fisheries sub-sectors. Recognizing that livestock and fisheries, including their biodiversity, constitute important natural resources, this Working Group has analyzed these sub-sectors in context of their conservation for livelihood security and linkages of these resources with land, water, and other natural resources, and has made necessary policy and programme recommendations for their integration in rainfed farming systems and watershed programmes.

## **Chapter III**

# **NATURAL RESOURCE MANAGEMENT PROGRAMMES OF CENTRAL MINISTRIES AND DEPARTMENTS: A REVIEW AND APPRAISAL**

### **3.1 Overview**

3.1.1 Various Central Ministries and Departments are implementing programmes for development of degraded lands and rainfed areas on watershed basis. The scheme wise physical and financial achievements of watershed programmes of Ministry of Agriculture (MoA), Ministry of Rural Development (MoRD) and Ministry of Environment and Forest (MoEF), since inception up to the end of the Tenth Five Year Plan, are summarised in Table 4.

3.1.2 Broadly speaking, the following two approaches have been adopted for development of natural resources, namely, (i) integrated approach under watershed programme for simultaneous development of multiple natural resources, which is facilitated by a multidisciplinary team with sufficient funds for development of the resources and (ii) situation specific approach under which only one type of natural resource is developed at one place (outside the watershed programme), and is usually facilitated by the specific development department / ministry in the areas which suffer due to over exploitation of the particular natural resource.

3.1.3 Integrated development of natural resources (on watershed basis) is carried out largely by MoA, MoRD, NABARD, externally funded projects, international NGOs etc. In the above programme, some of the organizations carry out only development of multiple natural resources (e.g. MoRD) while other organizations carry out not only development of multiple natural resources but also development of livelihoods (farm production system as well as off-farm livelihoods) as an integral part of the watershed programme. Up to the X Plan a total of 51 m ha was covered by above organizations with an overall investment of Rs.19,251 crore (Table 4).

3.1.4 The entire work is essentially between two Ministries, namely, MoRD accounting for 32.0 m ha, 63 per cent of the treated area, and the MoA accounting for 18.8 m ha, 37 per cent of the total treated area. But, the funds spent in the MoA slightly exceed the funds spent by the MoRD, 50.3 and 49.7 per cent, respectively. Of the various programmes, Drought Prone Area Programme (DPAP), Integrated Watershed Development Project (IWDP) and Desert Development Programme (DDP) of the MoRD and National Watershed Development Project for Rainfed Areas (NWDPA) and River Valley Projects and Flood Prone River (RVP & FPR) programme of the MoA, accounting for 27, 20, 15, 18 and 13 per cent of the total area, respectively.

3.1.5 Originally, the projected land for treatment / reclamation under watershed development programmes for the XI Plan was stipulated at 20 m ha. With the kind of performance achieved during the X Plan it is expected that if the resources are appropriately made available, it is possible to accelerate the pace of development of these lands. This seems necessary keeping in consideration the large extent of degraded / wasteland / rainfed areas remaining un-treated even after the X Plan. It will be

appropriate if the projections for the XI Plan are almost doubled in view of the seriousness of the situation in rainfed areas.

**Table 4: Degraded Lands Developed under Various Watershed Development Programmes, since Inception up to the Tenth Five Year Plan**

(Area in Lakh ha and Expenditure in Rs. crore)

S. No.	Ministry/Scheme and year of start	Progress since inception up to IX Plan		Progress in X Plan* (2002-07)		Total since inception up to X Plan*	
		Area	Expr.	Area	Expr.	Area	Expr.
(A) Ministry of Agriculture (Department of Agriculture & Cooperation)							
	NWDPR (1990-91)	69.79	1877.74	23.30	1147.82	93.09	3025.56
	RVP & FPR (1962 & 81)	54.88	1516.26	9.98	727.98	64.86	2244.24
	WDPSA (1974-75)	2.58	166.27	1.35	129.31	3.93	295.58
	RAS (1985-86)	5.81	76.39	1.30	45.35	7.11	121.74
	WDF (1999-00)	0.00	0.00	0.59	26.02	0.59	26.02
	EAPs	13.35	2039.81	4.80	1927.54	18.15	3967.35
Sub Total		146.41	5676.47	41.32	4004.02	187.73	9680.49
(B) Ministry of Rural Development ( Department of Land Resources)							
	DPAP(1973-74)	68.95	3284.74	68.32	1557.76	137.27	4842.50
	DDP(1977-78)	33.56	797.38	45.17	1152.50	78.73	1949.88
	IWDP(1988-89)	37.34	616.51	62.22	1821.64	99.56	2438.15
	EAPs	1.40	18.39	3.60	274.28	5.00	292.67
Sub Total		141.25	4717.02	179.31	4806.18	320.56	9523.20
( C ) Ministry of Environment and Forests							
	NAEP(1989-90)	0.70	47.53	0.00	0.00	0.70	47.53
Total (A+B+C)		288.36	10441.02	220.63	8810.20	508.99	19251.22

\* includes tentative achievement of 2006-07.

Abbreviations:

NWDPR	-	National Watershed Development Project for Rainfed Area
RVP & FPR	-	River Valley Project & Flood Prone River
WDPSA	-	Watershed Development Project for Shifting Cultivation Area
RAS	-	Reclamation of Alkali Soil
WDF	-	Watershed Development Fund
EAPs	-	Externally Aided Projects
DPAP	-	Drought Prone Area Programme
DDP	-	Desert Development Programme
IWDP	-	Integrated Wasteland Development Project
NAEP	-	National Afforestation and Eco-Development Project

## 3.2 Watershed Programmes with Ministry of Agriculture

### 3.2.1 National Watershed Development Project for Rainfed Areas (NWDPR):

The National Watershed Development Project for Rainfed Areas (NWDPR) was launched during 1990-91 (Seventh Five Year Plan) on pilot basis. In the Eighth Plan, the NWDPR was extended to twenty five States and two Union Territories (Andaman & Nicobar Islands and Dadar & Nagar Haveli). The programme continued in the Ninth Plan. Since November 2000, the NWDPR has been subsumed under Macro Management of Agriculture (MMA). During the Tenth Five Year Plan this programme

is being implemented in twenty eight States (including the three newly created states of Chhattisgarh, Jharkhand and Uttarakhand) and the two Union Territories (A&N Islands and D&N Haveli).

3.2.2 NWDPR has been thoroughly restructured by retaining the technical strength of the earlier programme and incorporating the lessons learnt from successful projects, especially on community participation. The average unit cost of treatment for less than 8 percent slope is Rs.4500 per ha and for higher than 8 percent slope is Rs.6000 per ha. The programme is being implemented under the WARASA – JAN SAHBHAGITA Guidelines, since October, 2000.

3.2.3 Since inception and up to the end of the X Plan an area of nearly 9.0 m ha is expected to have been treated with an expenditure of Rs.3025.56 crore under NWDPR.

3.2.4 **River Valley Projects (RVP) and Flood Prone Rivers (FPR) Programme:** Presently, this programme is being implemented in 53 catchments having a total area of 113.40 m ha falling in 27 States. In this programme all type of lands viz. , Agriculture, Waste and Forest are treated in an integrated manner with suitable package of treatments viz. construction of Contour Vegetative Hedge, Contour/ Graded Bunding, Horticulture Plantation, Contour/ Stagger Trenching, Sowing and Planting of Plants, Silvi-Pasture Development, Pasture Development, Afforestation, Farm Pond, Percolation Tank, Drainage Line Treatment ( such as Earthen Loose Boulders, Water Harvesting Structures, Check Bund, Spill-way, Sediment Detention Structures etc.) The unit cost of Rs. 6500 per ha and Rs.10000 per ha are adopted for the Category-I (75% area having less than 8% slope) and Category-II (75% having more than 8% slope) respectively for treating the area in its entire treatment period (which varies from 3-5 years).

3.2.5 Since inception of the programme and up to end of the X Plan an area of 6.5 m ha is expected to be treated with an expenditure of Rs.2,244.24 crore.

3.2.6 **Watershed Development Project for Shifting Cultivation Area (WDPSCA):** An area of 43.57 lakh ha, is affected by Jhum/Shifting Cultivation mainly in the States of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Orissa and Tripura. Such cultivation is also found in sporadically in the States of Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, Kerala, Karnataka and Sikkim. As per recommendation of the Task Force on Development of Shifting Cultivation Areas, constituted by the Ministry of Agriculture in the year 1983, the Scheme for Control of Shifting Cultivation /Jhum was launched in the VII Five Year Plan (1987-88) with 100% central assistance to the State Plan covering North Eastern States and 2 States viz., Andhra Pradesh and Orissa. The Scheme was initially implemented on Family Development Approach and 26512 jhumia families were benefited under the programme with an expenditure of Rs.60.72 crore.

3.2.7 As per decision of NDC, the scheme was transferred to State Sector and was discontinued in 1991-92. Again on the demand from North Eastern States, the Planning Commission revised the scheme for North Eastern Region only from 1994-95 onwards. Accordingly, the scheme is continuing in seven North Eastern States, namely, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura on watershed basis with 100% additional assistance to the State Plan.



3.2.8 Since inception and up to end of the X Five Year Plan, an area of 0.39 m ha is expected to be developed with expenditure of Rs.295.88 crore.

3.2.9 **Reclamation of Alkali Soils (RAS):** About 70.00 lakh ha is affected by salt problem, out of which about 35.81 lakh ha suffers from alkalinity in the country. Such alkali soils are largely located in 11 States, namely, Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh.

3.2.10 The isolated and projectized approaches for reclamation of alkali soils are adopted. Overall unit cost of reclamation under the Isolated Approach is Rs.11,300 per ha. Likewise, overall unit cost of reclamation under the Projectized Approach is Rs.57,300 per ha.

3.2.11 Since inception and up to the X Plan, an area of 0.70 m ha will be reclaimed with expenditure of Rs.121.74 crore.

### **3.3 Watershed Programmes of Ministry of Rural Development**

3.3.1 **Drought Prone Areas Programme (DPAP):** Drought Prone Areas Programme (DPAP) is the earliest area development programme launched by the Central Government in 1973-74 to tackle the special problems faced by those fragile areas which are constantly affected by severe drought conditions. The Drought Prone Areas Programme was in operation in 627 blocks of 96 districts in 13 States during 1994-95. On the recommendation of the Hanumatha Rao Committee, 384 new blocks were brought into the purview of this programme and 64 were transferred from DPAP to DDP. Consequently, coverage of the programme was extended to 947 blocks of 164 districts in 13 States. With the reorganization of States, districts and blocks, at present the programme is under implementation in 972 blocks of 182 districts in 16 States.

3.3.2 Until March 2000, the following cost norms were adopted under DPAP for various eco-systems (i) Semi-Arid Region @ Rs. 4,000 per ha (ii) Dry-Sub-Humid Region @ Rs. 3,000 per ha (iii) Dry Sub-Humid ( Hill ) Region @ Rs. 4,000 per ha (iv) KBK districts of Orissa @ Rs. 5,000 per ha. However, with effect from 1.04.2000, uniform cost norms @ Rs.6000 per ha have been introduced. Up to the X Plan an area of 13.7 m ha is likely to have been treated at a cost of Rs. 4,842.50 crore.

3.3.3 **Desert Development Programme (DDP):** Up to 1994-95 the Desert Development Programme was in operation in 131 blocks of 21 districts in 5 States. On the recommendations of the Hanumatha Rao Committee, 32 new blocks were brought within the purview of the programme and 64 blocks were transferred from DPAP. Consequently w.e.f. 1.4.1995 the coverage of the programme was extended to 227 blocks of the country. With the reorganization of districts and blocks, the programme is under implementation in 235 blocks of 40 districts in 7 States.

3.3.4 Up to the X Plan an area of 7.90 m ha has been treated at a cost of Rs. 1,949.88 crore.

3.3.5 **Integrated Wasteland Development Project (IWDP):** Integrated Wastelands Development Project (IWDP), a Centrally Sponsored Project, has been under implementation since 1989-90. From 1st April 1995, the programme is being implemented through watershed approach under the Common Guidelines for Watershed Development. The IWDP envisages the development of non-forest

wastelands in the country. The basic approach in implementation of this programme has been modified from 1.04.1995 when the above Common Guidelines came into force.

3.3.6 The projects under the programme are generally sanctioned in the Blocks not covered by DDP and DPAP. At present, the projects under the programme are being implemented in 443 districts of the country. Prior to 31.03.2000, watershed development projects under the programme were sanctioned at a cost norm of Rs.4000 per ha. These were funded entirely by the Central Government. The cost norm has since been revised to Rs.6000 per ha for the projects sanctioned after 1.4.2000.

3.3.7 Up to the X Plan an area of 10.0 m ha is expected to have been treated at a cost of Rs.2,438.15 crore.

### **3.4 Externally Aided Projects for Watershed Based Development**

**3.4.1 Projects with Ministry of Agriculture:** The Ministry of Agriculture is servicing also externally aided watershed development projects for the development of degraded and rainfed areas since 1983. Many of the projects have been completed and at present there are 5 on-going externally aided Projects. These programmes lay special emphasis on components like natural resource management, livestock development, infrastructure and institutional development etc. Under the externally aided projects an area of 1.81 m ha was to be covered at a cost of Rs 3,967.37 crore till the end of the X Plan.

**3.4.2 Projects with Ministry of Rural Development:** The Ministry of Rural Development is also servicing externally aided watershed development projects for the development of degraded and waste land areas. These programmes lay special emphasis on components like natural resource management, livestock development, infrastructure and institutional development etc. Under the above projects, an area of 0.50 m ha is expected to be covered at a cost of Rs. 292.67 crore till the end of the X Plan.

### **3.5 Watershed Based Programmes with Planning Commission**

3.5.1 The Planning Commission of India started two schemes in designated Hill areas, viz.; the Hill Areas Development Programme (HADP) and Western Ghats Development Programme (WGDP) from the Fifth Five Year Plan. Under these programmes, Special Central Assistance is given to the designated Hill Areas in order to supplement the efforts of the State Governments in the development of these ecologically fragile areas. Identification of areas under HADP was done by a Committee of the National Development Council (NDC) in the year 1965, while for the WGDP, it was recommended by a High Level Committee set up for this purpose in the year 1972.

**3.5.2 Hill Area Development Programme (HADP):** The objectives and focus of the programmes under HADP have been changing over each five year Plan within a broad framework of strategy and approach since its inception in the V Plan. In the V Five Year Plan, programmes were mainly beneficiary oriented. In the VI Plan, although the emphasis shifted to eco development, it retains the general form and shape of the programme as that of the normal State Plan with the same sectoral approach. During the VII Plan, however, the emphasis was laid upon eco development, eco preservation

and eco restoration. In the VIII Plan, the programme focused on community involvement and management of land and water resources.

3.5.3 During the IX Plan, the objectives of the programme emphasised as eco preservation and eco restoration. Activities were undertaken for conservation of biodiversity and rejuvenation of hill ecology. Emphasis was laid upon the traditional knowledge. The strategy was based on the two-pronged approach, viz. the Sub Plan Approach and the Integrated Watershed Approach. Up to the X Plan an amount of Rs.4,542.00 crore has been used under the above programme, whereas during the X Plan (first four years) an amount Rs.366.26 crore have been used.

**3.5.4 Western Ghat Development Programme (WGDP):** During the V Five Year Plan, the main objective of the WGDP Programme was to promote horticulture Plantation, Afforestation, minor irrigation, animal husbandry and tourism. Accordingly, activities addressing these sectors were taken up under this programme. During the VI Plan, an emphasis was laid on promoting beneficiary oriented and infrastructure development activities. During this period, the Watershed Development Programmes were also taken up on a pilot basis. During the VII and VIII Five Year Plans, the approach remained the same with a focus on the integrated development on compact watershed basis.

3.5.5 Up to X Plan an amount of Rs.812.23 crore has been used under the above programme, whereas during X Plan (first four years) an amount Rs.246.16 crore have been used.

### **3.6 Watershed Programmes Implemented by NABARD**

3.6.1 The Union Finance Minister, in his budget speech for 1999-2000 had announced the creation of a Watershed Development Fund (WDF) with the National Bank for Agriculture and Rural Development (NABARD) with broad objectives of unification of multiplicity of watershed development programmes into a single national initiative through involvement of village level institutions and Project Facilitating Agencies (PFAs). As a follow up action, a Watershed Development Fund (WDF) has since been established at NABARD with a total corpus of Rs.200.00 crore which included Rs.100 crore by NABARD and a matching contribution of Rs.100 crore by Department of Agriculture & Cooperation, Ministry of Agriculture and Government of India.

3.6.2 Out of 18 identified States under the WDF programme as on 31.03.2006 only 8 States ( Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Rajasthan, Tamil Nadu, Uttar Pradesh & West Bengal ) implemented loan component of the programme, whereas these plus six other States (Chhattisgarh, Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh and Orissa) are implementing grant component. A total number of 417 projects (369 under loan and 58 under grant component) were sanctioned under Capacity Building Phase (CBP) with a grant assistance of Rs.21.02 crore and covering an area of 0.39 lakh ha up to 31<sup>st</sup> March, 2006. These projects are expected to ultimately cover about 4.04 lakh ha area once they enter into full implementation phase.

3.6.3 A total of 237 projects (208 under loan and 29 under grant component) were sanctioned a grant assistance of Rs.226.63 lakh for preparation of project feasibility report (FR) up to 31<sup>st</sup> March, 2006. One hundred forty projects have graduated into

Full Implementation Phase (FIP) which includes 115 loan projects with a loan assistance of Rs.5,621.66 lakh and 25 grant projects with a grant assistance of Rs. 1,128.15 lakh up to 31<sup>st</sup> March, 2006.

### **3.7 Forest Development Programmes by Ministry of Environment and Forests and Managing Forest Lands in Watersheds**

3.7.1 The Ministry of Environment and Forests is also implementing programmes by adopting watershed approach. Most of these programmes aim afforestation in watershed areas under the National Afforestation and Eco-development Project. Up to the end of the X Plan, a total area of 0.07 m ha was covered at a cost of Rs. 47.53 crore. The programme has been conceived as a long-term measure for restoration of ecological balance by conserving, developing and harnessing land, water, livestock and human resources. It seeks to promote the economic development of the village community and improve the economic conditions of resource poor and disadvantaged sections of society in the rural areas.

3.7.2 Rajasthan has distinct problems because of large tracts of Hot Arid (sandy) areas. In view of the problem of sand dune stabilization in ten districts of this State, special projects are under implementation under DDP since 1999-2000 for combating desertification by way of shelterbelt plantation, sand dune fixation and silvi pasture development. These ten districts are Barmer, Bikaner, Churu, Jaisalmer, Jalore, Jhunjhunu, Jodhpur, Nagaur, Pali and Sikar.

### **3.8 Assessment of the Watershed Approach in Managing the Natural Resources**

#### **3.8.1 Magic entry point but low visibility:**

3.8.1.1 Watershed approach has been advocated, and rightly so, as the magic entry point (bullet) for integrated management of natural resources leading to enhanced and sustained productivity, income and livelihood security. Recognizing the shortcomings of watershed and other NRM programmes in the IX Plan and earlier, the X Plan had emphasized large-scale adoption of people-centred approach in NRM through participatory watershed development, participatory irrigation management, joint forest management etc., which are being implemented through direct funding (of developmental component) to the community based organizations. Formal involvement of multiple resource organizations in these programmes, including foreign funded organizations, NABARD, CAPART, NGOs, social activists etc., besides the govt. organizations at national and state levels were promoted.

3.8.1.2 In order to assess the performance of various ongoing projects / programmes of watershed development, a series of evaluation studies have been conducted by ICAR Institutes, State Agriculture Universities, National Remote Sensing Agency, Agro-Economic Research Centres, Indian Institutes of Management and independent agencies like Agriculture Finance Corporation, Institute of Development and Communication, Institute of Economic Growth, Development Center for Alternative Policies etc. Besides, impact assessment studies were carried out by Ministry of Agriculture, Ministry of Rural Development, Planning Commission, ICRISAT, CRIDA and Technical Committee of DOLR.

3.8.1.3 These studies support that in several watersheds the implementation of the programme has been effective for natural resource conservation by increasing the productivity of the land, increasing additional area under agriculture, employment generation and social upliftment of beneficiaries living in rural areas. But these success flashes have not spread to wider areas and have not been able to have visible impact at State or national level. The impact assessments on people's participation, post-project sustainability, congruence and synergy and on equity are briefly described below.

### **3.8.2 People's participation**

3.8.2.1 Reiterating their continued commitment for supporting the comprehensive natural resource development programme on watershed basis in rainfed areas, the Central Government and some of the State Governments adopted genuine changes in their approaches to assume facilitators role in place of implementers role though in a gradual manner. The NRM efforts have, however, so far primarily been on soil and water conservation. People-centric approaches, enhanced and sustained productivity and livelihood security of the people participating in the NRM have generally not been emphasized.

3.8.2.2 The participatory approach is still not institutionalized over wide areas, especially in the government funded programmes even though there are evidences of its success (on a limited scale). A significant number of NRM related schemes continue to be managed through top down approach, viz. river valley project and alkali soil reclamation scheme with the Ministry of Agriculture; minor irrigation projects with the Ministry of Water Resource; watershed development programmes initiated by the Planning Commission; RIDF supported natural resource development programme by NABARD; etc.. The Hariyali Guidelines of MoRD are devoid of participatory livelihood improvement. In fact, the National Planning Commission should withdraw from implementing watershed projects and assign the responsibility to a suitably equipped Department.

### **3.8.3 Post project sustainability of interventions**

3.8.3.1 Post project sustainability of interventions continues to be low on a large scale even in watershed projects which are managed as per the participatory guidelines. This is essentially due to the following reasons:

- (i) inadequate delivery mechanism at the national, state and district levels
- (ii) major focus on development of natural resource with very little attention towards management of developed natural resource
- (iii) lack of sustainability of community based organizations
- (iv) low level of capacity building particularly at the community level
- (v) lack of proper modality for carrying out repair and maintenance of community oriented structures
- (vi) poor attention towards formal allocation of user's rights over CPR
- (vii) lack of genuine contribution by actual participants associated with the particular resource
- (viii) low attention towards concurrent monitoring and evaluation through external organizations

- (ix) delay in fund flow particularly in case of those watersheds which are funded by Ministry of Agriculture
- (x) continued tendency towards top down Planning due to inadequate empowerment of watershed community etc.

3.8.3.2 The scientific concept of watershed based development could not be properly adopted in majority of cases due to staggering of 500 ha micro-watershed units over the entire block / district rather than selecting at-least 10 micro-watersheds in a compact area with each PIA. Because of this it is not possible to carry out scientific development as well as management of water resource and common land / forest department land.

3.8.3.3 Equity for resource poor families and empowerment of women are yet to receive due emphasis in the watershed programme. The participatory dimension of the guidelines under watershed programme has suffered a serious setback after the adoption of Hariyali guidelines with MORD in spite of repeated negative feedback from various field based organizations associated with participatory watershed programme.

3.8.3.4 The space for NGOs has been gradually reduced in spite of the fact that good results have been obtained by them particularly in situations where there has been sufficient flexibility in operation (as in case of watershed programme funded, managed as well as implemented by NGOs). These experiences are however lying in isolation without any significant effort to upscale them.

3.8.3.5 Likewise many of the innovative experiences obtained under externally aided projects (managed and implemented by state Govt.) could not be up-scaled in the areas where Govt. of India funded watershed programmes are operating (even by the respective states).

#### **3.8.4 Convergence and synergy**

3.8.4.1 Development of livelihoods (farm production systems as well as off-farm livelihoods) continues to receive low attention under the watershed programme. Although some attempts were made to integrate this component under the above programme by the Ministry of Agriculture, enough progress could not be made due to delay in fund flow as well as low attention towards proper organization of self-help groups. Much of the focus was laid only on organization of limited number of trials and demonstrations at the project cost. Formal linkage was also not facilitated regarding livelihood component as it was not even considered as a formal agenda under the programme.

3.8.4.2 Livestock management, though an important component of natural resources and livelihoods, did not receive any attention in the watershed programmes except organizing occasional cattle health camps. Likewise, fisheries component has also been neglected, thus excluding a large part of the population depending on these resources for their livelihood.

3.8.4.3 Convergence between inter-related schemes of different development departments could not take place due to striking differences in the operational guidelines as well as social consideration (of not concentrating different schemes at one place and thus depriving the community in other places). Forestry component has

hardly been integrated with watershed programmes primarily due to inadequate administrative support at district and state levels, except RVP & FPR programme.

3.8.4.4 Implementation of watershed/ wasteland programmes in forest lands, quite often witnesses problems posed by the Forest Department in view of Forest Conservation Act, 1980. Although, the common approach to the watershed programmes accepted by the Ministry of Agriculture and Ministry of Rural Development prescribes for development of forest lands in watershed areas, at the field level implementation of watershed projects suffers on this aspect. It is a fact that forests constitute one of the important natural resources which need to be conserved with utmost importance along with the other scarce resources like water and soil. In the watershed areas forests generally constitute the most vulnerable segment of the geo-hydrological unit occupying the ridge section. They contribute the maximum run-off due to higher slope and provide the erosive velocity to the flowing water. Integrated and holistic development in the watershed area can not be possible unless treatments of forest areas are properly addressed with suitable vegetative and mechanical measures. The scientific development of watershed recommends a ridge to valley development approach which signifies the development of forest areas in the upper reaches first. Unfortunately, in India, involvement of forest sector in the watershed programmes has remained limited. This has been partly due to inherent difficulty in convergence of the two concerned departments; and partly due to incompatibility between guidelines of the two programmes (i.e. watershed development programme and forest development programme). The major differences in the guideline are with respect to institutional setup at village level as well as type of biomass to be developed on the forest land.

3.8.4.5 Under the watershed programme, the institutional setup at community level (i.e. WA / WC) is far more autonomous (as it is registered under society act) as compared to the institutional setup under forest development programme (which consists of Joint Forest Management Committee to be registered with forest department and thus having a member from forest department as its secretary). Likewise choice of plant species is made completely by the community under the watershed programme whereas the above choice is usually restricted to those species which are approved in the working plan of forest department (which usually includes high value timber trees with long gestation period whereas community's preference is usually towards non-timber forest produce besides grass and fodder).

3.8.4.6 It is therefore crucial to improve upon these aspects in the future guidelines if development is to be carried out in forest land within the watershed area. It is also crucial to sort out matters pertaining to usufruct right over the produce from forest land. The latest approach of Community Forest Management (CFM) in place of Joint Forest Management (JFM), already being adopted in Andhra Pradesh, may be considered at least on pilot basis in the watershed areas. Key features of the above CFM approach are as follows:

- Increasing the representation of women members up to 50% in the executive committee meeting with a preference to consider the women member as chairperson of the JFM committee.
- Opening of two bank accounts at the JFM committee level in such a way that the first account will be operated jointly by the representative of the community and as well as forest department. This account may handle the developmental fund released by the forest department for improving the biomass in the

identified area. The second account may be operated only by representatives of the community. This may have earnings emanating through sale of annual produce as well as final harvest of the three components. The amount earned through final harvest of three components may be divided in to two equal portions. The half of the amount may be shared among the concerned user groups where as the remaining half may be retained in the bank account for further development of biomass in the above land.

3.8.4.7 Synergy and congruence have not been adequately thought over among the various ongoing programmes and several of the new initiatives of the Government, such as “Bharat Nirman, National Rural Employment Guarantee Scheme (NREGS), National Horticulture Mission, National Rainfed Area Authority, National Fisheries Development Board, Plant Variety Protection and Farmers’ Right Authority and National Biodiversity Board.

### **3.8.5 Inclusiveness**

3.8.5.1 The issue of equity poses one of the most difficult challenges in implementation of watershed projects. Most of the problems pertaining to equity in watershed projects thus emanate due to the concerns for balancing (a) private-social benefits; (b) short term and long term gains; and (c) scientific (i.e. ‘ridge to valley’ and integrated) approach vs. crop-productivity centric approach to resource management.

3.8.5.2 It may be noted here that the issue of equity, for the purpose of this report, would refer to distribution of private economic benefits among households within the village. Similarly, we may refer to equity issue in relative terms, rather than focusing on exclusion of small and marginal farmers per se. This kind of exclusion is not realistic in a situation where substantially large proportions (about 80 %) of operational holdings are small and marginal.

3.8.5.3 Whereas watershed development aims at developing the entire set of natural resources viz.; land, water, vegetation, within the boundary, the treatment is often incomplete and/or asymmetric. This may impinge on fully realizing the potential of benefits from the project. At the same time, the project involves choices in terms of sequence, intensity, and nature of treatments being carried out, and supplementary agronomic practices being promoted both for private as well as public land within the watershed. This obviously, has significant bearing on the size and distribution of private benefits resulting from the project intervention.

3.8.5.4 Together these factors lead to less than potential flow of benefits on the one hand, and at times, inequitable sharing of benefits among the different categories of stake holders landed with access to irrigation; landed without irrigation; and landless. Within each of the three categories, there is a problem of inequitable distribution depending on the location of the land and also on the socio-political space of the household essential for influencing the technology choice as well as mechanisms for benefit sharing among the stakeholders.

3.8.5.5 Given the fact that a large proportion of watershed projects are being implemented in low dry land regions with low and uncertain rainfall conditions, the issue of equity arises mainly from the water centric approach of treatments in watershed projects. Obviously, the direct and tangible benefits of such structures would remain limited to a few farmers owning plots in the proximity. The other major



intervention, covering almost all farmers within the village (micro watershed) is field bunding and land leveling. The problem with the former is that the benefits in terms of productivity is often small and having a long gestation period, whereas for the later, the treatment is either not required or, is not undertaken due to high cost and/or adverse environmental implication. The result is that only a few farmers would actually benefit from land leveling through watershed projects; in most cases these may be relatively better off farmers, having been able to bear the cost of financial contribution.

3.8.5.6 On the other hand, common property land resources (CPLRs) both revenue waste land and forest within watershed area are rarely treated owing to legal complexity. In fewer cases where CPLRs have been treated, the actual benefits are often negligible due to lack of protection. The same holds true in the case of provision for drinking water, which otherwise would have helped women. The larger reality therefore is exclusion of land less and at times, voiceless as in the case of women, whose interests are often overlooked at the stage of designing as well as implementing the intervention. Hence, more than complete exclusion of small and marginal farmers, the issue is of limited and selective benefits from the project.

3.8.5.7 The evidence from a large number of studies clearly suggest that the economic benefits are not only limited in terms of coverage of beneficiaries, but also heavily influenced by the decision making processes at various stages of implementation. It is in this context, participatory institutions have special significance. It is therefore, imperative that the design of the watershed treatment should take on board equity and sustainability aspects while Planning for productivity enhancement. To the extent equity is constrained by the structural aspects like geo-hydrological and property rights regime, the onus is on ensuring that the expected benefits are actually realized and later on shared equitably. This is the crux of the participatory processes of watershed development.

### **3.8.6 Investment and monitoring**

3.8.6.1 The available budget has been sufficient to treat only 60-70 percent of the watershed area with appropriate land and water development measures. Besides this no specific financial provision has been made for development of livelihoods / rainfed farming systems in majority of watersheds. Adoption of prototype approach and rigidity in fund allocation, flow and use are major bottlenecks in capturing new opportunities. There is also a need to raise the unit cost of treatment at least by adjusting for the inflation since the mid-nineties.

3.8.6.2 The watershed and other NRM programmes lack concurrent monitoring, evaluation and social, economic and physical auditing mechanisms, thus jeopardizing objectivity, accountability and transparency. Due to the operational multiplicity and lack of coordination, national level up-to-date integrated picture of the input-outcome balance is not available, emphasizing the need for a National Level Portal of all NRM and farming system programmes in rainfed areas.

## **Chapter IV**

# **FARMING SYSTEM BASED NATURAL RESOURCE MANAGEMENT IN RAINFED AREAS: TOWARDS THE SECOND GREEN REVOLUTION**

### **4.1 Sustained Livelihood Security Must be the Thrust in Rainfed Areas**

4.1.1 Rainfed areas are subjected to high levels of vulnerability, exacerbated by the climatic change. The little surpluses of farmers generated in good rainfall years or by migration incomes are eaten up by the crop and asset losses due to droughts or gaps in the rainfall resulting in very poor capital formation. Vulnerability of farmers has further increased by the recent trends in farming systems viz., decelerating TFP growth rates, high and growing input costs, high debt burden, tendency towards mono-cropping, decreasing buffering capacity of the degrading soils, fast receding water tables and volatility of product markets. The type of production systems and technologies extended into the rainfed areas has substantial impact on the livelihood security of people. Farmers' suicides in these regions are an indicator of the deeper malaise. The livelihood security and stability of the people therefore, needs to be at the centre stage of Planning for NRM in rainfed areas.

4.1.2 Limits to further expansion of surface and groundwater irrigations through big dams and tube wells are being reached and irrigated agriculture is hitting a plateau especially in the western-southern regions; north-eastern regions still have substantial amount of untapped ground water resources, which also requires appropriate policy support for ensuring sustainable development in these high potential-high poverty areas. On the other hand, rainfed areas - 85 m ha of the 142 m ha net cultivated area, accounting for 60 per cent of the cultivated area, have suffered neglect in the past. But, it is these areas which have high untapped yield and income potential. It is in this context that our Hon'ble Prime Minister has observed that rainfed areas, housing majority of our rural poor and marginal farmers, should be our highest development priority and the Second Green Revolution must stem from these areas, while we continue to strive to sustain and further augment the gains made in the irrigated areas.

4.1.3 A large percentage of the people in the country eke out their living from the fragile natural resources in the rainfed areas. As the on-farm and off farm rural employment opportunities have shrunk and growth in the larger economy could not absorb them, they continue to survive on the already stressed ecosystems. Livelihood security, nature of the production system and pattern of natural resource use are interlinked and cannot be seen in isolation. This integral view of natural resources management should be the basis for revival and sustained development of rainfed areas. It must be emphasized that without proper incentives and support systems for an appropriate and regenerative production system sustainable natural resource management in rainfed areas cannot be achieved; ensuring livelihood stability is also fundamental to NRM.

## **4.2 Farming System Approach for Synergising Conservation and Development**

4.2.1 Conventionally watershed development is taken as synonymous with development of rainfed areas, which has also become the 'corner stone of rural development'. Watershed development in practice has become a project-mode of 'treatment' of natural resources on an area basis. Various studies on the decade long experience of this participatory approach brought out the central preoccupation of watershed programme with soil and water conservation. Though the impact is substantive in terms of resource conservation, a very marginal impact is seen on production systems, it has fallen short of correcting the major unsustainable trends in natural resource use and livelihoods.

4.2.2 Land care through location-specific effective farming system must form the basis for sustained management of natural resources. Soil conservation, amelioration of problem soils and soil health improvement are the three fundamental building blocks for reviving rainfed lands. Experience has shown that soil conservation, though the necessary first step by itself did not lead to improving soil productivity and increased microbial activity. Absence of large scale adoption of measures to increase soil organic matter such as green manuring, biomass production, composting etc., are some of the missing links in the watershed programme.

4.2.3 Though soil moisture regimes have increased marginally with soil conservation, soils could not buffer the loss of moisture and nutrients owing to the overall low levels of soil organic matter. In effect, crops continued to suffer from the periodical droughts and prolonged gaps in rainfall events.

4.2.4 Water harvesting taken up on a wider scale did not solve the water problems. Ground water recharge gave a spurt to competitive digging of bore wells resulting into expansion of area under rice. Drinking water crisis both for human and livestock still is a major problem even in some of the completed watershed programme areas. Inequity in accessing recharged ground water is another major issue. Water harvested / recharged only created islands of 'irrigated areas' rather than stabilizing rainfed crops. Farmers who could mobilize investments for digging bore wells or who already have bore wells benefited, leaving others aside.

4.2.5 Inadequate efforts in organizing communities, lack of systems of maintenance and absence of protection of plantations have resulted in poor maintenance of infrastructure and assets creation. Inadequate efforts in institution building/strengthening, lack of human and system capacities in this regard and excessive emphasis on hard-ware targets are some of the root causes of weaker institutions.

4.2.6 In the absence of substantive emphasis on increasing biomass, weak efforts in protection mechanisms and unclear user rights, regeneration of biomass has fallen short of expectations. Consequently, the visible impact on livestock and related livelihoods of poor remain poor. The farming system approach, which seeks integration and synergy among resources, could not receive the desired support and incentives.

### **4.3 Meeting Different Technology and Socio-Economic Needs of Rainfed Areas**

4.3.1 The one-time project based treatment approach under watersheds is doomed to unsustainability. The watershed plus approach has not been fully implemented. The programmes/ subsidies supporting agriculture are not differentiated to suit the requirements of rainfed farming. Support in terms of fertilizer subsidies, price support, procurement, irrigation and power are not generally accessed by rainfed farmers at large, resulting into skewed national investments across the irrigated and rainfed areas. The historical neglect and absence of appropriate support systems have created a high degree of indifference on the part of farmers towards rainfed agriculture. Private investment and care for natural resources thus have suffered. Natural resources degradation cannot be arrested if the farmers are apathetic to use the land resources appropriately.

4.3.2 Extension of the support systems designed for irrigated agriculture to rainfed areas is also resulting in adoption of untenable farming practices, thus further degrading the already fragile areas with little buffers to cope up with adversities as borne by the following trends:

- High incidence of debt and resultant farmer suicides is often attributed to high cost of inputs in terms of seeds, pesticides and fertilizer, which are often spurious. The use efficiency of fertilizer inputs is also poor due to low soil organic matter.
- Intensive irrigated horticulture is being expanded to the rainfed areas, which has increased the demand for secured irrigation on an extended area; this trend may precipitate a larger crisis in the event of prolonged droughts.
- Increasing mono-crops and declining farming systems diversity are increasing vulnerability to diseases and pests and to rainfall and price fluctuations.
- Protective irrigation systems though being talked about since long have never seen light in rainfed areas.
- Large scale promotion of non-browsable tree plantations in the commons and grazing areas impacts the livestock economy adversely.
- Intensive milk-based dairy enterprises taking roots in the rainfed areas on a large scale also need a closer re-look.

### **4.4 Policy Actions**

4.4.1 The assumption of convergence of various departmental programmes with watershed development has not materialized, partly owing to the overall scarcity of investments. A well conceived policy support and a well structured incentive and support system for promoting rainfed farming systems is much needed to convert the project-based onetime investment in watershed development into productivity and livelihood benefits, rendering watershed development programmes as true entry point initiatives. The following shifts in policy direction are much needed:

#### **4.4.2 Soil health and biomass**

4.4.2.1 Healthy soils are the foundation of rainfed agriculture. Growing trend in mining of soil nutrients need to be reversed. Balanced fertilizer use, though much

needed, would not counter soil fatigue in itself. Improving the soil organic matter and enhancing microbial activity in the soil would restore the soils. Increasing labour and transportation costs are the main reasons for many of the green manure, composting and other options used for improving soil health to become unviable. Application of adequate quantities of organic manures would help in overcoming the micro-nutrient deficiencies and would also help in improving the fertilizer use efficiencies. In addition they create a nutrient pool in the soils to buffer any adverse situations including prolonged drought spells.

4.4.2.2 Provision of fixed labour days per acre annually for soil health improvement would bring many of the alternative sustainable options back into the farming systems. Ways to dovetail such requirements into the National Rural Employment Guarantee Scheme needs to be worked out. Similarly, biomass intensification programmes can also be dovetailed into NREGS on a project mode. Programmes promoting Rainfed Farming Systems should have a built in component of improving soil organic matter. The current efforts at promoting vermi-culture have a very narrow focus and limited scope. Composting methods with high biomass-to-dung ratio should be targeted to overcome the limitation of availability of dung. A regular subsidised transport (preferably through bullock carts) for manures to the distant rainfed lands should be provided. There is scope for integrating this service with NREGS. In the absence of such a facility, there is reluctance to apply manures in rainfed lands.

4.4.2.3 Provision of a power operated biomass-shredder as a common utility at the village level would help in cutting the biomass for faster decomposition in manure pits. Such a facility would also increase the fodder supply many fold by reducing wastage and chaffing the hard stumps. Research is needed on more user-friendly, low weight and transportable models of biomass-shredders.

4.4.2.4 Biomass production is the essential link between livestock and livelihoods. Biomass intensification should be at the core of watershed programme. The following are the policy requirements:

- Plantations in rainfed areas – in the forest land or in commons should be livestock oriented. Mono-plantations of non-browsable tree plantations would cause enormous damage to the rainfed production systems.
- Local mechanisms for vesting user rights to communities to manage and use common lands & streamlining procedures. Excellent examples are established by Foundation for Ecological Security across the country in this regard.
- Intensification of multi-purpose biomass in various places like stream banks, road sides, field bunds etc., should be promoted in addition to block plantations in common and private lands.
- Intensification of biomass used by small ruminants should also be prioritized.
- Support for watch and ward and initial watering be ensured till the biomass is properly established as lack of such provisions had resulted in poor survival in watersheds.

4.4.2.5 Millets, oilseeds and pulses based cropping systems are predominant in rainfed areas. From inter/ mixed cropping systems, these crop systems are now tending towards mono-cropping. Further, many of the crops which have greater potential and are highly drought tolerant, like small millets, are losing area at an alarming rate. There

is also declining research support for minor rainfed oil seeds like safflower, linseed, niger etc. Seed banks of rainfed crops should be established in rainfed villages. Coarse grains should constitute part of food reserves, food banks and Public Distribution System and should receive suitable Minimum Support Price (MSP).

#### 4.4.3 Labour allocation can be a driver for change

4.4.3.1 Many traditional sustainable practices in soil health management have become out of practice as the labour costs increased. There is a trade off between subsidies for chemical inputs and labour inputs. Green revolution technologies chose the former, but these technologies 'have run their course'. Labour based support systems would be the necessary corrective measures and provide stimulus to the rainfed agriculture economy.

**Table 5: Extent of loss in subsidies provided to chemical fertilizers**

Particulars	Units	Quantity	Usage*	Wastage
			49%*	51%
Total N consumption	Thousand tons	15603	7645	7957
Total N Subsidy	Rs. in crore	11054	5416	5637
Subsidy on per kg N (approx)	Rs. / kg N	8.5 to 9.5		
Subsidy on per kg N+P+K	Rs. Per kg	8.42		
Data source: Economic Survey, 2005-06, Values for the year 2005-06 (budget estimate up to Nov 2005) *Reference: Ghosh S.K.(1994) <sup>1</sup> , 24 per cent of the total N is used by the plant and the rest contributes to nitrate pollution				

<sup>1</sup>Ghosh S.K (1994), 'Impact of land and water resource degradation on agriculture production' in Deb DL (Ed), Natural resources management for sustainable agriculture and environment, Angor Publishers, New Delhi

4.4.3.2 The subsidy on nitrogen is Rs.9.63 per kg N. Assuming that 49 per cent of the N is used by the plants and the rest of the nitrogen is leached into the soil, the loss would be of the order of 7957 thousand tons annually. Interestingly Rs.5,637 crore (of the total Rs. 11,054 crore total subsidies on N) of annual subsidies to N, mostly in the form of urea, is lost and contributes to nitrate pollution in ground water; an amount more than the total annual investments on the entire watershed programme in the country. By extending the same amount of subsidy for composting and other methods of building soil organic matter, soil health can be substantially restored. The use efficiency of the external inputs would be increased if soil has adequate organic matter.

4.4.3.3 Similarly, the Working Group on NRM for the X Five Year Plan had estimated the annual saving of diesel due to draught animals at approximately 23.75 m tons. With a small percentage of such savings ploughed back into maintaining draught animals as subsidy, the negative trend of faster decline in bullocks can be reversed, with much savings on the oil front. Pest management, soil health, biomass regeneration, livestock productivity and other serious areas of concern can be effectively addressed through labour support and promoting sustainable agriculture practices on a wider scale.

4.4.3.4 The National Rural Employment Guarantee Act provides a unique opportunity in this regard. Extending labour subsidies for sustainable practices in Rainfed Farming also serves the cause of guaranteeing employment as it opens up a wide array of

productive work opportunities for people who are desperately in need of employment but cannot do manual earthwork.

#### **4.4.4 Livelihood Forestry in rainfed areas**

4.4.4.1 Isolated patches of forest land under ownership of the forest department within the villages / watersheds needs special dispensation. Owing to smaller size, high human and livestock pressure, they are highly degraded and are not brought under any management regime. Regenerating these lands with people's participation for providing biomass for livestock and livelihoods should be the core purpose of managing these forest areas. The present provisions under various watershed guidelines did not help in solving the vexed issue of treatment of degraded land under the forest department control. The National Rainfed Areas Authority should find ways to solve this problem with the core objective of biomass regeneration in degraded lands under the control of the forest department to support livestock and livelihoods of local people; such a new paradigm can be called 'Livelihood Forestry'.

#### **4.4.5 Cost reduction through low external inputs**

4.4.5.1 Escalation of external input costs in seeds, chemical fertilizers and pesticides have increased vulnerability of the rainfed systems. Larger experience is now available across the country on integrated approaches to pest management and low-external input technologies. Knowledge based extension of such measures and their large-scale promotion such as System Rice Intensification (SRI), would help reduce the input costs without undermining productivity. In addition to reducing debt burden, such measures would free farmers from the clutches of *shahukars*, release their produce from credit-interlocked markets, increase alternate employment opportunities and restore the agro-ecology. In spite of their advantages and larger scale demonstration across the country, there is little promotional support available for the alternative approaches which must be duly addressed to in the XI Plan. Community based knowledge extension systems and local enterprises should be mustered to promote low risk but high yielding agricultural systems. Adequate investments are also needed for supportive research. SRI should become a national movement with appropriate financial, human resources and policy support.

#### **4.4.6 Harnessing promise of high rainfall regions**

4.4.6.1 The relatively higher rainfall rainfed regions in the central and eastern India are now poised for a high agricultural growth. Substantial increase in productivity is possible in these regions without adversely affecting the agro-ecosystem. These areas are rich in biomass, water resources, ground water in particular, good soils and high labor supply. Many of the rivers originate from these regions and much of biodiversity is also located in these areas. Paradoxically, poverty is also concentrated in these high potential areas. Banking on the extension of green revolution technologies to stimulate growth in these regions will be inappropriate in the short and long term for natural resources and sustained growth. It is important that agriculture growth in these regions is built on an alternative paradigm rather than an exploitative one. We must learn from our past mistakes. In this context, the following will prove useful:

- Watershed programmes with biomass as a focal area can lay a solid foundation for an inclusive agricultural growth.

- Careful intensification of low-external input technologies, knowledge based extension, community managed seed systems, extensive critical irrigation support rather than intensive irrigation, livestock integrated farms, diversified farming systems and market access can provide a basis for sustained growth. Such a technology paradigm would expand the scope of inclusiveness in the process of agriculture growth.
- Emerging methods of rice cultivation like the System Rice Intensification (SRI) would unleash the potential of rice based farming systems without resorting to high chemical and water inputs.
- Stabilization/ protection of the present crop-systems from vagaries of rainfall distribution should be the first step in the process of an inclusive agriculture growth. Stabilization of the present farming systems would facilitate larger private investments to flow into farming.
- Access to energy is the critical constraint in these regions. Renewable energy systems based on biomass and large-scale support for water distribution will hold the key to protective irrigation in these areas.

#### **4.4.7 Horticulture led transformation**

4.4.7.1 Horticulture can play a pivotal role in transforming rainfed areas. There is a need to discourage rapid expansion of extensive irrigated horticulture into rainfed areas having serious water deficits; as, it is increasing the total demand for water several fold and increasing vulnerability. Horticulture investments, particularly under National Horticulture Mission need to be selective and area specific. Selection criteria of the Mission need to be revisited.

- The Mission should have a special component to promote dry land horticulture both in terms of fruit trees integrated into the farms/ households and block plantations.
- Augmentation of fruit production from the commons through intensive plantations would be useful for increasing nutrition and also allowing landless to collect and trade fruits. Allocation of user rights should precede such investments.
- Fruits from commons like tamarind, mango, ber, custard apple, aonla etc., provide significant wage incomes to people at the margin. NHM in rainfed areas should have a thrust on increasing gross fruit production from all lands in the village rather than mere increase in area under horticulture.
- Protective irrigation support till the rainfed horticulture systems are established is a prerequisite for effective establishment.

#### **4.4.8 Maximum income per drop of water**

4.4.8.1 A well defined water policy for rainfed areas with a thrust on protective / critical irrigation is much needed. Such a shift would secure large areas of rainfed crops from undue dry spells during sowing and other critical stages of crop growth. This would stabilize the yields of rainfed crops and thus, provide scope for attracting more private investments. Stable crop yields also secure livelihoods. Policy support is needed in terms of:



- Creating water distribution infrastructure to cover larger areas of rainfed lands within a village
- Water sources are primarily groundwater related in areas with less than 750 mm rainfall. A policy directive is needed to provide incentives to farmers owning groundwater sources to share water with other rainfed farmers to provide protective irrigation during Kharif season.
- Where new water bodies are created, it may be useful to package them with a community well/ bore well exclusively meant for supplying critical irrigation in Kharif to rainfed farms.
- Assured drinking water supply (through groundwater sources) for livestock as a common public utility needs to be ensured for the growth of livestock production.
- Pooling /leasing of bore wells or taking over rights on bore wells (at least for Kharif season) may be possible if packaged with right incentives.
- In areas with relatively higher rainfall, even surface irrigation bodies may provide such life saving irrigation.
- In both the cases energy supply needs to be ensured. Subsidised energy or renewable energy systems may also be used as an incentive for water sharing and social regulation.
- Farm level water harvesting should be made an integral part of the water policy for rainfed areas.
- The crop systems under tanks and other minor irrigation structures need to be revisited. Thousands of acres of well endowed agriculture lands under tank irrigation systems are left fallow in anticipation of rains for tanks to fill up. Strategies to use harvested water across seasons for critical irrigation support rather than one-crop of paddy will enhance the overall water productivity.

#### **4.4.9 Livestock for livelihood security**

4.4.9.1 Livestock is the lifeline of rainfed areas. The present support systems are all meant for water intensive milk based livestock systems. The evidence of negative externalities of such systems is growing. The contours of a livestock policy for rainfed areas need to be defined to have a more productive and secure livestock systems, as suggested below:

- Agriculture embedded livestock systems have a strategic advantage and have multiple-benefits.
- Extensive mono-cropping of the commercial (non-fodder yielding) crops is taking deeper roots in rainfed areas. Strategies to integrate fodder yielding food crops needs to be evolved. Dedicating the first five rows in the land for fodder crops is one such effort.
- Inter-cropping systems are going out of practice with increasing uncertainty in the early rainfall situations. Ensuring protective irrigation at this stage may bring back the inter-cropping systems. There is also a case for special incentives to promote inter-crops. Unfortunately not much location specific research is available in this regard.

- The situation of draught animals being replaced by tractors is a serious concern. The NRM working-group for the X Five Year Plan estimated about 23.75 m tons saving in diesel with the draught animal power available at that time. Replacement of this draught power would lead to substantial energy costs in terms of subsidies. This energy subsidy burden can still be overcome if maintenance of draught animals can be partially subsidised. This should be an integral strategy in the revival of rainfed farming. Timely availability of plough bullocks or tractor is a serious constraint for the small and marginal farmers and many a times they miss timely sowing resulting in low productivity.
- Rapid decline in the population of indigenous cows is creating a shortage of bullocks for agriculture and transport purposes. The indigenous systems of soils/ area specific preferences in bullock breeds need to be properly mapped and the traditional well entrenched supply systems need to be protected and strengthened.
- Effective ways of providing credit support for bullocks are needed. In several parts of the country, there has been an informal ban on finance for bullocks as farmers tend to sell them after the agriculture season, considering the difficulties in maintaining them during the off-season. Continuous employment for bullocks (ploughing, carting etc.) is also needed for it to provide livelihoods to some households.
- Sheep and goats are the most drought-proof livelihoods with assured and growing market. They also generate investment surpluses for the poor. Biomass intensification specially targeting the small ruminants should receive highest priority; much of the shrub/ tree-biomass for goats and sheep can be enhanced easily with little effort/ resources.
- Livestock health care is one of the most crucial missing links. Adequate investments should be made on community-managed livestock health care systems with strong linkages with animal husbandry departments. It is necessary as the reach of the formal healthcare systems in rainfed areas is very poor. Watershed programme provides the unique opportunity to establish such systems as it makes the social capital available. It calls for investments to organize and capacitate this system.
- Systematic effort in replacing livestock feed and fodder with rainfed crops'- produce would provide a basis for the paradigm of 'Rainfed Livestock Systems'. This would in turn create demand for millets.
- Backyard poultry has the potential to compete with the industrial poultry provided the support systems such as regular supply of chicks, health care and market operations like bulking, transport, etc., are established. Reduced cost of supplementary chicken feed if integrated into the farming systems along with natural foraging would provide a competitive edge for the back-yard poultry segment in the chicken and egg market. These systems if in place would help in exploiting potential of the new breeds evolved for backyard poultry for livelihoods of poor.

#### **4.4.10 Ensure basic infrastructure**

4.4.10.1 Agriculture infrastructure such as water bodies, soil conservation structures, Plantations, access roads, storage structures etc., is very poorly established and

whatever existing is in serious disrepair. Many of the villages/ farmers lack in even the basic amenities like threshing floors.

- Appropriate institutional mechanisms backed up by adequate funding should be established for continuous maintenance of the infrastructure. Establishing a practice of Annual NRM Infrastructure Maintenance Plans within the Gram Panchayat holds good promise. These Plans can be funded through convergence of programmes.
- Agriculture processing infrastructures are very poor and are often at distant market places forcing farmers to sell raw produce. Value addition opportunities are also externalized. With the growth in SHG movement across the country, options for collective marketing and value addition are opening up. This unique opportunity should be harnessed by dovetailing required processing infrastructure and technologies. A special area based Planning exercise for mapping the requirements of processing/ value adding infrastructure need to be taken up; this may be followed up by a national programme to fill-up the processing/ value adding infrastructure gaps. Scale of operation and appropriate level of decentralization of the infrastructure is a crucial requirement. The infrastructure should include common storage places for seeds and other agriculture inputs and agriculture produce within the village and at the bulking points.

#### **4.4.11 Seed security**

4.4.11.1 The seed systems in rainfed areas need a re-look to ensure seed security.

- Loss of seed material is common due to prolonged dry spells immediately after sowing. The changing climatic conditions would further aggravate the situation. Maintaining seed-buffers therefore, is important.
- Seed material should not unduly increase the total cost of cultivation. High cost seeds reinforce the tie up of credit and product markets and increase the debt burden of the farmers. It is important that farmers have full control over the seed material.
- Contingency crop plans (for drought situations) are not practiced because of acute scarcity of seeds of different crops. Varietal differences suited to rainfall situations and soils are also more pronounced in dry land farming. It is important to document such location specific requirements and to make the seed material available. Fodder seeds are also always a scarce resource. Diverse range of seed material needs to be maintained within the village.
- Community level seed banks with buffer stocks of seed material of diverse crops appropriate for the village/ area need to be maintained. These seed banks should be considered as a necessary common infrastructure for rainfed farms supported by the government on a regular basis. Seed banks should be controlled and maintained by organized farmer groups. Proper tie-up of the seed banks with seed farmers needs to be established. Over time, these seed centers may become autonomous and self-dependent.

#### **4.4.12 Credit flow and other financial instruments**

4.4.12.1 Credit flow to rainfed farmers is more pronounced by its absence. The debt traps with cyclical drought spells are well known. SHG movement has shown some

promise and a way out. Dovetailing farm based micro-credit Plans on the group platforms (SHG-men or women) and linkages with banks would be an important initiative. Provision of 3 to 5 years rotational credit at cheaper rates of interest with built-in provision for credit insurance needs consideration.

4.4.12.2 Credit should also be extended to sustainable agriculture technologies. As many of these practices are not formally recommended by the agriculture universities / departments, credit support is not available except for export oriented organic farming. Innovative ways of extending support to cushion the risks in rainfed farming need to be evolved. Community managed insurance or risk funds with reinsurance mechanisms by companies may be one emerging option.

#### **4.4.13 Decentralized food security through rainfed food crops**

4.4.13.1 Nutritional security in rainfed areas is seriously threatened with the changes in the consumption patterns. Distribution of rice and wheat under Public Distribution Systems lead to shift away from consumption of millets and other local food products. The drought-adapted millet based and other rainfed cropping systems have suffered in the process. With the absence of required price support systems, the area under coarse cereals has declined substantially. In spite of such a serious set back, the annual yield growth rates of coarse cereals are much higher than those of rice and wheat.

4.4.13.2 In fact, the annual growth rate in yield of coarse cereals (1985 to 2005) has been the highest in comparison to all other agriculture crops (cereals, rice, wheat, pulses, oilseeds, cotton and sugarcane). Support to the coarse cereals, termed as 'nutritional grains', would further strengthen the rainfed farming systems. There is a larger consensus on the promotion of millets. Policy support and actions are required in the form of price support and procurement of millets, large scale publicity in the nutritional value of these grains, including these grains in the schemes like mid-day meals and large scale distribution through the Public Distribution System. Creation of demand for coarse cereals is a major task at hand for reviving rainfed systems.

4.4.13.3 The on-going "Mission" on rainfed crops has not been effective. It is recommended that a 'Mission Coarse Grains' should be launched in the XI Plan with a specific agenda of operationalising price support and procurement of coarse cereals, integrating them with the Public Distribution System (PDS) and other schemes, establishing processing facilities and ensuring supportive research and technology transfer. This will improve not only household food security and farmers' income, but also conservation of natural resources - a win-win situation.

#### **4.4.14 Knowledge empowerment**

4.4.14.1 The extension system, in general, has drastically weakened. On the other hand, the knowledge transfer system on natural resource management, both logistically and content wise, is highly complex, especially in rainfed areas. An effective rural knowledge society and ICT system involving various stakeholders – farmers, development agents and agencies, knowledge generators and distributors (universities and public and private institutions) should be established for steering a knowledge-based NRM. Village Knowledge Centres (*Gyan Chaupals*) with extensive rural connectivity, including use of cell phones, should be established in each Gram Panchayat for bridging the information and knowledge gaps and thus empowering the farmers by latest knowledge on NRM, diagnostics and input and natural resources use .

## Chapter V

# INCLUSIVE AND SUSTAINABLE DEVELOPMENT: HUMANISING NATURAL RESOURCE MANAGEMENT

### 5.1 Towards Inclusiveness

5.1.1 In the past, conscious efforts have generally not been made to promote equity in watershed based NRM programmes. Increasing the access to land, water, bio-resources and forest on part of the landless, marginal and resource poor farmers, including common property resources rights, will provide the base for bridging the widening gap between the haves and have nots. It will also help in participatory conservation of the natural resources, particularly considering that poverty is the greatest destroyer of the resources. In this context, implementation of the Tribal Bill will be an important step.

5.1.2 Notwithstanding the various constraints, including structural ones, in attaining equity in watershed projects, experiences from some of the better implemented projects do indicate successful examples of innovation by different agencies. These innovations, in fact, set the stage for evolving a process of institution building, which could address the issues of conflicting interests among various stakeholders within the community.

5.1.3 Watershed development results in enhancement of ecosystem resources and productive potential. Moreover, this enhancement takes place generally on the basis of public funds and through collective community effort. Thus it can be argued that the additional resource that has been created should be assured equitably to everyone in the watershed, even as prior right to previously existing resources are recognized and left largely undisturbed. Thus, without greatly disturbing prior rights and use, potential access to productive resources on part of rural poor could be created by watershed development and thereby providing equitable access within a positive sum game framework.

5.1.4 Similarly, the biomass produced as part of the watershed development programmes, especially from those areas which are not suitable for usual crops but can be used for bulk biomass production like small dimension timber, bamboo, fiber, medicinal Plants, etc., could be made available to the resource poor on certain favourable terms so that the resource poor could take up value addition activities.

5.1.5 The suggestions made above may necessitate certain policy actions, especially at the macro level planning as well as at initial stages of project implementation. Following aspects may deserve special attention while firming up the policy actions.

- Increased emphasis on tribal dominated forest-based economies with high incidence of poverty and at the same time, better potential for economic benefits due to relatively favorable rainfall and soil conditions, and large proportion of households operating marginal lands. The allocation of fund under employment guarantee programmes may be utilized for this purpose.
- Dovetailing NREGA with watershed development should ensure systematic treatment rather than haphazard activities pertaining to land and water resources in the region. The NREGA-WDP Convergence Act in Madhya Pradesh should be assessed, suitably modified and adopted by other States. Skill development

as well as opening avenues for employment of skilled people through the NREGS should also be emphasized.

- Resolving legal complications in treating CPLRs, both under revenue and forest departments, and also for accessing benefits from regeneration of such land in a sustainable manner.
- Introducing special package for the communities who received land under distribution of surplus land. Since the land distributed under the scheme is highly degraded, development of such land may deserve special support under watershed projects.
- The wastelands and degraded lands, which are either unutilized or under utilized, should be brought under productive uses by development and distribution of such lands to landless for productive uses for their economic upliftment or some community plantations may be tried. Bio-energy production on waste and degraded lands is a distinct proportion both economically and deserves priority attention.
- Treatment and protection of CPLRs, provision of drinking water, and water rights to all households should be considered as necessary precondition for initiating watershed treatments. The prescribed checklist of activities to be carried out during the first phase of project implementation by the Parthasarathy Committee Report may be considered essential in this context.
- Ensuring water rights to all by distributing harvested water under the project.
- Treatments like land leveling, farm ponds, and farm forestry wherever feasible, may be undertaken irrespective of the poor farmers' ability to pay for the cost-contribution. These farmers should be cross subsidised by those who receive direct benefit from water harvesting structures.
- Ban on deepening of well and incentive for adoption of water saving devices/crops should be introduced. At the same time encourage bore well scheme on group-basis. This may be of special significance to tribal areas as demonstrated in South Gujarat by NGO.
- Special support should be given for adoption of sustainable agricultural practices that are knowledge intensive rather than input intensive, particularly among small and marginal farmers. Promotion of biomass production-based enterprises should be supported.
- SHGs consisting of landless households or women's group may be provided with additional seed money from the WDF. This, once again, should be based on recognizing poor's stake on land (especially CPLRs) and water (incremental water harvested through the project). The Report of the Parthasarathy Committee clearly recognized that by merely forming SHGs of poor/landless communities nothing much is going to be achieved, especially on a sustainable basis. What is therefore crucial is building adequate backward-forward linkages and up-scaling of marketing operations through multi-level federations. Watershed project has to extend this support by making adequate provision for seed capital. The SHGs should be elevated to become livelihood groups and bank should their leading policies accordingly.
- Provision of fodder bank in order to ensure smooth supply of fodder during the initial phase when CPLR is under protection. Special emphasis is needed on

livestock development especially among landless and small and marginal farmers. This essentially should be an integral part of, rather than an add-on to, watershed development.

- Availability of survival or life-saving irrigation for crops on community lands should be treated as priority.
- Outcome-planning, followed by participatory monitoring and sharing of information in public domain may help improve equity outcomes. It is essential that the outcome parameters are identified locally to suit the context specific situations.
- Revival of Gram Sabhas and continued involvement of PIAs should be assured in the post project period for ensuring at least the first round of repair and maintenance. Gram Swaraj Act of Madhya Pradesh may provide a useful model in this context. Essentially, the need is to adapt the administrative structure with at least one common principal of keeping Gram Sabha at the center stage.
- Involvement of Non-Government Organizations (NGOs) should be encouraged, by implementing NREGA on watershed basis. The model adopted by RGMWM in Madhya Pradesh provides a useful example of involving NGOs as Partner NGOs. The innovative practice for engaging para professionals on a contract basis is also worth replicating. Both these may help strengthen equity concerns in implementation of watershed projects especially when the implementing agency is a Government Department.
- Last, but not the least, emphasis should be placed on developing State specific guidelines as demonstrated in the case of Andhra Pradesh and Madhya Pradesh. Gujarat is also likely to move in this direction; the State Government has already passed a resolution that treatment on private land would be restricted to the BPL-families, tribal, and marginal and small farmers.

5.1.6 It may be recognized that while it is difficult to make a complete shift in the approach for planning and implementation of NRM and watershed development projects, special efforts should be made at the State/ District level agencies to ensure critical minimum achievements in terms of the equity oriented features listed above. Suitable data base should be developed on equity indicators and the successful cases and processes of equity promotion should be documented, up-scaled and shared with other NRM programmes within and outside watersheds.

## **5.2 Sustainable Development of Common Property Resources**

5.2.1 Successful results have mostly been obtained with regard to the development of private property resources. This was essentially due to the adoption of indigenous technologies; collection of higher rate of contribution and flexibility in ridge to valley approach so that landowners could participate in the programme at their own pace.

5.2.2 Sustainability of common property resource developed under most projects has however been low. Hence focused efforts need to be made to improve these resources which include (i) physical measures, namely, water harvesting structures and gully control structures, and (ii) biological measures i.e. perennial biomass in common land, etc. Main reasons behind un-sustainability of the above interventions are as follows: (i) lack of formal allocation of user rights to the persons concerned, (ii) lack of proper functioning of user groups identified for this purpose, (iii) lack of proper provision for

repair and maintenance (as well as for watch and ward) of the assets, (iv) lack of adequate efforts in developing stake of actual users (due to inadvertent top-down Planning and low emphasis on users contribution), and (v) less attention towards sustainable utilization of developed resource after implementation phase, etc. However, a few successful experiences on different types of common property resources, as briefly indicated below, have been identified and should be upscaled.

**5.2.3 Development of biomass in common lands:** The following options were found to be promising for sustainable development of biomass in common lands under watershed programme. Hence due attention may be paid to them while designing components of harnessing common property resources:

- High priority to natural regeneration of existing biomass through social fencing at least during the first 2-3 years. This period is meant mainly to stabilize the social fencing system and develop clarity about user rights in favour of resource poor families.
- Investment on plantation of new trees (timber or MFP) only after successful facilitation of social fencing system.
- Formal allocation of user rights in favour of resource poor families.
- Addressing the issue of encroachment of common land through a combined effort involving revenue authorities, experienced NGOs and respectable members of the community before investing the project fund on such lands.

**5.2.4 Construction of community oriented water-harvesting structures:** The following approach may be considered in improving the sustainability of community-oriented water harvesting structures.

- Building the stake of users concerned through (i) adoption of demand driven approach for deciding the location, type and size of structures, (ii) collection of at least a part of the contribution in advance during planning phase (and collection of the remaining contribution during the implementation phase).
- Building upon Indigenous Technical Knowledge (ITK) and promoting a wide range of technological options for harvesting of water resource as per the preference of various users.
- Provision of good technical support in designing and execution of structures.
- Adequate emphasis on structures, which provide drinking water for human beings and livestock.

**5.2.5 Construction of gully control structures:** The conventional approach of constructing a series of gully checks for preventing further bed erosion led to only partial success and that too for a short period. There was no clarity about ownership over, the asset and also mechanism for its repair and maintenance. Best results were however, obtained where the following approach was adopted, which is recommended for wider adoption.

- Construction of those structures which help in reclamation of gully course so that it becomes part of the main field. This is particularly relevant for the courses which are located in private land and also in upper areas where the gully course is in its initial stage.



- Construction of indigenous structures (which are popularly called as soil harvesting structures) with an intention to convert part of the gully bed for cultivation of higher moisture requiring crops (rather than merely preventing the gully bed from further degradation). These structures are to be constructed at a limited number of locations where farmers are keen to cultivate the developed bed with annual crops. Such structures are to be located preferably on boundary lines of the fields of the farmers concerned. These measures are relevant for the gully courses passing through private holdings.
- Allocation of usufruct rights over the drainage course to the farmers from whose fields the course is passing. This may particularly be applicable in cases where the government owns the drainage course, which is passing through the private fields. This approach may serve as an incentive for the farmers concerned to pay the required contribution for construction of such structures. In situations where gully course is passing through common land, user rights (over the asset) may be given to the identified user group members to whom the biomass in the adjoining common land is to be given so that they take interest in developing the gully course into productive asset.

### **5.3 Common Property Resources Rights and their Realization**

5.3.1 A variety of CPRs are created under various WSD Programmes, such as, Water Bodies, Plantations etc. In the absence of appropriate usufruct rights and appropriate withdrawal strategy, the landless poor and less influential farmers are generally devoid of their use.

5.3.2 Regulatory mechanism for developed resources under WSD programmes like; water bodies, plantations etc. has not yet been considered as an integral part of the watershed programmes. As a result, the benefit of resources created under watershed programmes like tapping of ground water by installing tube wells and bore wells etc. goes to the influential members of the watershed community. The post project sustainability strategy, therefore, may look into this aspect of equity so that appropriate regulations for CPRs through social legislation are ensured on a long term basis. This may be done by self imposition by the Watershed Community at large and necessary enabling policy framework may be created in order to achieve the objective.

**5.3.3 Analysis of the issues and formalization of users' rights over CPR:** Since 1995, watershed projects in the country are being managed through participatory approach in which funds for development of natural resources are directly given to the community. Though several of these projects were completed, there is no clarity about user rights over Common Property Resources (CPR) developed under the projects even where users paid genuine contribution towards their development. Hence, formal allocation of user rights is very critical for sustainability of Common Property Resource since it takes several years to get full returns from such resources.

5.3.4 Review of various guidelines of watershed development programmes of Government of India shows that provision for user rights received only a rudimentary mention. While the guidelines lay the responsibilities for management of common resources on User Groups they do not make clear provisions for devolution of rights that these groups should in turn enjoy. This, as discussed above, is a sure route for unsustainable development and ineffective devolution.

5.3.5 However, there are a number of Constitutional and Legislative provisions that enshrine the rights of the local people on natural resources. While all of them are applicable to either specific areas and / or specific people, they demonstrate that the concept of local community management of natural resources is enshrined in the Constitutional and Administrative Laws in India. This includes the Constitutional provisions of the 5th and 6th Schedule and Legislative provisions of Panchayat (Extension to the Scheduled Areas) Act, 1996, Chotanagpur Tenancy Act, 1908, Santhal Pargana Tenancy Act and Van Panchayat Act, 1976.

5.3.6 The following suggestions should help in realizing the rights:

- (i) A set of comprehensive actions may be taken by the government at National and State levels for devolving and decentralizing governance and administration of natural resources (particularly Common Property Resources) to the people.
- (ii) A clear national policy accompanied by a Model Bill on Common Property Resources may be evolved to crystalize the notion of CPR and create a set of clearly identified rights in favour of Local Community. The current legislative efforts in conferring rights in favour of forest-dependent tribal communities (Scheduled Tribes Forest Rights Protection Bill 2005) may serve as an inspiration for such an effort. The Bill may clearly State, in a graded manner, different kinds of rights and entitlements of the community (the three categories of rights, powers and functions as indicated in the following recommendation) and the legal nature of relationship of the State, line departments and Panchayat Raj Institutions over the resources. The essential foundation of the policy and legal frame should be rooted in equity by making the resource-dependent community as the primary stake-holders entrusted with the rights and responsibilities of maintaining, managing and improving the quality of the resources while deriving benefits from them.
- (iii) At the district level, the administrative instrument of MoU may be used for formal allocation of user rights to different stakeholders. For this purpose the user rights may be categorized into the following three types:
  - ❖ **Ownership right:** over the land resource (which need to be retained by the government); and over the assets created on the above land through participatory approach (which could be given to Gram Panchayat);
  - ❖ **Management right:** over the CPR to be given either directly to the UG concerned (if the size of CPR is small and types of benefits belong to only one UG) or to a multiple users association (if the size of CPR is large or where multiple users are associated with each type of CPR); and
  - ❖ **Usufruct rights:** over CPR (to be given to actual UGs who are getting direct benefit and who contributed towards its development).
- (iv) The details regarding collection of user charges and modality of sharing the benefits between different stakeholders may be spelled out in the above MoU in such a way that major benefits out of CPR goes in favour of UGs. Likewise modalities for sustainable utilization and management of resources may be spelled out in such a way that major responsibilities rest with respective user groups and / or management committee of multiple user groups. The 'annual' income from CPR may come mainly through collection of user charges on unit basis (e.g. in case of tank water the user charges could be fixed for a unit area

under irrigation / or a unit hour of water discharge, whereas unit charges for grazing in common land could be worked out separately for each type of livestock, etc). However 'one time' income (e.g. felling of timber trees, etc) may come after completion of a particular cycle.

- (v) Based upon the above approach an initiative has been taken under Sujala Watershed in Karnataka, for providing the users rights to different stakeholders in the proportion of 20:40:40. The 20 per cent share of income (annual or one time income) from CPR is to be given to Gram Panchayat for the benefit of larger community; 40 percent share is to be retained by the management committee of multiple UGs towards repair, maintenance, watch and ward, further development of CPR, etc; and the remaining 40 percent share is to be shared among the eligible UG members. The above proportion may however vary depending upon the type of product under the CPR i.e. biomass from common land, fish from water pond, irrigated crops from cultivated land, etc. At this stage distinction may however be made between (i) mandatory rights to be given to all eligible user groups (for a specified term period) and (ii) actual rights to be availed by those who have taken entrepreneurial risk (during a particular year) by using the CPR through competitive bidding / auction. In such cases it would be desirable that bidding / auctioning is restricted to those entrepreneurs who belong to the local community rather than opening it to external persons who could usually be the contractors.
- (vi) Recognizing that formal allocation of users' right through Memorandum of Understanding may be a short term administrative solution to the issue, it would be essential to simultaneously adopt legislative approach to provide legal authenticity to the mechanism. This may be done through an act in the State Assembly as being currently attempted in Karnataka for creation of Tank Users Panchayat. The bill envisions the Village Panchayat as a unit of governance whose functions are carried out by the User Groups as the Management Committee: the Line Agencies of the State functioning as facilitators, experts and guides to ensure technical and resource support to the Tank Users, and the State Government providing the policy oversight, clearing hurdles for fund flow and preventing encroachments.

### **5.3.7 Equity for resource poor families and gender perspective in user's right:**

Traditionally, customary rights have been given to specific members of the community with respect to specific products from the CPR. However while allocating the new usufruct right, due consideration may be made to identify those user groups which belong to resource poor families. Besides this, preference may be given to allocate the above rights to women SHGs and their federations in order to simultaneously address gender as well as equity aspects. This type of preferential allocation of right may be done particularly for those products over which customary rights did not exist with the community (e.g. timber trees, etc). Likewise preference may also be given to such groups and federations while auctioning the produce through open bidding.

**5.3.8 Measures for dovetailing water-use regulation as an important and integral part of the watershed programme:** So far, major efforts have been made for development of natural resources without matching attention towards management of developed natural resources. Most of the gains made in recharging of groundwater table are nullified because of indiscriminate digging of bore wells after completion of project period. Social regulation against over-exploitation of groundwater is therefore a crucial

requirement for achieving sustainable utilization of developed natural resource. This requires greater commitment from the community in order to facilitate the above regulatory mechanism. In this connection, the following two specific steps may be taken at the village level.

- (a) **Advance commitment from the community about social regulation before finalization of watershed site:** A number of experiences are available regarding social regulation on use of community oriented surface water resource. However such experiences are very rare with regard to ground water resource. Nevertheless each of these experiences have clearly brought out that advance commitment from the community is crucial if social regulations are to be facilitated after the development of water resource under the project. Care should however be taken to see that such commitments are not made merely to complete a formality. It would be appropriate to make exposure visit to a unsuccessful watershed (where overexploitation of water has taken place after completion of watershed project) as well as to a successful watershed (where social regulation against overexploitation of water resource has been carried out by the community for sustainable and equitable use of ground water resource). The proposed commitment from the community may be facilitated after completing above exposure visits in order to have a lasting impact. Needless to mention that, the commitment may be taken in an open meeting of Gram Sabha before finalizing the watershed site. A copy of above commitment may be sent to block / district authorities besides keeping it in Gram Panchayat / Watershed Committee office. At this stage, the commitment may consist of the following aspects (other items may however be added as per the need and local situation):
- (i) Social regulation on digging of new bore wells in the watershed area;
  - (ii) Promotion of community oriented bore wells (exclusively for resource poor families and for only low water requiring crops);
  - (iii) Ban on pumping of surface water collected at the water harvesting structures designed for recharging of groundwater;
  - (iv) Discouraging conversion of traditional irrigation tanks into percolation tanks unless adequate provision of water has been made for those families who do not own wells in command area but have riparian rights over the irrigation water;
  - (v) Sharing of groundwater from bore wells in such a way that the owner of the bore well uses a part of the water (as per community agreed allocation by the community) and the remaining quantity is shared (on nominal payment basis) with other families whose bore wells have dried up (this type of resolution provides an incentive to bore well owners against uncertainty of its drying up in future); and
  - (vi) Improving the efficiency of water use by moving towards critical irrigation (to rainfed crops) from normal irrigation (to high water requiring crops). The efficiency may further be enhanced through adoption of efficient methods of irrigation. Hence there should be a virtual ban on inefficient use of ground water under the project.
- (b) **Treating ground water as a common property resource:** At present ground water is practically a private property owned by limited number of well / bore

well owners. Before the adoption of bore well technology, the problem was not much evident due to limited extraction of water from open wells. Bore wells are leading to overexploitation of underground water resulting in non-functioning of many wells / bore wells in adjoining areas.

5.3.9 At the conceptual level no one disagrees with the point that ground water should be treated as a common property. However, at the field level there are operational problems to apply the above concept due to difficulty in deciding the quantity of water for which formal right can be given to different bore well owners located at different topographical situations and with varying extent of land ownership.

5.3.10 It is now well recognized that some challenging steps have to be taken to sort out the operational problems related to right over ground water resource through appropriate 'water reform' on the pattern of 'land reform' in order to address the increasing crisis of overexploitation by some families at the cost of others. The intensity of problem is likely to escalate as the proportion of reserve water in the profile gets further exhausted. In this connection, the following approach may be considered for initial testing on pilot basis.

"Each bore well owner may be allocated the right to extract ground water in proportion to the area owned by him / her (which is contributing to the recharge of water table). The remaining water under the bore wells may be considered as a property of other families particularly those where bore wells have dried up or functioning at a sub-optimal capacity. They may however pay nominal charges to actual owners of functional bore wells towards operational expenditure, depreciation of bore well, etc." While doing so the right of landless families may be separately protected through provision of community oriented bore wells exclusively for them in suitable recharge zones.

5.3.11 In order to facilitate the above approach, the following three steps may be considered at the village level: (i) Adoption of participatory hydrological monitoring system to assess the quantity of water recharged in a particular year, (ii) Regulated extraction of groundwater from bore wells as per only annual recharge (without over extraction of reserve water from the profile) and also as per only users right over the recharged water (as discussed earlier) and (iii) Adoption of group action for regulation against over-extraction of ground water by owners of those bore wells which are interconnected with each other at the underground level.

## **5.4 Sustainable Development of Livelihoods**

5.4.1 The livelihoods can be grouped into two categories, namely, (i) non-land based livelihoods (which are also called as micro-enterprises) and (ii) land-based livelihoods (which include not only agriculture and horticulture but also livestock, sericulture, fisheries, etc.). In the past, much of the attention was paid towards non-land based livelihoods (by giving financial support for inputs as well as new infrastructure) so that new members could initiate these livelihoods.

5.4.2 Improving the productivity of existing land-based livelihoods (of participating families) did not receive much attention in the past. Sustainability of these livelihoods directly depends upon sustainable management of natural resources, namely, land, water, perennial biomass, etc. Hence, under watershed programme, enhancement of productivity of the two livelihood systems is now getting greater attention so that it

helps not only in better participation of the families concerned but also in achieving overall objectives of the programme. Practically all the innovative watershed projects have included this as an important objective of the programme. There are at least two strategic learning's on this aspect, as briefly discussed below.

5.4.3 The first learning deals with refinement in the methodology for preparation of action plan for enhancement of productivity or income. Key aspects of this methodology with respect to (i) technological design; (ii) institutional framework, and (iii) financial system are indicated below.

- (i) **Technological design:** This includes the following four main aspects: (i) integration of production, processing and marketing; (ii) emphasis on up scaling of success stories; (iii) focus on gap in adoption of technology; and (iv) use of successful farmers as a resource persons/ consultants. Farm Schools as recommended by the National Commission on farmers should be established and supported for technology refinement and large scale adoption.
- (ii) **Institutional mechanism:** It includes the following seven main aspects: (i) organization of commodity groups by drawing the members concerned preferably out of SHGs; (ii) use of commodity groups for transactions related to production technology, procurement of input, marketing of produce, etc, but involvement of SHGs for carrying out financial transactions; (iii) initial consolidation of action plan of different participants at the SHG level; (iv) subsequent consolidation of action plan of different SHGs at its federation level; (v) consolidation of action plan of resource poor SHGs for funding under the project; (vi) consolidation of action plan of remaining SHGs for funding through bank; and (vii) overall coordination of programme by federation of SHGs at village level.
- (iii) **Financial system:** It includes the following five main aspects: (i) provision of financial support only for filling of gaps in adoption of technology; (ii) release of fund by Project Director (for livelihood component) as a grant to the federation of SHGs against the approved annual action Plan; (iii) utilization of above fund by the federation of SHGs as a revolving loan through mature SHGs (as per the respective action Plans); (iv) release of project fund to SHGs for only those members who belong to resource poor families; and (v) provision of financial support to remaining members of SHGs through linkage with banks and other credit institutions.

5.4.4 The second strategic learning consists of a shift towards greater use of indigenous inputs and also towards community managed support system for providing various types of services and inputs. This may include community managed artificial insemination centre, community managed seed bank, community managed resource persons, namely, book writers, para workers, etc. Key features of the strategy for development of agriculture, horticulture, livestock, fisheries, etc. are briefly mentioned below:

➤ **Strategy for development of agriculture**

- ◇ Focus on organic farming (on a limited scale).
- ◇ Control of pests through non-pesticide methods or through integrated pest management (on a large scale).

- ◇ Establishment of seed banks with federation of SHGs for production and marketing of improved varieties and hybrids (evolved under public sector).

➤ **Strategy for development of horticulture**

- ◇ Plantation of orchard crops in new areas for improving water use efficiency.
- ◇ Adoption of organic farming practices (on a large scale).
- ◇ Enhancing the area under vegetable crops (for improving water use efficiency as well as creating employment opportunity for women members).

➤ **Strategy for development of livestock**

- ◇ Upgrading the breed of large ruminants through community managed artificial insemination as well as natural insemination units.
- ◇ Upgrading the breed of small ruminants through community managed natural insemination unit.
- ◇ Management of diseases of livestock through community managed livestock para-workers.
- ◇ Improving the fodder base particularly for small ruminants through improvement management of biomass in common land (in favour of grass and fodder rather than common forestry).
- ◇ Further improving the fodder base particularly for large ruminants through cultivation of improved varieties of non- leguminous and leguminous fodder crops under irrigated condition, and through fodder banks in arid and semi-arid rainfed areas.
- ◇ Processing, viable addition and collective marketing of produce–producer–processor–market linkage; and replicating the Annual experience throughout the country.

➤ **Strategy for development of fisheries**

- ◇ Improving the sustainability of fishery cooperatives by organizing general body members into a number of small size SHGs and reconstituting the office bearers of executive committees by bringing representatives from mature SHGs
- ◇ Introducing composite fish-cum-prawn culture with different varieties of fish (suitable for different depths of pond water)
- ◇ Improving other technological inputs (through release of juveniles / fingerlings in situations where filling of water in pond is delayed; enhancement of standing water in the tank by desilting the bed area; local production of fingerlings in smaller ponds supported by bore well irrigation; management of disease and predators through appropriate practices before filling of water in tank as well as during rainy season, etc.).
- ◇ Collective marketing of fish to distant places by executive committee of the cooperative society; and also self-marketing of fish in local markets by women members of the cooperative society.

5.4.5 Transparency, governance and participatory management are prerequisite for equitable harnessing of the natural resources. Development of mutual trust between executive committee and general body members through adoption of transparent systems in financial transactions is the vital step. Therefore, all stakeholders should be exposed to initial financial management system through adoption of SHG concept and through other arrangements.



## Chapter VI

# NEW STRATEGIES AND APPROACHES FOR MANAGEMENT OF NATURAL RESOURCES

## 6.1 Reliable Database and Soil and Land Mapping

**6.1.1 Data Base for Watershed Development:** The watershed development programme requires database on the following aspects preferably on 1:50000 scale for planning, implementation, monitoring and evaluation purposes.

1. Delineation and codification of sub watershed / micro watershed that allows to have a viable hydrological unit for planning and development purposes;
2. Identification and demarcation of priority watersheds to adopt selective approach in development programme; and
3. Generation of data on soil and land characteristics on 1:50000 scale that provide the status of the catchment area.

Out of the above datasets, broad land capability classes could be derived that would guide in soil and water conservation planning at macro level. The departments such as All India Soil and Land Use Survey (AISLUS) and National Bureau of Soil Survey and Land Use Planning (NBSS&LUP) having expertise in generating the aforesaid database could be assigned the task.

**6.1.2 Data Base for Combating Desertification and Land Degradation:** To develop the degraded lands that are suffering from acidity, salinity, alkalinity, water-logging, soil erosion, etc., it is essential to generate data base on degraded lands with spatial extent using remote sensing techniques on 1:50000 scale. Subsequently, to develop the priority watersheds or degraded lands, soil database on larger scale preferably on 1:4000 / 1:15,000 is essential that would allow proper diagnosis of soil and to adopt suitable soil and land reclamation measures, scientific land use Planning vis-à-vis the diversification in crop planning. Such detailed database is essential not only for the degraded lands in the rainfed area but also for command area where salinity, alkalinity and water logging are acute in nature. It would also allow generating soil health card and reclamation of problems soils. Keeping these in view, the Working Group recommends the creation of the following database for planning and management at various levels.

1. Database on watershed prioritization including delineation and codification of watersheds on 1:50000 scale.
2. Database on soils on 1: 50000 scale.
3. Database on degraded lands on 1:50000 scale.
4. Database on soil and land characteristics on 1:4000 / 1:10000 scale.

**6.1.3 Soil Survey Status:** The data base requirement for development of degraded lands in the country would comprise soil survey and land resource mapping of various kinds and intensities, soil analysis, map processing and generation of digital data using

modern tool. The status of soil survey and mapping carried out by various central organizations are as below.

**Table 6: The Status of Soil Survey and Mapping**

S. No.	Name of the Organization	Kind of Survey and Mapping with Scale	Area so far covered (in m ha)
1.	AISLUS	Rapid Reconnaissance Survey for Watershed Prioritization (1:50000)	200.00
		Land Degradation Mapping (1:50000)	65 Districts
		Detailed Soil Survey (1:4000/15000)	13.50
		Soil Resource Mapping (1:50000) under NRIS (DOS)	89 Districts
2.	NBSS&LUP	Small Scale Soil Mapping (1:250000)	300.50
		Soil Resource Mapping (1:50000)	198.40
		Detailed Soil Survey (1:4000/15000)	8.48
3.	NRSA	Waste Land Mapping (1:50000)	Whole Country
		Soil Resource Mapping (1:50000) under NRIS (DOS)	200.00

**Source:** AISLUS, NBSS&LUP and NRSA, 2006

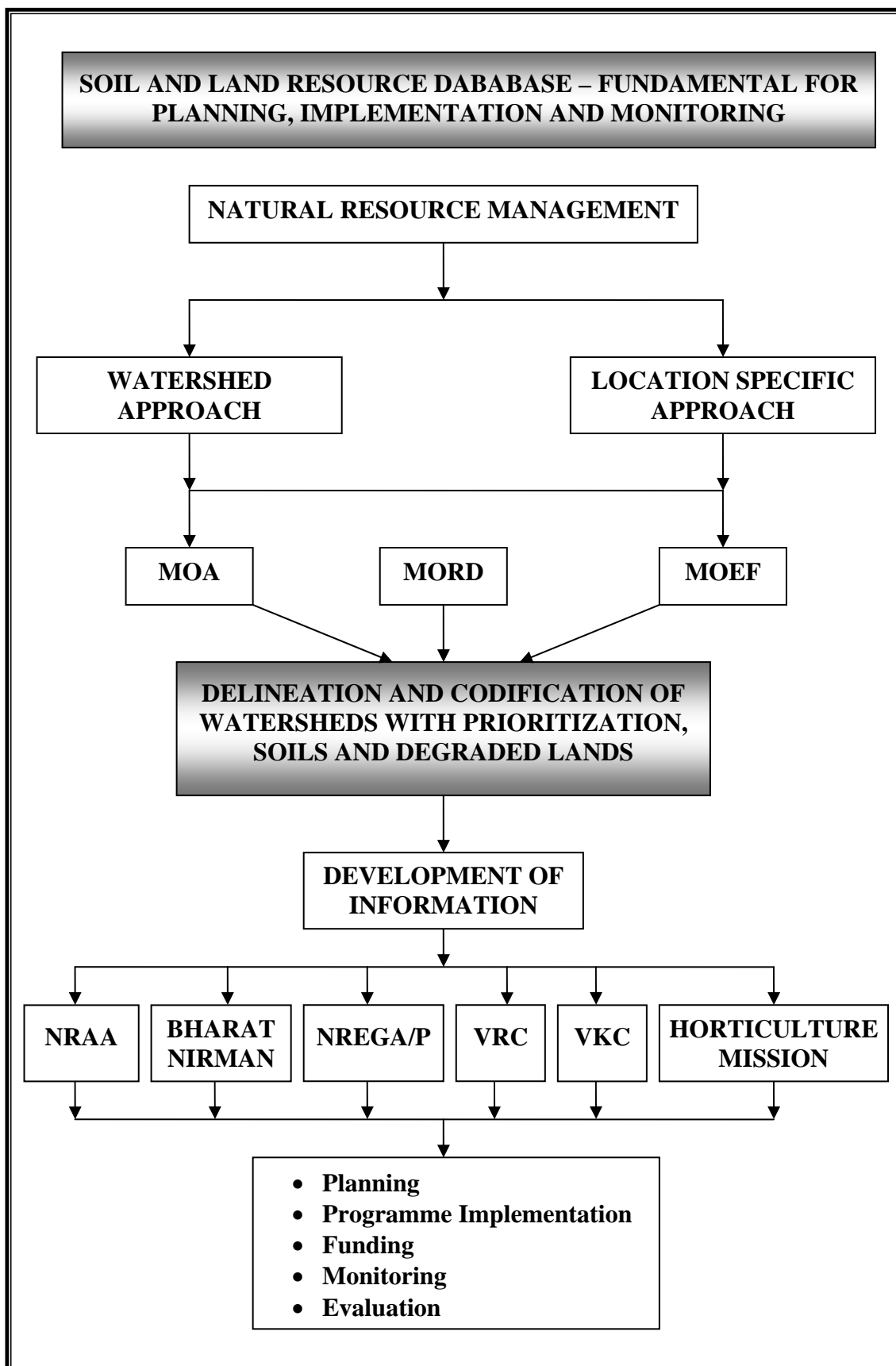
6.1.4 In this context, the responsibility for creation of database on watershed prioritization has been assigned to AISLUS by Department of Agriculture and Cooperation. As on date, database covering an area of 200 m ha is available with the organization, which is being converted into digital format in collaboration with National Informatics Centre. The survey of the balance area for watershed prioritization shall be completed by XI Plan period.

6.1.5 The soil resource mapping using remote sensing techniques has been initiated by Department of Space under Natural (National) Information System Project during IX Plan period. As on date 60% area has been covered under mapping. The remaining 110 m ha area is to be surveyed which has been taken up by AISLUS under joint collaborative project between DAC and NRSA for which Rs. 10.0 crore has been earmarked for XI Plan period.

6.1.6 The detailed database on soil and land characteristics is pre requisite to address the various issues related to scientific land use planning, reclamation of soil acidity, salinity and alkalinity; proper diagnostic of soils, judicious use of chemical fertilizer and irrigation water, deficiency of micro nutrients and maintenance of soil health for soil and land productivity. As on date, AISLUS generated detailed database on soil and land characteristics of priority watershed covering an area of 13.5 m ha. However, it is essential to cover all the degraded lands along with 140 m ha of cultivable lands under detailed soil survey, which is essential for maintaining the soil health, and to ensure the sustainability in agriculture production and eco-development.

6.1.7 The task of delineation and codification of watersheds with prioritization of and of soils and degraded lands can be accomplished only by synergistic cooperation among the Ministry of Agriculture, Rural Development, Environment and Forest and their concerned Departments and programmes (see Box) in generating sharing and utilizing the information. It seeks active participation of Central and State level organizations dealing with soil survey and mapping. Such soil database should be vital

for setting up Village Resource Centres (VRCs) for the benefit of farming community. Necessary financial and human resources will be provided for the purpose.



## **6.2 Decentralization and Professionalism**

6.2.1 At present, decentralization and professionalism are very weak in spite of promoting participatory approach under watershed programmes. In the original guidelines some provisions were made on this aspect, but could not be institutionalized over a large area. As we know, a number of new agenda items are now becoming an integral part of the watershed programme. Many of the new objectives are undoubtedly interrelated, but they require support from a variety of specialists dealing not only with technological aspects but also management as well as social aspects. Field experiences in successful watershed projects revealed that the following points may specifically be considered in order to achieve multiple objectives in a balanced manner: (i) adoption of log-frame tool for overall management of project; (ii) greater focus on monitoring and evaluation of programme; (iii) outsourcing of specific jobs on turnkey basis to experienced organizations in Government and non Government sector for providing professional inputs; (iv) redesigning of community based organizations in order to meet the emerging needs; (v) improving the delivery mechanism at other levels; (vi) self reliance through proper management of common fund by community based organizations, etc.

6.2.2 Direct funding to the community is considered as the most significant mechanism for decentralization of decision-making process (under the watershed programme). This has shifted the focus from Government departments at block/ District levels to the community based organizations (CBOs) at village level. As per the original guidelines, the UGs and SHGs are expected to plan and execute developmental works whereas WC is expected to provide management support. In reality, however, the UGs and SHGs are playing a very insignificant role for the above purpose. Most of the planning, implementation and decision-making responsibilities got centralized with WC in an inadvertent manner. This has resulted into a representative democracy in place of a participatory democracy even in a project at micro level. Over centralization of responsibilities and funds with WC has resulted in unhealthy feelings among other village level institutions particularly the Gram Panchayat.

6.2.3 At present, the responsibility for governance of project fund rests with developmental department at District level whereas responsibility for execution of works rests with WC at village level. There is however a need to decentralize both the responsibilities as indicated below.

6.2.4 The responsibility for governance of developmental fund may be decentralized in favor of Gram Panchayat. This will happen if entire developmental fund is initially released to Gram Panchayat which in turn may release it to different village development committees. All matters pertaining to governance of fund may be sorted out at the level of Gram Panchayat in a transparent manner through open meetings of Gram Sabha.

6.2.5 The responsibility related to execution of work may be decentralized in favor of UGs and SHGs. For this purpose, the role of watershed committee may be modified in such a way that it may receive funds (from Gram Panchayat) but actual execution of works is carried out by either the UGs concerned (who gave the proposals) or by SHGs of labourers (who are willing to execute the works). Hence, the release of fund to the above groups may be done by WC on weekly basis either against the completed works (to UGs) or as advances (to SHGs). The UGs/ SHGs may be kept in the center stage of planning and execution so that proper supervision of works as well as timely payment

to labourers and other service providers could be achieved. (It may incidentally be mentioned that such a decentralization in release of funds is not a requirement in the conventional type of contractor-based implementation system since contractor pays to the labourers as per market rate, out of one's own resource but later claims from the project as per latest SSR).

6.2.6 In the existing guidelines, a reasonable provision has been made for creation of new organizations at PIA and community level. However, no financial allocation is made even for strengthening of existing organizations at other levels (namely District, State and National levels). Besides this, the monitoring and advisory committees constituted under the project at different levels have not been able to function properly to provide relevant support to the whole programme. The primary stakeholders (i.e. PIAs and CBOs) have hardly any say in the above committees due to inadequate representation and low level of empowerment. Likewise, experienced resource organizations in the NGO sector do not have adequate formal space to contribute in a meaningful manner.

6.2.7 Put together, these aspects have resulted into a low level of delivery system, which is currently recognized as the most critical gap in the whole programme. The ongoing experience in majority of bilateral as well as international bank funded watershed projects has, however, shown that the following organizational reforms may be considered, if successful experiences are to be upscaled in the mainstream watershed programme funded by the Government.

- Strengthening of existing organizations at different levels by providing an additional full time Project Management Unit (PMU) for the project period. The number and type of professionals may vary at each level depending upon the need. The members of PMU may be hired from open market and initially nurtured (for about 6 months) by an experienced management institution. Afterwards these units can be handed over to the concerned organizations at respective levels.
- Creating a consortium of experienced resource organizations (consisting of GO as well as NGOs) at different levels for providing professional support (on cost basis).
- Refining the existing monitoring and advisory committees at different levels to assume greater responsibility for governance of the project.

6.2.8 The watershed approach has been accepted as a major theme for development of rainfed / dryland areas with a view to conserving natural resources of water and soil and to mobilize communities for socio-economic upliftment by enhancing people's participation. To ensure appropriate coordination at the National and State levels and to ensure appropriate implementation and convergence of different programmes, it is necessary that at State level all programmes are coordinated by one single agency and at the National level the programmes are coordinated, supervised and monitored by a National level Authority, such as the NRAA.

### **6.3 Organizational and Management Reforms**

Organizational and management reforms are needed at different levels to increase the efficiency of the system.

**6.3.1 At the National level:** The following steps are needed:

- Active involvement of the newly created National Rainfed Area Authority (NRAA) is a must in the watershed programme for providing professional and management support even if this programme is funded through different ministries of Government of India, bilateral projects, international banks, etc.
- The executive committee of the above authority can also work as an empowered committee for providing concurrent policy support to the project through need-based Government orders, office orders, etc.
- Provision of dedicated project management units (PMU) for the project period with SMS in project management, livelihood, community organization, capacity building, gender, monitoring and evaluation, GMIS, etc. A separate unit may be hired by each major State or a group of States depending upon number of watershed projects. The SMS may be hired from open market and initially nurtured (for about 6 months) by a suitable management organization.
- Development of a consortium of resource organizations (in GO and NGO sectors) for designing of processes and for providing professional services to the project on cost basis. For institutionalization of the consortium, a small size secretariat may be supported out of project fund for initial 2-3 years. This unit may be located either with a State level management institution or with partners of the consortium (on rotation basis).

**6.3.2 At State level:** The following steps are called for:

- Creation of an autonomous watershed development mission (registered under society act) for providing administrative support to all types of watershed programmes in the State funded through different sources. Its governing council may be chaired by Chief Minister whereas executive committee may be chaired by Chief Secretary with co-chairpersonship by heads of concerned developmental departments which are providing the funds for watershed programme.
- The executive committee of the above mission can also work as an empowered committee for providing concurrent policy support to the project through need-based Government orders, office orders, etc.
- Provision of a dedicated project support unit (PSU) for the project period with SMS in project management, livelihood, community organization, capacity building, gender, monitoring and evaluation, GMIS, etc. The SMS may be hired from open market and initially nurtured (for about 6 months) by a suitable management organization.
- Development of a consortium of resource organizations (in GO and NGO sectors) for designing of processes and for providing professional services to the project on cost basis. For institutionalization of the above consortium, a small size secretariat may be supported out of project fund for initial 2-3 years. This unit may be located either with a State level management institution or with partners of the consortium (on rotation basis).

**6.3.3 At District level:** The following actions are needed:

- Constitution of an autonomous District level watershed development mission (registered under society act) for management of different types of watershed projects in the District. The executive body of this agency may be chaired by District collector and its governing council may be chaired by President, Zilla Parishad.
- Constitution of dedicated Project Management Units with SMS in not only technological subjects (engineering, agriculture, horticulture, fisheries, livestock, collective marketing, etc.) but also in social and management aspect (community organization, capacity building, gender, monitoring, evaluation, GMIS, etc). The number of such units in a District may be adjusted as per the number of watershed projects. Usually one unit may be created for every 5 sub-basins / blocks.
- Constitution of an empowered management committee for approval of projects, reviewing and monitoring of progress, overcoming management related constraints, etc. This committee should have at least 50 percent representation from CBOs and PIAs. One of the experienced NGO representatives may be designated as vice chairperson of the above committee.
- Establishment of an autonomous capacity building centre (managed by a consortium of experienced resource organizations in GO and NGO sector) for meeting the capacity building needs of secondary stakeholders under the programme. This center may be networked with the cluster level resource centers for building the capacity of primary stakeholders at the project level.

6.3.4 Finally, at the grassroot level, each village should be treated as a management unit under watershed programme. At community level, the micro-watershed of 500 ha is considered as a management unit as well as geo-hydrological unit. This unit is to be demarcated on watershed basis. Hence, it is usually located either within a part of one village or includes a part of adjoining village(s). This approach is creating physical and social inconveniences in facilitating the participation of total community. At PIA level, a larger unit of 5000 ha is considered as a management unit as well as geo-hydrological unit (in a particular block) which is to be sub-divided into 10 units of micro-watersheds (of 500 ha each) as indicated above. As per the original guidelines the larger unit of 5000 ha is expected to be demarcated on watershed basis, so that scientific requirements of watershed based development are properly met. However due to social reasons, this larger unit (of 5000 ha) is usually not demarcated on watershed basis and consequently 10 units of micro-watersheds are scattered in different villages throughout the block.

6.3.5 As per the ongoing situation, the independent unit of 500 ha (as a micro-watershed) is becoming unsatisfactory not only for facilitation of peoples participation but also for carrying out watershed based development particularly with respect to those items which require larger unit of operation (namely perennial biomass in common land and water harvesting structures for community use). Hence it becomes essential to modify the existing approach in such a way that larger area at PIA level is strictly demarcated on the basis of watershed parameters i.e. ridge and valley (over a compact area) whereas smaller area at community level is demarcated on the basis of revenue boundary (i.e. village as a unit) so that scientific requirement as well as peoples participation could be integrated in a reasonable manner. It may further be desirable to

enhance the total area at PIA level to represent sub-basin as a still larger unit so that it may further help in meeting scientific requirements besides providing additional money for strengthening staff position (WDTs) with PIA. In this connection, the following specific suggestions may be considered which have emerged out of recent experiences in many of the successful watershed projects.

- A sub-basin of about 5000 to 10000 ha may be considered as a geo-hydrological unit at the block level / PIA level.
- Each village within the above sub-basin may be considered as a management unit (rather than each micro-watershed of only 500 ha). This would help in involving the entire village community. Under this approach preparation of engineering design and estimate of various structures may be done keeping in view the micro-watershed as a geo-hydrological unit but implementation of approved works may be done by taking village as a management unit.
- Under this approach, necessary changes may be made in the composition of CBOs (Watershed Committee may be replaced by Village Development Committee; Watershed Association may be replaced by Village Sabha).

**6.3.6 Outsourcing of certain components on turnkey basis:** It is generally perceived that technical standards are going down under watershed programmes as the participatory approach is moving forward. This is said to be partly due to large expansion of programmes and partly due to unsatisfactory level of Subject Matter Specialists at WDT level (which are usually hired on contractual basis at low salary for the project period). It is also assumed that the standards may further go down if new components are added under the programme without matching provision for involvement of experienced resource persons.

6.3.7 The field experience in many of the bilateral projects (KAWAD, Sujala etc.) has however shown that the technical standards can be strikingly enhanced if certain components are outsourced to experienced resource organizations / persons on turnkey basis. These persons may initially establish the merit of the case by working on a pilot basis in a part of the watershed area. Afterwards, up scaling of above experience may be done in the remaining area either by the same resource organization / person or may be taken over by regular project staff depending upon the capacity. The fund for this type of outsourcing may be met out of the respective developmental component.

**6.3.8 Re-phasing the programme duration:** At present, the project duration is of 5 years with two phases. The initial period of 1.0 to 1.5 years is treated as capacity building phase (in MoA guidelines) or as probation phase (in MoRD guidelines). During the capacity building / probation phase major attention is given to (i) organization of community, (ii) capacity building of different stakeholders, and (iii) development of NRM and livelihoods on a limited scale. The remaining period is treated as 'main implementation phase', which includes the following types of activities: (i) organization of other families, (ii) carrying out planning and implementation of the rest of the natural resources management and livelihoods and (iii) participatory monitoring of physical progress, financial progress and processes. After this phase the project is closed abruptly without any follow-up support by the PIAs. As a result of this approach the capacity of CBOs in performing new roles during post project period remains low resulting in un-sustainability. Also, by the end of project not all the developmental components are fully implemented due to limitation of time period.



6.3.9 Under the emerging scenario, the numbers of components and sub-components are going to be further increased. In view of this, the project duration may be enhanced from 5 years to 10 years and the overall period may be divided into 3 distinct phases as per details given in Table 7.

**Table 7: Proposed phases and their duration under watershed programme**

S. No.	Phase	Duration (Years)
1.	Institution building / capacity building phase	2
2.	Natural resource development & management phase	3 + 2
3.	Phase for development of Rainfed farming systems	3
	<b>Total</b>	<b>10</b>

6.3.10 The duration of institution building / capacity building phase may be increased to 2 years. Natural resource development phase may take 3 years where as management of developed natural resources may take another 2 years. The phase for development of rainfed farming system would require additional 3 years. The above categorization of phases has been done for the sake of clarity in communication. There would however be over-lapping of activities from one phase to another phase.

6.3.11 The requirement of SMS would vary from phase to phase. The institution building phase / probation phase requires support from a limited type of SMS with greater preference towards social science discipline. If needed, the services of some of the technological specialists may be obtained through outsourcing or part-time involvement under the project. During the natural resource development phase, greater preference may be given to technical SMS belonging to need based disciplines. One SMS (social science) may however be retained to provide the required continuity during the phase. The sub-phase dealing with management of natural resource may however be managed essentially through SMS having social science background. The technical support (if any, during this phase) may be provided through outsourcing to experienced organizations.

6.3.12 The requirement of subject matter specialists would be different during the phase for development of rainfed farming systems. It will consist of technically qualified subject matter specialists in the field of agriculture, horticulture, livestock, fisheries, micro-enterprises etc. One SMS (social science) may be retained to provide the required continuity during this phase.

**6.3.13 Harmonizing State level guidelines:** At present different States are at different levels with regard to management of watershed programme – some are still in the first generation watershed programme while others are ready to move to third generation watershed programme. Different States vary considerably in their experience regarding development of CBOs particularly SHGs and their federations. The existing guideline at the National level is too broad which is not able to build upon local strengths and requirements unless suitably modified. Besides, the participatory processes and operational modalities have not been described in detail in the National guidelines. The initial experience in Andhra Pradesh has shown that State specific process guidelines are helpful in making the best use of local situation. These guidelines should however be made within the overall framework of the National guidelines. The proposed process guidelines should focus on the following aspects.

- Detailed operational modalities for carrying out various tasks on the basis of field experiences in innovative projects.
- Appropriate strategy for development of community based organizations, keeping in view the changing scenario under watershed programme.
- Institutional reforms even at other levels based upon available financial resource in respective States as well as through convergence with related schemes / projects.
- Reallocation of available fund as per the local need.
- Concurrent policy support through empowered committee at State level.

**6.3.14 Collective marketing of produce by CBOs:** In rainfed areas significant improvement in income from livelihoods would come not only from enhancement of productivity but also through collective marketing of produce. The watershed programme provides a unique opportunity to institutionalize the concept of collective marketing, since developmental efforts are carried over a concentrated area, community is organized into sustainable institutional set-up; common fund is available with the community as part of the project intervention, etc. Based upon successful experiences on collective marketing by CBOs, the following specific recommendations are made:

- Organize the community into SHGs and CIGs of not only women members but also men members.
- Federate the SHGs not only at village level but also at higher level.
- Involve SHG federations in collective marketing of produce, which includes farm level processing, grading, packing, storage, transport, etc.
- Reform the State marketing laws in favour of alternative marketing system.
- Create alternative auction platform based upon Dutch system of auction (as being currently practiced by NGO at Bangalore).
- Develop infrastructure facilities at various levels to carry out collective processing, storage, etc.

**6.3.15 Formal space for innovative ‘Activists’ engaged in natural resource development:** At present a number of innovative activists like Shri. Singh (Tarun Bharath Singh, Rajasthan), Shri. Premjibhai Patel (Vruksha Prem, Gujarat) are actively engaged in promoting sustainable development of natural resources in the country. They are able to facilitate bottom-up development process through higher rate of contribution from the community (i.e. more than 50 percent contribution for development of even community oriented water resources). There is a need to build upon these initiatives through a separate channel of funding in such a way that enthusiasm and creativity of such activists are not adversely affected.

**6.3.16 Refinement in guidelines of watershed programmes with NABARD under WDF:** The Union Finance Minister, in his budget speech for 1999-2000 had announced the creation of a Watershed Development Fund (WDF) with the National Bank for Agriculture and Rural Development (NABARD) with broad objectives of unification of multiplicity of watershed development programmes into a single National initiative through involvement of village level institutions and Project Facilitating Agencies (PFAs). As a follow-up action a Watershed Development Fund (WDF) has since been established at NABARD with a total corpus of Rs.200 crore which included Rs. 100

crore by NABARD and a matching contribution of Rs. 100 crore by Department of Agriculture & Cooperation, Ministry of Agriculture and Government of India.

6.3.17 At present a major portion of the above fund under WDF is used as a loan to the State Government with the result the programme is not able to move at a desired speed even though it has a good approach as well as management system. In view of this, the following two steps may be taken (i) enhancing the amount of fund to Rs.600 crore for developing 4 lakh ha, and (ii) the fund could be used as a total grant to the State as in case of rest of the fund from Government of India. At the State level this programme could be managed by a consortium of organizations implementing it for establishing scale models by up-scaling of innovative experiences, irrespective of the source of innovation.

**6.3.18 Public-private partnership:** It may be desirable to provide formal space to other organizations (besides Central and State Governments) for promoting the comprehensive approach under watershed programme. This may be done through public – private partnership in selected areas where they have generated successful experiences through their earlier efforts.

6.3.19 Public partnerships with profit making private entities like corporates should be on the basis of value addition and core competencies. While the public sector and civil society has accumulated experience in core competencies in the areas of natural resources management, the private sector can bring in better management systems, business and marketing skills, infrastructure, financial services and related investments. The public-private partnership could be in the areas of (a) mobilizing resources under corporate social responsibility, (b) on specific project based partnerships with the private sector in terms of promotion of marketing activities and developing related skills, and (c) building skills of rural youth to enable them to move into service sector. The spirit of participation and principles of participatory approach and community decision making should be the core values of the partnership. If financial resources could be mobilized under the corporate social responsibility, they should be effectively used in catalyzing several initiatives related to poverty for which mobilizing funds within the programmes is difficult.

6.3.20 For promoting the PPP, a separate channel of funding may be created for development of 40 lakh ha at a cost of Rs.6,000 crore. Out of this area, half may be developed by corporate sector and the remaining area by experienced voluntary organizations. The above funds may be managed by NRAA with the help of consortium of concerned corporate bodies and voluntary organizations.

## **6.4 Institutional Arrangements**

**6.4.1 Role of Gram Panchayats in employment security and asset building:** Vulnerability to rainfall fluctuations limits the scope of private investments in rainfed farming systems. Ground water access showed some sense of security but very soon lead to congestion and competitive access resulting in investment losses precipitating a large crisis. Those who have access to water moved into the high-input, high-cost agriculture taking much larger risks based on a fragile natural resource base. This has compounded the problem further and has deepened the crisis in these rainfed areas.

6.4.2 Securing the natural resource base of the rainfed farming systems is a fundamental issue. Soil conservation alone did not serve the purpose as it did not

improve the overall soil health in the absence of soil organic matter. As the labor costs increased and with seasonal labour scarcities, private investments have opted mostly for chemical ways foregoing the traditional methods of soil fertility management. This skeletal focus has led to imbalances in nutrient use that has precipitated micro-nutrient deficiencies and kicked off yet another spiral of cost- risk- benefit imbalance. Long-term sustainable measures of resource management have been a victim and agriculture growth has been impaired with accumulated nutrient deficiencies and soil fatigue.

6.4.3 Public investments in the form of labour subsidies can ameliorate the situation and help in reviving the health of natural resources in rainfed areas. Improving soil health is an asset building process and is a public good.

6.4.4 The stagnant prices and global competition are the greatest impending threats to forced displacement of people from rainfed areas. Also, it is important to absorb increasing labour costs to enable the rainfed agriculture to be economical and sustainable; and for it to sustain livelihoods of people at the margin.

6.4.5 NREGS is a unique opportunity in this regard. Many of the labor intensive soil health restorative practices like green leaf manuring, green manuring, composting, and tank silt application can come back into the system. Integrating labour components in rainfed farming systems with NREGS will benefit the purpose of employment guarantee as it opens up non-earthwork related employment opportunities for a large labour force that do cannot do manual hard earth work. Panchayat Raj Institutions must play a leading role in harnessing this opportunity for capacity building, asset creation and increasing rural employment and livelihood opportunities.

6.4.6 Broadly speaking the critical labour oriented works in rural areas can be categorized into four types, namely, (i) manual earthwork / physical work, (ii) preparation of products, (iii) provision of services and (iv) critical farm operations that can catalyze change processes. There is a need to enlarge the scope of NREG to accommodate all types of above works as per details given below:

- (a) **Manual earth work:** The normal earthwork like digging of compost pits, tank silt application, farm ponds etc., can be taken up in NREGS without any policy changes.
- (b) **Preparation of products:** These are project based group initiatives. For example few land less (aged) women as a group can take up large scale composting using biomass from commons with some infrastructure facilities. While their wages are covered under NREGS, they would have substantial quantity of composted organic manure in 4 or 5 cycles. This manure can be sold to eligible rainfed farmers at a cheaper rate. The proceedings can help in surplus generation. Several such inputs – like bio-pesticides, horticulture planting material, biomass production for energy so on, can be generated locally with local inputs that would help in improving the agriculture productivity.
- (c) **Provision of services:** Several critical services like group support to tending cattle, protecting plantations in the commons, pest-surveillance etc., are critical to sustaining rainfed farming. To illustrate, wage labour dependency is a greatest limiting factor for poor to keep livestock, the only source of asset building. Support to a group of household in the form of tending of cattle (allocation of labour) would help all of them to keep livestock and to diversify their income. Similarly, good pest-surveillance would save half the effort and

investments in pest control. Support for sustaining bullocks for about 3 months during summer period would bring-back bullocks into farming systems that may save substantial diesel consumption. With some creative engagement, systems can be designed for decentralized renewable power generation. Such critical services can be supported under NREGS.

- (d) **Supporting critical operations to catalyze sustainable technologies:** Because of labour intensity, some of the sustainable, high productive technology options are not taken up by farmers. System of Rice Intensification, for example is not catching up because of labour intensity in weeding. Support for two weedings in the whole package would encourage many farmers to take to this method of rice cultivation that saves about 20 to 30% water, while increasing crop yield.

6.4.7 The above group based support systems for rainfed-farming systems, coupled with skill development and retooling can be systematically designed for integration into NREGS. Group based wage-entitlements (defined per unit) for conversion to sustainable rainfed farming systems can be the operational framework. It can also attract other complementary finances in the form of credit. Operationally it can be built on the platforms of community based organizations and Gram Panchayats. The cost norms, payment and measurement systems can also be easily developed.

6.4.8 This process would affect large scale transfer of resources to the poor in a large stretch of rainfed areas in the country by making their agriculture economically viable and through gainful productive employment. The restorative effect on the ecological systems would be substantial. This is a process that can realize the vision of inclusive growth of the XI Five Year Plan. Watershed programmes and NREGS works are operated parallel in several situations. Provisions should be made in the watershed programmes to re-adjust the budget heads if some works are already been taken up by NREGS.

**6.4.9 Redesigning of community based organizations to meet the emerging needs:** Under the ongoing watershed programmes two types of groups (SHGs and UGs) and two types of management bodies (WAs and WCs) have been organized. Out of these, only SHGs are functioning properly beyond the project period. Lack of sustainability of other CBOs both during and after the project period is a significant concern.

6.4.10 In the emerging scenario, a number of new community based organizations are to be added, namely, federation of SHGs and UGs, common interest groups (CIGs), Village Development Committees (VDCs), etc. In view of this, the risk of unsustainability of CBOs will become higher particularly in situations where professional facilitation is not proper. Hence follow up nurturing of above CBOs is very crucial even beyond the project period. For this purpose, it is essential to develop para workers and also community managed resource centers to support the above CBOs (on charge basis).

6.4.11 The following three guiding principles may be observed for improving the sustainability of existing CBOs and for organizing and nurturing the new CBOs.

- Beginning may be made with organization of adult members of all the participating families in the village into women SHGs and men SHGs

- Afterwards other groups as well as management bodies may be additionally organized by drawing members out of above SHGs
- Sequencing of above CBOs may be observed in such a way that they are organized as and when the need arises. The following specific sequence may however be considered as a general guideline:

Step – I	:	SHGs (of women as well as men) UGs (of men as well as women) Development of book writers and para workers
Step – II	:	Area groups and Watershed Association Watershed Committee (WC) Village development committee (VDC)
Step – III	:	CIGs (of one livelihood / commodity at a time)
Step – IV	:	Federation of SHGs Federation of UGs
Step – V	:	Community-managed resource center

6.4.12 Special care may be taken to see that organization of WC and VDC is not hastened. It may be constituted only after organizing sufficient number of SHGs and UGs and also after preparation of first year's action plan for development of individual oriented natural resources (through SHGs) and of community-oriented natural resources (through UGs). The WC may be organized (after this stage) for consolidation of the above action plans and also for taking follow-up actions related to approval of plan, release of funds, implementation of approved works, etc.

**6.4.13 Mainstreaming of women SHGs and their federations:** Participation of women under public sector watershed programmes is very low in spite of sufficient evidence regarding their deep interest and heavy dependence on natural resources. Due to increasing migration, men are not readily available in the villages to actively participate in the programme. On the other hand, participation of women in watershed projects does not take place properly unless they are organized in sustainable groups. Hence in future, there is a need to mainstream women SHGs and their federations not only for addressing women related agenda but also for overall management of watershed projects through participatory approach.

6.4.14 The following specific aspects may be integrally built within the framework of watershed programmes in order to address the above aspects: (i) organization of all willing adult women in SHGs and their federations; (ii) allocation of separate fund for women specific agenda; (iii) preferential development of land and water resources owned by women headed households/ widows; (iv) payment of equal wages to women in development works; (v) adequate representation of 'organized' women into management committees; (vi) management of selected watershed programmes by all women committees (having members from only women SHGs) and carrying out rest of the developmental activities through women SHGs; (vii) preferential allocation of usufruct rights as well as bidding rights over CPR to women SHGs and their federations; and (viii) focus on development of water resources for drinking purposes.

**6.4.15 Integral involvement of Panchayat Raj Institutions (PRIs) in the watershed programme:** Hariyali guidelines of MoRD (2003) brought PRI in the centre stage of watershed programme by making it a project management unit (at District level), a project implementation unit (at block level) and an executive body (at village level). Under these guidelines, role of CBOs (particularly watershed committee, federation of SHGs besides user groups and self help groups) is getting marginalized as compared to the earlier guidelines by MoRD (Common guidelines, 1995).

6.4.16 Through the Hariyali guidelines executive function is centralized with Gram Panchayat (which is often based at a cluster of villages) as compared to the earlier set-up of WC (which was often based at a village). Though Gram Panchayat is a constitutional body, it does not presently have adequate capacity to facilitate participatory processes under watershed programmes. Most of the works by PRI are executed through contractors without taking any contribution from actual beneficiaries. The account keeping system with the GP is also inadequate, as it is presently managed by a departmental representative rather than by a local member chosen by the community.

6.4.17 There is however a need to integrate both GP and CBOs with proper role clarity in such a way that strengths of both organizations are harmoniously utilized. The GP should play the role of governance (which was earlier played by District level department) and UGs and SHGs should carry out planning as well as implementation of works which (was earlier done by WC).

6.4.18 In this context the following specific roles and responsibilities should be performed by Gram Panchayat and CBOs. These suggestions are largely based upon the proposed design of World Bank funded watershed project in Uttaranchal State, the ongoing design of tank development project in Karnataka State and Government of India's guidelines on rehabilitation of indigenous tanks in different States.

- Developmental fund under the project should be first released to GP (in place of WC). Later on the Gram Panchayat would allocate the above fund to different villages/ habitations under its jurisdiction based upon the extent of area and the population.
- The concerned villages should organize SHGs and UGs and form separate village development committees (by having representatives from respective SHGs and UGs). The above members of VDC should be chosen in open meetings of village/ habitation Sabha. The above VDCs should facilitate Planning and execution of works through SHGs and UGs.
- The VDC formed through the above process should be designated as special sub-committee of Gram Panchayat in order to give it more formal status (as being attempted through a legislative 'act' in Karnataka with regard to tank users committee). The members of VDC should choose two office bearers (one as the chairperson and the other as member secretary) out of its executive committee members.
- The Sarpanch and the concerned ward member should however act as president/vice president respectively of the village Sabha with an understanding that decision making process will be facilitated by village Sabha and executive function will be performed by VDC.

- In villages where jurisdiction of GP and village are the same, a separate VDC should still be formed to carry out executive function. It should be formed in the GS as discussed earlier.
- Taking into consideration the workload of account maintenance with the Secretary of GP, it would be useful to appoint a separate accountant for the watershed programme by each VDC. This person should preferably be identified from the villages concerned.

## **6.5 Fostering Convergence and Synergy among Programmes**

6.5.1 As mentioned earlier, a large number of WSD Programmes of different Central Ministries/ Departments are under implementation in different States. These programmes are being implemented under different guidelines of respective schemes. At times, the implementing and the coordinating agencies for these schemes differ. The objectives of the schemes also vary depending on the mandate and area of operation. Such a fragmented approach may defeat the very objectives of scientific management of watersheds in particular and that of natural resource management in general. The multiplicity of programmes and agencies operational in an area pose problems of coordination and coherence as well. At the National and State levels also a coordinated approach towards prioritized planning and implementation becomes rather difficult in this scenario and the possibility of overlapping of schemes in a particular area can not be ruled out.

6.5.2 Notwithstanding the importance of convergence of inter-related schemes / projects in filling the gaps in development and improving the efficiency of inter-related schemes, the fragmented approach continues at the ground level due to the following reasons:

- The development departments, local legislators, District level PRIs, etc do not prefer to integrate several schemes at one place as they are afraid of the loss of their identities and spread, with little concern for the efficacy.
- The inter-related schemes (even if converged in the same village) become a burden on the watershed staff (PIA and WC) since there is no provision for hiring additional staff or paying extra remuneration even to the existing staff under the watershed programme.
- The guidelines of the inter-related schemes are usually not based on participatory processes (such as direct funding to the CBO, contributory approach, bottom-up Planning, ITK, etc.). Hence inclusion of such schemes creates confusion among the CBOs and eventually leads to deterioration in the quality of even the watershed project.

6.5.3 The following strategy may be adopted for facilitating proper convergence of inter-related schemes:

- The inter-related schemes may be converged with the ongoing watershed programme only if required provision under administrative component is made and if implementation of works is to be carried out as per the participatory mechanisms under the watershed guidelines.
- The foreign funding agencies (dealing with the watershed programme) may be involved to fill the gaps in the mainstream programme either by associating themselves with the missing components or by implementing separate phases of



the project like probation phase, consolidation phase, etc, rather than starting parallel programmes.

- The guidelines of the watershed programme funded by the various ministries need to be integrated so that the programme can operate within a common framework not only with respect to financial allocation but also with regard to institutions at different levels, developmental components, etc. Keeping in view the complexity of the ongoing programmes and likely enhancement in their scopes during the next generation watershed programmes, it may be desirable to deploy a series of autonomous organizations at different levels (National level, State level, District level, project level, village level) for their congruent implementation. The respective funding organizations may work through the above setup so that greater professionalism can be provided under the project around commonly agreed framework, action plan and outcome.
- Experience at field level has shown that convergence of schemes from different departments can be relatively easily done if it happens around a sustainable CBO (rather than around one or the other developmental department). Since watershed project is to be managed through CBOs, it may be useful if these organizations are facilitated to take the initiative (or respond to the initiative) for achieving the desired convergence

**6.5.4 Convergence through the National Rainfed Area Authority:** The newly created National Rainfed Area Authority (NRAA) may help in promoting the new paradigm for development of rainfed areas. For this purpose, a greater working relationship would be required with the existing organizations at State and District levels. It is therefore desirable to create subsidiary units of National Rainfed Area Authority at State and District levels. These units should have an independent administrative setup (drawing and disbursing of funds) and may be anchored with those departments / committees which are dealing with overall planning of inter departmental programmes at different levels such as Planning Department at the State level and Planning Committee at District level. The mandate of NRAA and its subsidiary units should include (i) preparation of 20 year Perspective Plan for management of NRM (ii) coordination of different sources of funding for NRM related programmes, (iii) addressing issues arising on account of competing demands on land and water resources between rural and urban areas, (iv) facilitating the adoption of common process guidelines in all programmes related to natural resource management irrespective of the source of funding, (v) upscaling of successful experiences through innovative approaches by involving organizations which are directly associated with above experiences and (vi) directly managing the critical components which require special attentions under NRM programme e.g., institution building and capacity building component, concurrent evaluation of programme through external resource organization, preparation of demand driven comprehensive development plan for the identified area etc.

6.5.5 The NRAA should help restructure and converge the emerging and ongoing schemes which have direct bearing on sustainability of natural resources. These include (i) development of backward areas, (ii) NRM component in Bharat Nirman scheme, (iii) mitigating distress of farmers in endemic areas, (iv) natural resource development in tribal areas, (v) National Rural Employment Guarantee Scheme (vi) National Horticulture Mission etc. As indicated earlier, the proposed common process

guidelines may be made mandatory while converging the above schemes with the proposed watershed programmes.

## **6.6 Economic and Financial Incentives and Fund Flow**

**6.6.1 Need for public investment in the form of labour support to promote new paradigm in rainfed areas:** Securing the natural resource base of the rainfed farming systems is a fundamental issue. Soil conservation alone did not serve the purpose as it did not improve the overall soil health in the absence of soil organic matter. As the labour costs increased and with seasonal labour scarcities, private investments have gone towards chemical ways foregoing the traditional methods of soil fertility management. Public investments in the form of labour subsidies can ameliorate the situation and help in reviving the health of natural resources in rainfed areas. Improving soil health is an asset building process and is a public good.

**6.6.2 Revision in financial norms:** At present the overall budget for a watershed unit is worked out on the basis of Rs. 6000 per ha (in case of watersheds funded by MoRD) and Rs. 4,500 per ha to Rs. 6,000 per ha depending upon the degree of slope (in case of watersheds funded by MoA). The above financial norms were evolved more than 5 years ago. Under the changing scenario a number of new components (development of non-land based livelihoods, productivity enhancement in agriculture, horticulture, livestock, fisheries, etc.) are being added and a special investment is envisaged for addressing issues related to equity for resource poor families within the context of watershed programme.

6.6.3 Field experience has shown that the existing budget in the mainstream watershed programme is adequate for implementation of only 50-60 percent of NRM works. Further, there is no specific financial provision for establishment of Project Support Units at District and State levels and also for involvement of external resource persons for monitoring and evaluation of projects, field studies, action research; technical support, etc. In order to bridge these gaps and based on the analysis of financial aspects in innovative watershed projects funded through bilateral agencies, World Bank, etc., and keeping in view the rate of inflation, it is recommended that the existing financial norms of Rs. 6000 per ha may be enhanced to Rs. 15,000 per ha, with an understanding that it would be adjusted to the inflation rate at every two years interval.

**6.6.4 Allocation of funds for major components:** The type of components and allocation of funds (for each component) vary considerably in the watershed programmes of the two ministries. This variation is observed mainly with respect to four components, namely: (i) community organization, (ii) training programme, (iii) development of natural resource and (iv) development of livelihood. The latest MoRD (Hariyali) guidelines reduced the financial allocation under community organization and training programme by 5 percent and added to the allocation under natural resource development. The MoA guidelines however retained sufficient fund under community organization and training components. Further, it separated the fund for livelihood development out of the overall allocation for natural resource development.

Both the guidelines, however, did not create any financial provision for administrative component at District and State levels as well as for monitoring, evaluation and thematic studies to be carried out by external resource persons/ institutions. Details about existing and proposed allocation of budget are given in the following Table 8.

- The fund for the administrative component may be provided not only for CBOs and PIAs but also for creation of Project Support Units at District, State and National levels in order to improve overall delivery system under the project. Hence, allocation of budget under this head may be enhanced from 10 to 12 percent.
- Sufficient fund for community organization, training programme and follow-up support services may be provided in view of the emerging scenario in the next generation watershed programme. Hence this component (which may be called as integrated capacity building component) may have at least 10 percent financial allocation.
- A specific fund for the livelihood development component may be allocated under the project. This can be done by taking the required amount out of the overall fund for development of natural resource. The reduction in the allocation for natural resource development would eventually be compensated in two ways: (i) the overall amount under this component will not be reduced as overall financial allocation per ha is likely to be enhanced from Rs. 6000 to Rs. 15000, and (ii) convergence of funds from other related schemes like NREGS at the field level.

**Table 8: Existing and proposed allocation of fund for different components and sub-components under watershed programmes**

S. No.	Components/ sub-components	Financial allocation (%)		
		Existing		Proposed
		MoRD	MoA	
A.	Administrative component			
	At community and PIA level	10.0	10.0	10.0
	At District and State level	-	-	2.0
	Sub-total (A)	10.0	10.0	12.0
B.	Development cum management components			
	Integrated capacity building (including community organization)	5.0	12.5	10.0
	Development of natural resources	85.0	50.0	50.0
	Development of farms production systems and micro enterprises	-	27.5	25.0
	Planning Monitoring and evaluation	-	-	3.0
	<b>Sub-total (B)</b>	<b>90.0</b>	<b>90.0</b>	<b>88.0</b>
	<b>Total (A+B)</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

- A separate allocation of at least 28 percent of the fund for development of farm production system as well as micro enterprises so that due attention could be paid to this component during regular planning, implementation and monitoring of the programmes.
- A new allocation of 3 percent fund may be made for carrying out concurrent review, monitoring and evaluation and field studies by internal as well as external

resource persons/ institutions. This is one of the most crucial aspects, which needs separate financial provision at different levels.

**6.6.5 Decentralization in management of funds:** The fund flow mechanism for watershed projects particularly those implemented by Central Ministries / Departments is not appropriately streamlined. Since the natural resource management activities, such as, raising plantation, bunding, construction of water harvesting structures etc. are time bound operations and these are required to be carried well before the onset of monsoon, any delay in release of funds and its availability at the watershed level, defer execution of these activities. As a result, the benefits do not reach in time to the watershed community. Such delays are caused because the sanction of projects / releases from the GOI begins at the commencement of the financial year. The funds are then placed at the disposal of respective State Governments, who take their own time to release the funds to the implementing agencies. Such delays can be avoided by evolving a mechanism in which administrative approval in respect of projects is accorded before the commencement of the financial year. Fifty per cent of the release of approved projects may be made at the beginning of the financial year to execute operations that are necessary to be carried out before the commencement of monsoon. The remaining amount can be released later on.

6.6.6 A major shift in the financial management system was made since 1995 after the adoption of the common guidelines of MoRD. Two unique features of the above system are: (i) direct funding to the community for developmental component, and (ii) implementation of programme through contributory approach. Although the above financial mechanisms were clearly mentioned in the project guidelines, the operational modalities at field level are found to be quite inadequate. The following two types of situations are often observed particularly under the Government funded watershed programme.

- Release of developmental fund by the District nodal agency to WC is done against completed works (rather than against approved annual action Plan). This pattern used to be followed in watershed programmes managed through the conventional top-down approach.
- Execution of works (at field level) through nodal persons from local community and deduction of contribution from wages of the labourers or other service providers. This modality is also similar to the earlier situation where works were implemented through contractors or piece-meal workers.

6.6.7 Several innovative experiences are now available, which would help in improving the ongoing financial management system. This is now possible primarily due to increased social capital formation in rural areas through organization of SHGs (of women as well as men) and their federations. Main features of the proposed financial management system for the next generation watershed programme are indicated below:

- (i) Improving the mechanism for release of fund at various levels as per the following details: (i) fund from centre/ State level to District level against annual allocation; (ii) from District level to WC level against approved annual action Plan, and (iii) from WC level to user groups/ labour groups against completion of works. If needed, advance fund may be released by WC to mature SHGs in order to minimize the delay in payment of genuine wages to the labourers.

- (ii) Reduction in the number of installments for release of funds (preferably one installment per year).
- (iii) Allocation of fund as per phase specific requirement (e.g. larger proportion of fund for management component as compared to developmental component during capacity building phase and consolidation phase).
- (iv) Re-allocation of fund for community organization as well as capacity building at different levels including the community based organizations
- (v) Development of natural resource through higher rate of contribution (15 to 30 percent as compared to 5 to 10 percent).
- (vi) Collection of genuine contribution from actual users (through payment of at least half of the expected amount in advance before preparation of design and estimate).
- (vii) Integration of cost sharing and corpus building approaches for collection of contribution. As per these approaches, the project invests its development fund only after deducting the proposed contribution from user(s) (i.e. cost sharing approach) and provides a separate common fund later on (for building the corpus) for development of livelihoods as well as repair and maintenance of community oriented structures/ measures.
- (viii) Development of land-based and non-land based livelihoods through revolving fund to be handled by federation of SHGs (of women and men) at village level.
- (ix) Outsourcing of services on critical aspects to experienced resource organizations under GO, NGO, etc. on turnkey basis. The funds for this purpose are to be taken out of the concerned development component.
- (x) Integration of alternate source of funding (e.g. bilateral agency, NGO, etc) in the mainstream watershed programme particularly for the capacity building phase and consolidation phase.
- (xi) Adoption of voucher-based MIS for improving the efficiency of accounting system not only at District and PIA levels but also at CBO level.

**6.6.8 Reforms in fund flow mechanism** is crucial to meet the specific requirement under the participatory approach (as the payment for works, particularly labour wages are to be made on weekly basis out of project fund to avoid contractor-ship). The funds for NRM related schemes from Government of India may be sent directly to the District level NRM mission by the respective ministries / organizations. Likewise, State component of funds for above schemes may be sent by the State Government to the District level NRM mission (if needed via Zilla Parishad) so that subsequent fund flow could be in time to the identified CBOs and PIAs.

**6.6.9 Self reliance through proper management of public fund by Community Based Organizations:** During the last decade a major change has taken place regarding the strategy for management of public fund in development programmes. This has resulted into a shift towards ‘revolving fund’ oriented development in place of ‘one time subsidy’ oriented development. There is sufficient evidence to suggest that most of the relevant developmental works under watershed programme can be implemented through ‘revolving fund’. This is applicable not only for development of all type of livelihoods (non-land based as well as land-based) but also for development of privately owned natural resources. Sustainability of developmental interventions would

be a natural outcome of such an approach. This shall also help in switching from a project mode to a programme mode of development and thus eliminating the inevitable features of a project mode of operations i.e. targets, top-down, etc.

6.6.10 Though the above concept was understood since long, it has now become increasingly feasible due to enhancement of social capital in rural areas (through proper functioning of SHGs of women as well as of men; and also their federations at different levels). The watershed programme provides a unique opportunity to focus on the formation of social capital as an integral part of the programme. Hence the revolving fund based development holds the key for future sustainability under watershed programme.

## **6.7 Monitoring and Evaluation**

6.7.1 Substantial area has been covered under watershed development as well as development programme of degraded lands since Third Five Year Plan. The impact of development needs to be monitored and evaluated at 5 years periodicity. The task could be achieved by updating the land use and land degradation status using remote sensing and GIS and evaluating the impact in terms of change in land use pattern and over all change in biomass over the period. Digital image analysis could be employed to update existing status of land use and land degradation besides impact evaluation through supervised classification and change detection study through generation of Normalized Difference Vegetation Index (NDVI) of satellite data of pre and post treatment period.

**6.7.2 Greater focus on participatory monitoring and evaluation (PM&E) in line with proposed outputs and outcomes as per log-frame:** An efficient PM&E system, encompassing all aspects (outputs, quality of products, processes, outcomes, impacts, etc) with clearly defined responsibilities at different levels is a prerequisite for efficient project management. However, it is noticed that monitoring is presently limited to physical and financial progress with very little attention towards processes and impacts. It is also not designed as a framework for learning and decision support system for actors involved in project implementation.

6.7.3 The following specific provisions may therefore be made in the National guidelines for improving the efficiency of monitoring and evaluation system:

- (i) Action Plans may be prepared as per 'log-frame' at District and watershed levels.
- (ii) Set of indicators and baselines may be established on processes and products to facilitate comparison.
- (iii) Due emphasis may be laid on capacity building regarding Participatory Monitoring and Evaluation (PM&E) for CBOs and project staff.
- (iv) Specific funds may be allocated for monitoring at different levels.
- (v) A timeline may be prepared for monitoring and evaluation of activities as a part of the District level action Plan (to be implemented by internal as well as external resource persons).
- (vi) Besides involving existing Government institutions, a panel of resource organizations may be identified to carry out reviews and studies.

- (vii) Provision may be created for Project Support Units at State and District levels with Subject Matters Specialists in PM&E to facilitate proper monitoring of activities.
- (viii) Provision of a social scientist may also be made for data collection and analysis at cluster/ block level.
- (ix) Empowered committees may be constituted at State level to carry out critical monitoring of progress / processes and to address issues through administrative and policy support on concurrent basis.
- (x) Financial provision may be made for carrying out studies on emerging issues and concerns.
- (xi) Self-monitoring system may be facilitated through CBOs.
- (xii) MIS may be developed for data analysis and it may be linked with decision support system at District and State levels.
- (xiii) Flexibility may be provided in project design to incorporate learning and for making mid-course corrections.

## **6.8 Strengthening Information System**

6.8.1 Various departments and ministries deal development of watershed and degraded lands. All such activities need to be brought under single platform for proper accountability of the watershed development programme, to evolve future strategy and to avoid duplication of efforts. The matter deserves utmost priority in the context of management of soil, water and forest resources. It is essential to develop Information System for Watershed Development (ISWD) using GIS and RDBMS. It could be developed from the data base available with AISLUS that would allow also to recognize each and every watershed in the country with National Code. The estimation of degraded wastelands should be entrusted to one professionally competent organization such as AISLUS, NBSS&LUP and NRSA by drawing experts from relevant disciplines. The efforts should be closely linked with the Village Knowledge Centres and Village Resource Centres.

## **6.9 Scaling Up of Successful Experiences under Watershed Programmes**

6.9.1 A large number of innovative NGOs have established good models regarding sustainable development of natural resources in different parts of the country. Lack of sufficient funds is the main reason for limited coverage of area by them. There is a need to upscale such experiences in respective areas so that significant impact could be created through this initiative. Hence a separate channel of fund may be created for this purpose in different States. This provision may be made on the pattern of the one created earlier for NABARD during X Plan. A consortium of experienced NGOs may be constituted at National as well as State level (through registration under society act) to manage the above programme. During XI Plan about 20.0 lakh ha may be covered through this approach with a financial allocation of Rs 3000 crore.

## **Chapter VII**

# **RESEARCH AND TECHNOLOGY INTEGRATION WITH NATURAL RESOURCES MANAGEMENT**

## **7.1 Research and Technology for Promoting Sustainable Agriculture through Watershed Projects**

7.1.1 Research support to natural resource management and watershed projects is essential to derive maximum benefits to the watershed community and rural people at large. Generally, watershed approach is followed in rainfed areas which are typically characterized by low production and productivity. Further, crop diversification, input uses and credit availability are very scarce in these areas. It is, therefore, necessary that the watershed areas should be statutorily linked to professional institutions, such as, Krishi Vigyan Kendras (KVKs), State Agricultural Universities (SAUs), ICAR Institutions, etc. for technical backstopping for appropriately implementing various converging development programmes to maximize benefits to the community. In addition to integrating science and technology inputs in developing rainfed areas, there is a need to bring inputs from social and economic sciences to progressively improve the systems design; particularly in the areas of monitoring, evaluation and impact assessment. The following specific suggestions are made to integrate overall research and technological inputs for natural resource management, particularly under watershed programmes.

7.1.2 Ensuring that watershed based development evolves as a continuous process with an upward trajectory, research and technology inputs must play a crucial role. The long drawn stagnation suffered by the rainfed areas is mainly attributable to the weak R & D. Three aspects are important for integrating research and technology inputs in watershed projects:

7.1.3 First, need to adopt farming systems based approach as against crop or input centric approach for promoting productivity through watershed projects. In rainfed agriculture, a critical feature that needs special attention is that farming system based sustainable agriculture will require more location specific and participatory approaches as against crop/input specific centralized approaches with standardized recommendations. Livestock, inland fishery, and plantation may assume special significance in this context.

7.1.4 Second, differentiated approach should be adopted for focusing on the three categories of rainfed areas viz.; high potential rainfed regions, low potential dryland regions, and special problem areas. At present, focus of the watershed projects is mainly on treatments and enhancement of productivity. Issues of resource use efficiency are generally overlooked. It is imperative that identification and promotion of agronomic practices that are based on farming systems approach, assume equal importance, if not more, as watershed treatments.

7.1.5 Third, location specific R & D would require availability of skilled personnel not only for extension but, also for provision of bio-inputs, which initially would be in



short supply. Training and promotion of local entrepreneurs should receive special priority in this context.

## **7.2 Research Priorities in NRM in Rainfed Areas**

7.2.1 The Working Group identified thrust research areas for three categories of areas, namely, those receiving rainfall of less than 500 mm; those receiving 700-1100 mm; and those receiving more than 1100 mm per year. It may be useful to relate these areas respectively with low potential dryland regions; high potential rainfed regions and hilly/forest based economies.

**7.2.2 Low potential dry land regions (less than 500 mm rainfall):** Ground water recharge, improving farm ponds, water efficient crop systems, diversified farming systems integrating biomass components, improving water use efficiency, mechanisms and methods to provide protective irrigation, small ruminant focused livestock development, rainfed horticulture, *in situ* methods to build soil organic matter, and Low External Input Agriculture (LEIA) should be the main thrust in this region. Social regulation on ground water use and its equitable sharing, institutional mechanisms to ensure fodder security (like fodder banks), usufruct rights on commons etc., are the main thrust areas for action research. Risk minimization should be the core principle in the technological choices and low external input sustainable agriculture systems need to be explored.

7.2.3 Special efforts are also needed on revival of millet and other arid and semi-arid crops based systems through proper price support, value chain analysis and easing the critical bottlenecks like small scale processing technologies. Research support for the proposed “Mission on Millets and other Major Rainfed Crops” need to be established. Emphasis should be placed on developing and adopting improved varieties of pulses, coarse grains, oilseeds, fodder, spices and medicinal plants.

7.2.4 Support systems for small ruminants (goat and sheep) are very weak. A special drive is needed to understand the issues of small ruminants and to scale up successful experiences. Research is also needed on increasing the ‘rainfed’ components within the dairy sector i.e. substitution of the feed and fodder with rainfed biomass/ crops, promoting less water intensive animal types/ breeds and management practices.

**7.2.5 High potential rainfed regions (700 to 1100 mm rainfall):** Promoting socially regulated, equitable ground water use needs to be emphasized in this region. Appropriate technologies for drawl of ground water, ensuring power supply and harnessing renewable sources of energy for the purpose could be the thrust areas in that direction. Biomass based enterprise development and integrated farming systems could be the lead areas for research in these areas. Institutional support is needed for delivery of technical and extension services in partnership with universities, NGOs and young entrepreneurs. National and State level institutions for entrepreneurship development may be involved.

7.2.6 Water harvesting and supplementary irrigation to stabilize rainfed crop systems should be a focal area for action research. Special efforts on improving the rice based farming systems need to be taken up. System of Rice Intensification (SRI) is showing promise to reduce the seed, inputs and water use and improving yields. Research efforts are needed to fill in the gaps in larger adoption of SRI. The approach should be pursued up in a mission mode.

**7.2.7 Forest-hilly areas (>1100 mm rainfall):** Decentralized water harvesting and soil conservation methods, non timber forest product based plantation and integration of watershed development with forest management plans could be the focus in this region. Horticulture based integrated farming systems need to be strengthened. As these regions have high incidence of poverty, special focus on livelihood systems is much needed. Securing rights on land and other natural resources for the poor should be a special component in the watershed programmes and technical designs. Innovations in service delivery mechanisms for improving production systems is a challenging task and must be addressed on priority basis.

7.2.8 The Himalayan ecosystems need a special dispensation addressing the specific problems. Likewise, shifting cultivation in the forest tracts of Orissa and Andhra Pradesh need special focus, as they meet substantial part of livelihood needs of tribals. These areas are fast degrading as no conservation investments are made by the Government programmes due to the unsatisfactory situation on rights / access to land. Shifting cultivation in these regions must be recognized as a farming system and investments be made to improve its productivity with a long-term perspective.

### **7.3 Some Common Focus Areas Across all Rainfed Areas in the Country**

7.3.1 Owing to the complexities involved in rainfed farming systems research, special on-field operational participatory research programmes need to be evolved in partnership with CBOs and NGOs having demonstrated ability for research and development. Institutions like CRIDA, CAZRI are given special mandate and support for focusing on farming systems operational research by involving local organizations.

7.3.2 The present biases in research investment towards irrigated agriculture research need to be corrected by increasing the resource allocation for rainfed crops/ areas. Special incentives are needed to attract quality scientific personnel into rainfed areas research. Several empirical evidences show that the rainfed areas, including many less-favoured areas, give the most growth for an additional unit of investment, besides having large impact on poverty alleviation.

7.3.3 Innovative ways of improving soil health with low external inputs should receive greater attention. Promising results are reported by soil micro-biology research at ICRISAT on restoring soil nutrient availability to plants through improving life in the soil. Investments need to be made on participatory research on bringing these promising research outputs into wider practice and up-scaling. They have potential to correct the emerging problem of micro-nutrient deficiencies and addressing the larger issue of “hidden hunger”.

7.3.4 An exercise on detailed mapping (health maps of rainfed areas) of appropriate crop-livestock-horticulture strategies for different agro-climatic zones in the rainfed areas with a focus on identifying the unsustainable practices needs to be carried out. Such an exercise should take into account depletion of groundwater, degradation of land, depletion of soil nutrients, denudation of commons, level of crisis in agriculture and livelihoods. These maps could form a strategic basis for the NRAA to plan its region specific programmes.

7.3.5 Effective ways of composting, particularly *in situ* methods with low water requirements is much needed. The relation between soil moisture-soil organic matter-crop responses needs better appreciation to feed into policy making.

7.3.6 A special programme on value chain analysis in rainfed food crops based systems would be of historical significance. Coarse cereals, actually nutrition rich cereals, are showing promising increase in yield growth rates (higher than any other food crop like paddy, wheat etc.) in spite of the lack of investment in research support on these crops and heavy decline in their cultivated area. The technology research mission on millets and other rainfed crops should cover the following areas:

- (a) Yield improvement,
- (b) Evolving specific plant types for inter cropping systems,
- (c) Strategies to integrate millets, oilseeds and pulses into the rainfed farming systems including innovations on agronomic practices,
- (d) Addressing the issues of processing, storage etc., with a particular emphasis on low-cost milling technologies and increasing shelf life,.
- (e) Technologies to handle the produce once it is integrated into the regional PDS,
- (f) Assess nutritional attributes of millets and other rainfed crops and their importance; canvas the same for wider awareness,
- (g) Design a larger campaign to generate demand for millets and other rainfed crops including skill transfer in making various preparations, and
- (h) Exploring value addition opportunities and other sources of demand, particularly in the livestock sector.

7.3.7 Oil seed crops, which are major cash crops in large tracts of rainfed areas, deserve high priority. The focus of research investments should be on the basis of people depending on such crops but not on the easy availability of technology options. This trend needs to be corrected.

7.3.8 Decentralized processing technologies need to be developed as the centralized systems take away all the biomass (e.g., pigeon pea, groundnut) required for livestock or soil. This will also save transport cost and generate additional on-farm employment.

7.3.9 Risk reduction, as said earlier, should be the core principle for research in rainfed areas. Promising experiences are emerging across the country on managing insect pests with minimum use of chemical pesticides. The agriculture research system should recognize these emerging low-cost, low external input pest management options and strengthen them irrespective of the source of innovation. While there are substantive investments in intensive organic farming and standard recommendations, there is no reason why practices like NPM should not be taken up on a large scale.

7.3.10 Besides, special attention may be paid to the problem areas as listed in the report of the Parthasarathy Committee. The critical point to highlight is that farming system based sustainable agriculture will require more location specific and participatory approaches as against crop/input specific centralized approaches with standardized recommendations.

7.3.11 An interface between research and project implementation agencies is a missing link in the present institutional design. A nodal partnership at the State level with a

resource organization that can scout for technological solutions and provide necessary linkages with research establishments may be formally constituted to support implementation agencies. The NRAA should fill this gap.

## **7.4 Strengthening of Social Science Research and Monitoring**

7.4.1 Institutional innovations at the community level are crucial for any process based participatory approach to succeed. Constant monitoring and objective assessment of participatory processes, assessment of impacts that feed into improvement in institutional design and mid-course corrections in the NRM programmes will improve the effectiveness of investments. Such a process needs to be institutionalized.

7.4.2 Most of the NRM projects such as watershed projects, joint forest management, schemes for water harvesting, land reclamation, participatory irrigation management, tank rehabilitation, pasture development etc. have built-in provision for monitoring and evaluation (M & E) at different stages of the project implementation. But more than financial provisions, the main issue is that of the process through which these activities are undertaken and the end-use of the results obtained from the studies. Generally, M & E is undertaken as part of the funding requirements. Though the process involved in selecting the agencies for undertaking M & E is 'fair and transparent' there is often a built-in bias towards getting those agencies that have a track record of giving 'favorable' results. There are of course, not explicitly laid down criteria, but the implicit message is more or less the same. The problem with this kind of consideration, notwithstanding the issue of quality and unbiased-ness, is that the implementing agency remains cut-off from the field reality. This may hamper mid-course corrections or improvement in project design and implementation. Following aspects need special attention in this context.

- Undertake detailed monitoring on a sample basis and discuss the results on a multi-stake holder platform at least once in a year.
- Adopt three staged approach for project implementation as suggested by the Parthasarathy Committee, further developed into a ladder approach.
- Create a State and District level project monitoring cell directly under the NRAA for designing the methodology, scrutinizing the results and dissemination of the findings through discussions. The State level committee may be headed by a National level expert preferably from other State.
- Undertake post-facto research to capture the full impact and also understand the issue of sustainability and equity.
- Create space for obtaining people's perceptions and suggestions by adopting participatory M & E methods and M & E formats to be made smaller and simpler.
- Link closely link with remote sensing, NRM, and hydrological data bases.

7.4.3 The scope of the present M&E systems built into the project implementation need to be expanded to include longer term partnership with institutions of repute to provide objective feed back for system correction. Partnerships may be established with ICSSR institutions, research oriented organizations like IRMA, ICRISAT and civil society organizations like WASSAN, WOTR, etc.

7.4.4 It is essential that a consortium of organizations is set up nationally and also at the State level to take up regular studies on M & E, process evaluation and impact assessment, on a mutually agreed upon methodology. The team should meet periodically in order to share experiences as well as early signals coming from the field to feed into design corrections. Such an arrangement entrenched into the institutional framework at the National and State levels would remove the built-in bias towards giving 'favorable' results.

7.4.4 While most of the organizations are involved in various M & E activities, the need is to bring them onto a common platform so as to enlarge the scope of cross learning and creating a larger picture. A consortium of organizations under the aegis of NRAA may help ensuring consistency, continuity, and quality. The scope of these partnerships should be extended to dissemination and discussion on a public forum.

## **Chapter VIII**

### **NATURAL RESOURCES MANAGEMENT IN THE XI PLAN**

#### **8.1 Main Findings of the NRM Efforts in the Past Plans**

8.1.1 During the last three decades, despite considerable emphasis on conservation, natural resources degradation in the country has accelerated. Over exploitation of ground water across the country has resulted in increasing number of dark blocks every year. Improper use of surface water is resulting into water logging and salinity in soil to such an extent that it is nullifying the creation of additional area under irrigation. Unbalanced use and at times excessive dependence on chemical fertilizers (particularly urea), is deteriorating the chemical, physical and biological properties of soil. Mining of soil nutrients and depletion of soil organic matter is resulting into soil fatigue, which is affecting the growth in agriculture productivity. Degradation of perennial bio-mass in common land / forest department land continues to increase in spite of significant efforts under joint forest management. This is leading to enhancement of flash flood during rainy season, reduction in base flow during post rainy season as well as over all shortage of food and fodder.

8.1.2 The technology fatigue, soil fatigue, declining fertilizer response rate, depleting water resources, irrigation potential and capital stock and agro-climatic aberrations are identified as the key factors behind the deceleration in agriculture growth. The agriculture economy is seriously affected by the unsustainable use and degradation of the natural resources. The crisis is much more serious in the rainfed areas as indicated by the need for a larger relief package for an unprecedented agriculture crisis in Vidarbha, Andhra Pradesh and other states.

8.1.3 Large part of the natural resources that are fast degrading are lands, water and other natural resources owned by people for farming or accessed by them for farming or livelihood needs. Natural resources can not be conserved without sustaining peoples' economic and livelihood interest in them through appropriate farming systems. In spite of several recommendations on Farming Systems as the centre stage of rainfed area's policies, not much has been done in this direction. Further, the undifferentiated support available for general agriculture such as credit, price support, procurement, irrigation and input subsidies, infrastructure, research etc., are not accessed by farmers in rainfed areas due to inherent natural limitations. Rainfed farming in order to be viable needs continuous public support even beyond (and before) the timeframe of watershed programmes, which has generally been ignored in the past.

8.1.4 In the absence of differentiated support, simple soil and water conservation work with communities taken up in the watershed programmes to reverse land degradation, regenerate natural resources, improve farming systems and enhance livelihoods have remained wishful thinking. A holistic view of developing rainfed areas, matched comprehensively with investments, is required to lay the foundation for future growth of rainfed agriculture rather than making mere incremental changes in the earlier framework.

8.1.5 Natural resources development programmes were taken up by a range of organizations which could be classified into two major categories. First, those adopting

integrated approach under participatory watershed development programmes as taken up largely by MoA, MoRD, NABARD, externally funded projects, international NGOs etc. The focus is on simultaneous development of multiple natural resources facilitated by a multi-disciplinary team. While MoRD programmes have exclusive focus on development of natural resources, others integrate development of livelihoods (farm production system as well as off-farm livelihoods). Second, those adopting situation specific approach dealing with a specific resource/ thematic focal area like reclamation of problem soils etc. adopted by various Ministries and implemented by specific departments.

8.1.6 During the Tenth Plan, several useful steps were taken. These included large-scale adoption of people centered participatory approach with direct funding to community based organizations in watershed development, irrigation management, joint forest management etc., involvement of resource organizations, change in the approach of Government to assume funding and facilitator roles in place of implementer's role and continued commitment of Government of India for supporting the comprehensive participatory natural resource development programme on watershed basis in rainfed areas.

8.1.7 But, several weaknesses have persisted and new weaknesses have emerged. For instance, the participatory approach is still not institutionalized over a wide area especially in the Government funded programmes in spite of evidence of its success (on a limited scale). Several NRM related schemes continue to be managed through top down approach. Consequently, post project sustainability of interventions continues to be low on a large scale even in watershed projects which are managed as per the participatory guidelines. Poor coordination, delivery and fund flow systems, lack of user's right on CPR and little attention on monitoring and evaluation have further exacerbated the problems.

8.1.8 Development of livelihoods (farm production systems as well as off-farm livelihoods) continues to receive low attention under the watershed programmes. Although some attempts were made to integrate this component by the Ministry of Agriculture, enough progress could not be made due to delay in fund flow as well as low attention towards proper organization of self-help groups. The efforts were narrowly focused on limited number of trials and demonstrations at the project cost; livelihood component was not even considered as a formal agenda under the programme.

8.1.9 The scientific concept of watershed based development could not be properly adopted in majority of the cases due to staggering of 500 ha micro-watershed units over the entire block/ district rather than selecting at-least 10 micro-watersheds in a compact area with each PIA. Further, convergence among inter-related schemes of different development departments could not take place due to striking differences in the operational guidelines as well as social considerations (of not concentrating different schemes at one place and thus depriving the community in other places).

8.1.10 Inclusiveness has remained illusive in the watershed based development programmes. Equity for resource poor families and empowerment of women are yet to receive due emphasis in the ongoing programmes. The participatory dimension of the guidelines under watershed programme has suffered a serious setback after the adoption of Hariyali guidelines with MoRD in spite of repeated negative feedback from various field based organizations associated with participatory watershed programmes.

The space for NGOs has been gradually reduced in spite of the fact that good results have been obtained by them particularly in situations where there has been sufficient flexibility in operation (as in case of watershed programme funded, managed as well as implemented by NGOs). These experiences are however lying in isolation without any significant effort to upscale them. Likewise, many of the innovative experiences obtained under externally aided projects (managed and implemented by State Govt.) could not be up-scaled in the areas where Govt. of India funded watershed programmes are operating (even by the respective States).

8.1.11 The available budget has been sufficient to treat only 60-70 percent of the watershed area with appropriate land and water development measures. Besides this no specific financial provision has been made for development of livelihoods / rainfed farming systems in majority of watersheds.

## **8.2 Shift in the Overall Approach for Natural Resources Management**

8.2.1 Sustainable management of natural resources is presently the most critical concern at all levels. This applies to the natural resource to be developed under the watershed programme as well as other areas outside the watershed programme. It is being widely recognized that a comprehensive approach is to be adopted if sustainability is to be achieved in natural resource management. This may involve simultaneous thrust on the following three main components:

1. institution building as well as capacity building,
2. management of natural resources besides development of the resource, and
3. diversification and intensification of rainfed farming systems.

8.2.2 It is also being realized that different areas are at different levels of development with regard to natural resources. Hence each area may not require all the components and sub-components indicated under the comprehensive approach. The areas already developed under watershed programme up to the X Plan may be immediately ready for adoption of rainfed farming system. The comprehensive approach (with all the three components) may, however, be necessary in areas which are to be newly identified under watershed programme during the X Plan. For addressing the above variability in situations it is desirable to adopt ladder based development so that different organizations/projects may consider relevant components and sub-components depending upon the level up to which they have already reached in the proposed ladder (of components and sub-components).

8.2.3 Besides the comprehensive approach in watershed areas, there are other areas where situation specific approach is to be adopted for development of only one natural resource at a given place. In such areas management of natural resource may require equal attention besides development of natural resource. In the same way rainfed farming systems are to be adopted in different types of areas namely (i) those which are already developed under watershed programme up to the X Plan, (ii) those which are proposed to be developed during the XI Plan and (iii) other areas where natural resources may have been developed by farmers themselves. Sustainable development of natural resources would be possible if institution building and capacity building have taken place properly. Hence this component may be crucial in all situations indicated above.



## **8.3 Key Features of the Proposed Comprehensive Approach**

**8.3.1 Differentiated programme components and subcomponents:** Broadly speaking, there are three major components under the comprehensive natural resource management programme, namely, (i) Institution Building and Capacity Building, (ii) Development and Management of Natural Resources, and (iii) Diversification and Intensification of Rainfed Farming System. Each of these components has a number of critical sub-components, as detailed below.

**8.3.2 Institution building and capacity building:** This component consists of four major sub-components, namely, (i) establishment of project based delivery mechanism at State, District, block and village levels, (ii) capacity building of different stake holders through a small scale development of natural resources as well as rainfed farming system, (iii) monitoring and evaluation of above components as per the specified outputs and outcomes, and (iv) preparation of strategic plan for development of natural resources of entire area under the mini-watershed (Table 9).

8.3.3 Under this component, WDTs with PIAs may consist of only those persons who have social science background with required experience in organization of SHGs and management of training programmes particularly for CBOs. Any technical support for limited development of natural resource as well as management of rainfed farming systems may be obtained through outsourcing to experienced resource persons / organizations approved by district watershed management committee. The expenses for this purpose may be met out of the budget for the respective developmental component.

8.3.4 Towards the end of this component a comprehensive strategic plan may be prepared for the entire watershed area with the particular PIA. This plan may be prepared through out-sourcing to experienced organizations on competitive basis. The payment for this purpose may be made against the specified outputs. The above plan shall become the basis for preparation for annual Action Plan of various components and sub-components under the project.

**8.3.5 Development and management of natural resources:** This component may consist of two parts, namely, (i) development of natural resources and (ii) management of natural resources. The part 1 of this component consists of five sub-components, namely, (i) large scale development of land, water and perennial biomass, (ii) treatment of problem soils, (iii) plantation of horticulture crops, (iv) limited development of rainfed farming systems through trials and demonstrations, (v) development of need based infrastructure, and (vi) establishing support systems for livestock. Likewise the part 2 of this component consists of five sub-components, namely, (i) formal allocation of users' right over CPR, (ii) collection of user charges for CPR, (iii) repair and maintenance of assets in CPR, (iv) sustainable use of natural resources, and (v) preparation of Strategic Plan for development of rainfed farming systems in the entire project area (Table 9).

8.3.6 Under the part 1 of this component, the WDTs may consist of persons having required technical qualification as well as experience with respect to the concerned natural resource namely land, water and perennial biomass. Besides these one additional person with social background may be continued under the above part of this component. The part 2 may be managed only through WDTs with social background. Any technical assistance under this part may be obtained through outsourcing.

**Table 9: Details about major components as well as project duration for sustainable development of natural resources on watershed basis during XI Plan**

S. No.	Components	Duration	Sub-components
1.	Institution building & capacity building	2 yrs	<ul style="list-style-type: none"> <li>• Project based institution building at State, District and watershed level.</li> <li>• Capacity building through limited development of natural resources &amp; rainfed farming systems.</li> <li>• Monitoring &amp; evaluation of this phase as per outputs.</li> <li>• Preparation of strategic Plan for development of natural resource in the entire project area.</li> </ul>
2.	Development and management of natural resource as well as infrastructure	3 yrs	<ul style="list-style-type: none"> <li>• Development of natural resource / infrastructure.</li> <li>• Large scale development of land, water and perennial biomass.</li> <li>• Treatment of problems soils.</li> <li>• Plantation of horticulture crops.</li> <li>• Limited development of rainfed farming systems through trials and demonstrations.</li> <li>• Development of need based infrastructure.</li> </ul>
		2 yrs	<ul style="list-style-type: none"> <li>• Management of natural resource / infrastructure.</li> <li>• Formal allocation of user's right over CPR.</li> <li>• Collection of user charges for CPR.</li> <li>• Repair and maintenance of CPR.</li> <li>• Sustainable use of natural resource.</li> <li>• Preparation of strategic Plan for development of rainfed farming system in entire project area.</li> </ul>
3	Development of rainfed farming system *	3 yrs	<ul style="list-style-type: none"> <li>• Diversification of farming systems as per typologies of farms / families</li> <li>• Large scale development of agriculture, horticulture, livestock, fisheries etc through up-scaling of successful experiences</li> <li>• Improvement in income from off-farm livelihoods</li> <li>• Sustainable use of revolving fund as well as credit from external sources</li> <li>• Collective marketing of produce including processing at village level.</li> </ul>
	<b>Total:</b>	<b>10 yrs</b>	

\*This shall include farm based as well as non-farm based livelihoods.

8.3.7 A number of need based infrastructure facilities / equipment are also to be provided under the programme for making the best use of natural resources. This may include storage structures for grain bank / seed bank, equipment for generation of energy at local levels through run-off water, perennial biomass etc. These facilities may be created along with development and management of natural resources.

**8.3.8 Diversification and intensification of rainfed farming system:** This component may focus on the following five sub-components, (i) diversification of farming systems as per typologies of families, (ii) improvement in productivity of agriculture, horticulture, livestock, fisheries etc., (iii) sustainable use of revolving funds as well as integration of financial agencies through micro Credit Plans, (iv) improvement in income from off-farm livelihoods through sustainable use of revolving fund, and (v) collective marketing of produce including processing at village level (Table 9).

8.3.9 Under this component WDTs may consist mainly of those persons who have required technical qualifications and experience with respect to each type of livelihood namely agriculture, horticulture, livestock, fisheries, micro-enterprises etc. Besides this one person with social science background may maintain continuity from the earlier components.

8.3.10 Collective marketing of produce would be a critical sub-component at this stage. Hence, technical assistance on this aspect may be arranged through outsourcing to experienced an organization. The expenses for this aspect may be met out of the funds under this component.

## **8.4 Project Duration**

8.4.1 Comprehensive management of natural resources under watershed programme would deal with a large number of components and sub-components as indicated above. This would obviously require longer duration as compared to the earlier approach adopted during the X Plan. Likewise, participatory approach requires longer duration in order to get properly institutionalized particularly in new areas. Based upon the field experience in successful watersheds (where comprehensive approach has been adopted) it is recommended that overall duration of the project may be enhanced from 5 years to 10 years for new watershed areas to be identified during the XI Plan.

8.4.2 The first component under the above project deals with institution building and capacity building at all levels. Although this component shall continue throughout the project period, a specific thrust on this aspect is to be given during the initial 2 years for some of the sub-components indicated in Table 9.

8.4.3 As discussed earlier, the second component under the above project is to be implemented in two parts. The part 1 is to deal with development of natural resource and part 2 is to deal with management of natural resource. The first part of this component may continue for three years where as the second part may continue for subsequent two years (Table 9).

8.4.4 The component related to development of rainfed farming system would initially continue in a project mode for three years (Table 9). Later on it may be managed in a programme mode by the community based organizations with the help of common fund / revolving fund available with the above organizations.

## **8.5 Cost Norms and Allocation of Funds for Different Components**

8.5.1 During the X Plan the average cost norm for watershed programme varied from ministry to ministry. The cost norm with the Ministry of Agriculture was Rs.4500 per ha (for areas where slope was less than 8 per cent) and Rs.6000 per ha (for areas having higher slope). In case of Ministry of Rural Development, the norm was Rs.6000 per ha for all areas under its jurisdiction.

8.5.2 The allocation between different components also varied considerably from ministry to ministry. For the institution building and capacity building component, the allocation was only 15 percent in case of MoRD watersheds (which includes 10 percent towards administration and 5 percent towards community organization + training programme). In case of Ministry of Agriculture watersheds the allocation for this component was 22.5 percent (which includes 12.5 percent for administration and 10 percent for community organization + training programme).

8.5.3 The allocation for developmental component was 85 percent in case of watersheds with MoRD and 77.5 percent in case of watersheds with MoA. The entire amount under this component was to be used for development of natural resource in watersheds funded by MoRD, as there was no specific allocation for development of livelihoods. In case of watersheds with MoA only 50 percent allocation was made for natural resource development and the remaining 27.5 percent was allocated for farm production systems including off- farm livelihoods.

8.5.4 As discussed earlier, the above funds were found to be inadequate even for treating the entire area under the on going watershed programme. This constraint is likely to further aggravate in future since the natural resource development is going to be carried out in the entire area; as well as livelihood development component is to be added as an integral part of the programme. Detailed analysis in successful watersheds implemented particularly under bilateral projects has shown that comprehensive development of natural resource as well as livelihoods require an average of Rs.15000 per ha. Hence, this amount should be considered for all types of watersheds funded by Govt. of India during the XI Plan towards achieving sustainability of natural resource management.

8.5.5 Keeping the above in view, the following types of allocations may be considered for different components and sub-components during the XI Plan. A total of 25 per cent amount which may include (i) 12 per cent for administrative cost (consisting 10 per cent for PIA and CBO and 2 percent for project based SMS to be provided under the PMU at District and State level), (ii) 13 per cent for management component (consisting of 10 per cent for committee organizations + training programme and 3 per cent for planning, monitoring, evaluation through external resource persons, Table 10).

8.5.6 A total of 50 percent amount may be allocated for natural resource development including provision for infrastructure facilities / equipment. There is no further break-up for this component because actual need is going to vary from watershed to watershed. Further clarity on this aspect may emerge during preparation of strategic Plan for this component (Table 10).

8.5.7 A total of 25 per cent of the amount may be allocated for rainfed farming systems. Out of this 15 per cent may be used for development of farming and farm

production system and 10 per cent for off-farm livelihoods (micro-enterprises). These components may focus on the following sets of activities: (i) Organization of trials and demonstrations on grant basis, (ii) exposure visit to successful experiences and follow-up support services on grant basis, (iii) up-scaling of above experiences through revolving fund, (iv) supply of equipment on contributory basis, and (v) provision of incentives towards labor costs for adoption of new paradigm on grant basis (Table 10).

**Table 10: Financial allocation for sustainable development of natural resources on watershed basis during XI Plan**

S. No.	Component	Allocation of fund (percent)			Funds for sub-components during XI Plan
		Existing (MORD)	Existing (MOA)	Proposed (XI Plan)	
1.	Institution building and capacity building	15.0	22.5	25.0	<b>Administrative component</b> <ul style="list-style-type: none"> <li>• Administrative cost at PIA and CBO levels (10%)</li> <li>• Administrative cost at district and State levels (2%)</li> </ul> <b>Management component</b> <ul style="list-style-type: none"> <li>• Community organization (5%)</li> <li>• Capacity building of stake holders (5%)</li> <li>• Preparation of strategic Plan (1%)</li> <li>• Concurrent evaluation through external resource persons (2% )</li> </ul>
2.	Development and management of natural resource as well as infrastructure	85.0	50.0	50.0	As per the need (to be assessed through demand driven Planning
3.	Development of rainfed farming system	0.0	27.5	25.0	Farm production system - 15% Off-farm livelihoods – 10%
	<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	

## 8.6 Institutional Framework for Management of Different Components

8.6.1 Inadequate delivery system has been identified as the weakest link in the ongoing watershed programme where participatory approach is to be institutionalized on a large scale. Hence, it calls for a major reform on this aspect at different levels as per details given in Table 11. The proposed institutional framework is based upon the following five aspects:

- The emerging NRAA may have its subsidiary autonomous units at State level as well as District levels in order to perform its mandate in a proper manner.
- The overall administration of watershed programme at State level as well as District level may be carried out through a single autonomous nodal organization at respective levels even if funds may flow to them through separate ministries from national level. These organizations may be called as State level natural resource management mission and District level natural resource management mission.
- The above nodal organizations may be supported by Project Management Units (PMU) at State as well as District level. The size of each PMU particularly at District level may vary depending upon number of watersheds to be managed by it. These units should be created only for the specific project period.
- An empowered committee may be constituted at each level (national, State and District levels) to facilitate democratic decision making process as well as to provide timely administrative and management support to the watershed project. The above committees may have the administrative authority to issue Government orders and office orders for improving the watershed programme based upon the feedback received through various sources from time to time.
- A consortium of support resource organizations may be formed at national, State and District levels for building the capacity of stakeholders at respective levels. This body may work on contractual basis against the specific TOR.

**Table 11: Institutional framework for sustainable development of natural resources on watershed basis during XI Plan**

S. No.	Stage	Institutional framework at different levels
1.	Institution building and capacity building*	<ul style="list-style-type: none"> <li>• Initial two years under the project</li> <li>• National Rainfed Area Authority (NRAA)</li> <li>• Subsequent years of the project</li> <li>• Nodal organizations at State and District levels</li> </ul>
2.	Development and management of natural resource as well as infrastructure	<ul style="list-style-type: none"> <li>• <b>National level:</b> Separately by each ministry</li> <li>• <b>State level:</b> natural resource management mission</li> <li>• <b>District level:</b> natural resource management mission</li> </ul>
3	Development of rainfed farming system	- do -

\*Institution building and capacity building components are the weakest links in the ongoing watershed programmes. This is resulting into low sustainability of interventions during post project period. Hence the NRAA may also focus on these aspects at least for two initial years through involvement of reputed and experienced organizations in NGO, GO and private sectors on competitive basis as per the specified outputs and outcomes.

## 8.7 Proposed Areas and Requirements of Funds for Natural Resources Development During the XI Plan

8.7.1 Broadly speaking, the available proposals for natural resource management could be grouped in three categories, namely, (i) comprehensive development of natural resource on watershed basis, (ii) situation specific development of natural resources – outside the watershed project area, and (iii) large scale development of rainfed farming systems – inside and outside the watershed project areas. Further details about each category of proposals are indicated below:

**8.7.2 Comprehensive development of natural resources:** As discussed earlier, the proposal under this category would involve development of natural resources as well as rainfed farming systems. Hence, all the components and sub-components indicated earlier under Table 9 may be considered under this proposal with project duration of 10 years. Keeping in view the proposals made by different ministries / organizations, it is proposed to carry out comprehensive development of natural resources over an area of 366 lakh ha with a total budget requirement of Rs. 54,900 crore during the XI Plan (Table 12).

**Table 12: Details about integrated development of natural resource inside watershed projects during XI Plan**

S. No.	Organization	Area (lakh ha)	Unit cost (Rs./ ha)	Total cost (Rs. crore)
1.	Ministry of Agriculture	67	15000	10050
2.	Ministry of Rural development	250	15000	37500
3.	NABARD	4	15000	600
4.	Tribal Department	NA	NA	NA
5.	Foreign funding organizations	5	15000	750
6.	Private organizations	20	15000	3000
7.	Non-government organizations	20	15000	3000
8.	Any other	-	-	-
	<b>Total</b>	<b>366</b>	<b>15000</b>	<b>54900</b>

NA: not available

**8.7.3 Situation specific development of natural resource:** Under this category of proposals only one type of natural resource may be developed at a given place depending upon the severity of it's over exploitation. Major emphasis under this category may be given on the following two components (i) institution building and capacity building and (ii) development and management of situation specific natural resource as per the details given earlier. Extent of area to be covered under this category of proposals with respect to reclamation of problem soils by Ministry of Agriculture is given in Table 13 which includes a total of 24 lakh ha with a budget estimate of Rs. 2,400 crore during the XI Plan.

8.7.4 Besides problem soils, like saline, alkali and acidic soils, comprehensive development of degraded lands assigned to resource poor families under land distribution programmes should also be emphasized. About 9.04 m ha land has been distributed over years to the poor under various land distribution programmes; about 66percent of the land distributed is from the Government waste lands. As they are highly degraded, much of these lands are left fallow defeating the very purpose of land distribution.

**Table 13: Details about situation specific development of natural resources (outside the watershed project area) in XI Plan**

S. No.	Type of scheme	Name of the organization	Area (lakh ha)	Unit cost (Rs. /ha)	Total cost (Rs. crore)
A.	Development of surface water	MOWR	NA	NA	NA
B.	Development of ground water	-do-	NA	NA	NA
C.	National Afforestation programme	MOEF	NA	NA	NA
E.	Reclamation of problem soils	MOA	24	10000	2400
	<b>Total</b>		<b>24</b>	<b>10000</b>	<b>2400</b>

NA: not available

8.7.5 Towards comprehensive rehabilitation of lands assigned to poor and improving related livelihoods to bring the lands into productive use, investments need to be made in facilitating the assignees to have clear land titles and occupation of land, soil and water conservation, biomass regeneration, improving soil fertility and irrigation. Integration of livestock, especially easing the constraints of plough bullocks, credit linkages etc., also should find a place in the programme architecture. The programme can be taken up on blocks of assigned land with adequate investments on capacity building and community organisation. The XI Plan should target developing an area of 4.5 m ha of assigned land with an investment of Rs.6,750 crore. This budget proposal is included under the head ‘Location specific management of natural resources outside the watershed area’.

8.7.6 Development of common land with revenue department through adequate investment deserves special attention. High levels of encroachment and high levels of degradation due to open access are the main problems of the common lands. Substantial field experiences are now available across the country on facilitating community centered regeneration of the common lands with a focus on natural regeneration. Foundation for Ecological Security in several states, Ananta Paryavarana Parirakshana Samithi in Andhra Pradesh and several other organizations have demonstrated the methods of large-scale regeneration of common lands. A programme on “Community Centered Rehabilitation of Common Lands” should be taken up during the XI Plan targeting an area of 2.0 m ha outside the proposed watershed development. programme.



The processes of community organization, vesting usufruct rights, planning and implementation can be synthesized from the field experiences.

8.7.7 Investments in the revival of small size indigenous water harvesting structures and in the development of community borewells will help in retaining ground water as a common property resource, as already discussed earlier.

**8.7.8 Large scale development of rainfed farming systems:** As discussed earlier, a new programme on “Natural Resources Use and Management Based on Rainfed Farming Systems” approach should be taken up during the XI Plan. Such a programme would translate the conservation efforts made in the watershed programmes into production and livelihood benefits and thereby would ensure sustainability of the natural resources. While such a programme is to be in-built into the regular participatory watershed development programmes with enhanced budgets, a special programme also needs to be taken up to cover the areas outside the current watershed programmes i.e. areas already treated up to the X Plan and other areas even developed by farmers themselves. The programme can have a target coverage of 663 lakh ha during the XI Plan with 363 lakh ha area covered within the watershed programmes initiated in the XI Plan period and an additional area of 300 lakh ha in completed watershed programmes and other areas developed by farmers themselves. The programme can be called ‘Revival of Rainfed Farming Systems Programme’.

8.7.9 A total allocation of Rs.15,000 crore is suggested during the XI Plan period for the programme (Table 14) which can be split into two phases. The first phase of two years (Rs.2,000 crore allocation) to build substantive experience in operationalising such programme in 400 high priority blocks spread in different typologies of rainfed areas (< 700 mm rainfall, between 700 and 1100 mm rainfall and Himalayan rainfed areas) and the second phase (Rs.13,000 crore allocation) starting from the year 2009 could scale up the programme to cover another 1200 blocks. With the emerging experience from operationalising the programme during the first phase, the 2nd phase programme guidelines can be improvised. The time frame of the programme could be four years from the day of operationalising the programme in the villages.

**Table 14: Development of rainfed farming systems (inside and outside the watershed areas) in XI Plan**

S. No.	Type of scheme	Organization	Area (lakh ha)	Unit cost (Rs./ha)	Total cost (Rs. crore)	No. of districts
1.	Watershed area proposed during XI Plan	MoA	*	*	*	
2.	Watershed area developed earlier up to X Plan	MoA	150	5000	7500	
3.	Other areas	MoA	150	5000	7500	
	<b>Total</b>		<b>300</b>	<b>5000</b>	<b>15000</b>	

\*Included under Table 10.

8.7.10 A Development Block can be a unit area instead of a micro-watershed for the purpose of the programme implementation. About 25,000 ha area can be targeted for

coverage in each block. Prioritization of Gram Panchayats can also be done within each block. The programme should focus on the small and marginal farmers and follow a participatory process and should be embedded in the community based organizations/organized farmer groups. The costs of community organization, facilitation and knowledge based extension should be inbuilt into the package. The programme should offer a package of incentives, services, technological options and labour support for groups of farmers willing to diversify and follow appropriate farming systems.

8.7.11 The package of measures could include comprehensive soil health improvement focusing on soil organic matter, biomass regeneration and composting (high biomass to dung ratio), revival of green (leaf) manuring and other sustainable practices, integrated crop systems (with multi-purpose trees, rainfed fodder, livestock feed as integral components), protective irrigation coverage to stabilize rainfed crop systems, collective utilities like seed banks, threshing floors, biomass-shredders or chaff cutters, local storage, processing facilities and support for integrating livestock . The programme should be founded on the basis of indigenous knowledge systems and using locally available inputs. Additional labour support can be allocated to such groups of farmers for a specific period of 4 to 5 years under NREG for purposes like common grazing, protection of plantations, critical watering support for trees, green leaf manuring etc. Though the budgets are allocated on per ha basis, operationally budgets should also be used to develop support systems at the block level or at Gram Panchayat in addition to supporting farmers in groups.

8.7.12 The programme should have measurable location specific indicators for transition to healthy rainfed farming systems. In the first phase the programme should be taken up by involving experienced NGOs and research establishments who have demonstrated such results on ground. Capacity building and community organization should also be funded under the programme.

## **8.8 Financial Allocations for Creation of Database and Soil and Land Use Mapping and Communication**

**8.8.1 Budget outlay for data base creation:** The non-availability of comprehensive database and information on delineation and codification of watersheds and on soil fertility is a major bottleneck in planning, programming and implementation of NRM activities, particularly at the grassroot level. Based on the status of soil survey and land degradation mapping, a tentative budget outlay has been prepared and furnished herewith for fund allocation (Table 15).

8.8.2 The task of data base generation followed by development of digital spatial data need to be synergized and harmonized by integrating the services of organizations such as AISLUS, NBSS&LUP, NRSA and NIC. The National Rainfed Area Authority, along with the National Fisheries Development Board and the National Livestock Council, as proposed by the National Commission on Farmers, in collaboration with concerned ICAR, other Central and State Government institutions, including State Agricultural Universities, should help the NRM programme for generating the necessary data.

**Table 15: Tentative Budget Outlay for Data Base Creation**

S. No.	Kind of Data Base	Type of Survey	Area to be Surveyed (m ha)	Cost of Survey (Rs. in crore)	Remarks
1.	Watershed Prioritization	Rapid Reconnaissance Survey (1:50000)	100.0	25.0	In-house programme of AISLUS for XI Plan
2.	Soil reconnaissance at level	Soil Resource Mapping (1:50000)	110.0	10.0	Component of Nationwide Soil and Land Degradation Mapping. Provision has been kept in the XI Plan budget of AISLUS
3.	Realistic data base on Degraded Lands	Land Degradation Mapping (1:50000)	329.0	12.0	Component of Nationwide Soil and Land Degradation Mapping. Provision has been kept in the XI Plan budget of NRSA
4.	Detailed Soil Data for Priority Watersheds	Detailed Soil Survey (1:4000/15000)	25.0	6.25	In-house programme of AISLUS
5.	Detailed Soil Data Base for Agriculture Land	Detailed Soil Survey (1:4000/15000)	140.0	700.0	Funds allocation is required
6.	Development of Digital Spatial Data Base for Watershed, Soil and Degraded Lands	Data Base of AISLUS will be brought under digital format as per MOU between DAC and NIC	-	-	Part provision has been kept in the Budget Outlay for XI Plan
7.	Updating of Land Use and Land Degradation status	RS data on 1:50000 scale	5000 scenes	15.0 @ Rs. 19,000.0 per scene	Budget provision for remote sensing data, on screen updating and ground truthing is to be made
8.	Monitoring and Evaluation using RS & GIS techniques	Digital Analysis of pre and post treatment period data	50000 watersheds	30.0 @ Rs. 60,000.0 per watershed	Budget provision for remote sensing data, digital analysis and ground truthing is to be made
*9.	Space enabled spatial database for Village Resource Centre	Digital Spatial Database of natural resources on 1:10000 scale registered to Cadastral Survey plots using high resolution satellite data	5000 VRC	1000 @ Rs. 20.0 lakh per VRC	Budget provision for VRC database to be made for XI Plan

\*Necessary funds will be made available by the Department of Space

8.8.3 An effective rural knowledge society and ICT system involving various stakeholders – farmers, development agents and agencies, knowledge generators and distributors (universities and public and private institutions) should be established for steering a knowledge-based NRM. Village Knowledge Centres (*Gyan Chaupals*) with extensive rural connectivity, including use of cell phones, should be established in each Gram Panchayat for bridging the information and knowledge gap and thus empowering the farmers by latest knowledge on NRM, diagnostics and input and natural resources use.

## **8.9 Improvement in Fund Flow Mechanism**

8.9.1 The existing fund flow under watershed programme varies from Ministry to Ministry. In the case of MoA schemes the fund flows from Govt. of India to State Governments through Macro Management mode, while in MoRD schemes it flows directly from Central Government to an autonomous organisation at the District level. In fact, at District level all sources of funding should converge at one nodal agency which must ensure smooth flow of funds to the implementers, facilitators and other stakeholders at the field level.

8.9.2 The fund flow through the Macro Management System has suffered a severe set back in terms of delay in release of funds as well as diversion of funds to other schemes where non participatory approaches were adopted. Under the participatory approach in watershed programme, the people are expected to implement the programme without the involvement of contractors. Hence, it is crucial that the fund flow mechanism is improved in case of schemes of the MoA on the pattern of the mechanism with the MoRD schemes.

8.9.3 Division of funds between Centre and States varies from programme to programme. Some schemes require State government to contribute 10 per cent while others require more. One or two schemes do not require any contribution from the State. Naturally, State Governments have a tendency to choose only those schemes which are free for them. In view of this, it is crucial that all schemes on NRM should have the same share from the State so that same preference could be given to all schemes by the State (the amount of share actually does not matter much).

8.9.4 Use of WDF with NABARD should be promoted on full grant basis provided (i) it is used in mitigating the distress in the 31 endemic Districts, (ii) interest earned through RIDF will continue to be added in the corpus as a matching contribution by NABARD and (iii) the funds are used to create innovative approaches in natural resource use and management. The WDF guidelines need to be suitably revised in this context.

## Annexure – I

### Constitution of a Working Group on Natural Resource Management for the Eleventh Five Year Plan (2007-2012)

Fine. M-12043/12/2006-Agri.  
Government of India  
Planning Commission  
(Agriculture Division)

Yolanda Bhawan, Parliament street,  
New Delhi, 7th June, 2006

**Subject:** Constitution of a Working Group on Natural Resource Management for the Eleventh Five Year Plan (2007-2012)

In pursuance of Plan Coordination Division's U.O. No. N-11016/4/2005-PC dated 21st December, 2005, it has been decided to constitute a Working Group on Natural Resource Management in the context of formulation of the Eleventh Five Year Plan (2007-2012). The composition and terms of reference of the Working Group are as follows:

1.	Shri R. B. Singh, Member, National Commission on Farmers on Farmers, Office Block, 2nd Floor, NASC Complex, Pop: Jodhpur Village, Pisa, New Delhi – 110 012	Chairman
2.	Dr. J. S. Samara, DDG, ICAR, New Delhi	Member
3.	Dr. K. S. Gajbhiye, Director, NBSS&LUP, Nagpur	Member
4.	Prof. Amita Shah, Gujarat Institute of Developmental Research, Gota; Ahmedabad – 380 060	Member
5.	Dr. S. P. Wani, Principal Scientist, ICRISAT, Patancheru, Hyderabad – 502342, Andhra Pradesh	Member
6.	Ms. Indrani Kar, Senior Director & Head, Agriculture and Food Processing Division. C.II., 23, Institutional Area, Lodhi Road, New Delhi	Member
7.	Dr. R. K. Pachauri, TERI, India Habitat Centre, Lodhi Road, New Delhi.	Member
8.	Director, National Remote Sensing Agency, Hyderabad	Member
9.	Shri A. Raindrop Babu, Director, WASSAN, House No. 12-13-452, street No. 1, Tarnaka, Secunderabad – 500 017, Andhra Pradesh	Member
10.	Shri Crispen Lobo, Executive Director, Watershed, Organization Trust, Ahmednagar – 414001	Member
11.	Shri Sanjoy Hazarika, Managing Trustee, Centre for North East studies & Policy Research, D-6, 6143, Vasant Kunj, New Delhi	Member
12.	Shri Anil Shah, Development Support Centre, Marutinandan Villa, Near Government Tube Well, Bhopal, Madhya Pradesh – 380 058	Member

13.	Prof. P. S. Ramakrishnan, UGC, Emeritus, Professor, School of Environmental Sciences, JNU, New Delhi	Member
14.	Shri Lamor Rynjah, Additional Secretary, Deptt. of Land Resources, Nirman Bhawan Annexe, New Delhi	Member
15.	Secretary, Ministry of Panchayati Raj, or his representative, New Delhi	Member
16.	Secretary (MoEF) or his representative, Ministry of Environment & Forests, Paryavaran Bhawan, New Delhi.	Member
17.	Secretary (MoWR) or his representative, Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.	Member
18.	Vice-Chancellor, Himachal Pradesh Agriculture University, Palampur.	Member
19.	Vice-Chancellor, Junagarh Agricultural University.	Member
20.	Representative, CARITAS India (NGO), Ashoka Place, Gole Dak Khana, New Delhi	Member
21.	Secretary, Watershed Management, Govt. of Orissa, Bhubaneswar	Member
22.	Secretary, Deptt. of Agriculture, Govt. of Chhattisgarh, Raipur	Member
23.	Director, Central Research Institute for Dry Land Agriculture (CRIDA), Hyderabad	Member
24.	Shri S. P. Tucker, Principal Secretary, Irrigation & Command Area Development Deptt., Govt. of Andhra Pradesh, Hyderabad	Member
25.	Smt. Rugmini Parmar, Director, Deptt. of Expenditure, Ministry of Finance, New Delhi.	Member
26.	Adviser (Rural Development), Planning Commissioner, Yojana Bhawan, New Delhi	Member
27.	Dr. N. Sanghi, Former Director (NRM), MANGAGE, Hyderabad	Member
28.	Adviser (Agri.), Planning Commissioner, Yojana Bhawan, New Delhi	Member
29.	Secretary for Minor Irrigation, Govt. of West Bengal, Kolkata,	Member
30.	Principal Secretary (Planning), in charge of State Land Use Board, Yojana Bhawan, Lucknow, U.P.	Member
31.	Shri R. C. Gupta, Deputy Director General, Fertilizer Association of India, 10, Shaheed Jit Singh Marg, New Delhi – 110 067	Member
32.	Shri Prem Narain, Joint Secretary, DAC, New Delhi	Member-Convener

### Terms of Reference

- (i) To critically review the performance and impact of ongoing programmes executed by the various Central Ministries/Departments for the development of natural resources, regeneration of degraded lands and wastelands, land reclamation and soil and water conservation.
- (ii) To suggest measures for decentralization of the programmes and improvement in the delivery mechanism through greater professionalism.

- (iii) To suggest how best to integrate and converge various watershed based programmes of different Ministries/Departments under one umbrella, so as to bring about synergy in their implementation.
  - (iv) To evaluate whether the benefits of such programmes have been equitable and whether the needs and interests of small and marginal farmers and other vulnerable sections have been met and to suggest a strategy to ensure equity for resource poor farmers.
  - (v) To also examine whether the institutions and mechanisms/structures created under the programmes have been sustainable and to make suggestions for enhancing their sustainability.
  - (vi) To examine the issue of user rights over common properly resources and equitable use of such resources (including water). Also, to suggest measures for dovetailing water-use regulation as an important and integral part of the watershed programme.
  - (vii) To suggest economic and financial incentives for sustainable land and water development programmes.
  - (viii) To suggest modalities to enable Gram Panchayats to access funds, under National Rural Employment Guarantee Act for development of Rainfed agriculture.
  - (ix) To study the feasibility for the involvement of public-private partnership in Natural Resource Management and Watershed Development Programmes.
  - (x) To suggest mechanism, for creation of a data base on Natural Resource Management to degraded wastelands and dry land/rainfed areas and to develop common guidelines for collecting baseline and monitoring data for monitoring purposes by a common inter-ministerial office.
  - (xi) To review the soil and land mapping programmes and to prioritize them as well as to suggest improvements.
  - (xii) To suggest appropriate integration of research and technological inputs in watershed programmes.
  - (xiii) To suggest measures/programmes for natural resources management for XI Five Year Plan and requirement of funds, as well as area to be covered under the programmes of various Ministries/Departments.
3. To assist the Working Group in its task, separate Sub-Groups on specific aspects may be formed by the Chairman of the Working Group. The Sub-Groups will furnish their reports to the Working Group. The Chairman of the Working Group may also co-opt officials and experts as considered necessary.
4. The Working Group will submit its interim report to the Planning Commission latest by 31st July, 2006 and final report by October, 2006.
5. Non-officials shall be entitled to TA/DA as permissible to Grade I Officers of the Government of India and the expenditure will be borne by Planning Commission. The TA/DA of Government and public sector officials will be borne by their respective organizations.

6. The undersigned will be the nodal officer of the Working Group and may be contacted at the numbers/e-mail given below for any query/clarification with regard to this Working Group.

Sd/-

(Dr. Renu S. Parmar)  
Director (Agriculture)  
Tel. No. 011-23096605  
Email: [rsparmar@nic.in](mailto:rsparmar@nic.in)  
Fax No. 011-2332 7703

To

The Chairman, Members and Member-Convener of the Working Group.

Copy for information to:

PS to Deputy Chairman

PPSs to Member (AS)/Member (VLC)

PPS to Member-Secretary

All Heads of Divisions

US (Admn-1) Branch/Accounts-1 Branch.

P,C. Division (2 copies)

PPSs to Adviser (Agri/JS (Admn.)





Prof. R. B. Singh  
Ex – Member  
National Commission on Farmers  
Government of India  
Ministry of Agriculture

Dear

I have the honour to draw your kind attention to my D.O. letter to your good self dated February 5, 2007, submitting therewith the Report of the “Working Group on National Resources Management, Eleventh Five Year Plan (2007- 2012)”. I am resubmitting herewith the same report, after some repackaging of the contents and certain updating in the background information, without any substantial change in the recommendations and action points.

Once again, I thank you for the opportunity given to me to work on this important assignment.

Yours sincerely,

(R.B. SINGH)

Prof. Abhijit Sen  
Member  
Planning Commission  
Yojana Bhawan, Parliament Street  
New Delhi – 110001

**Copy to:**

1. Shri Bhaskar Chatterjee, Chairman Sub-Group I, Additional Secretary, Deptt. of Land Resources MoRD, National Building Organisation Annexe, Niman Bhawan, New Delhi.
2. Dr. N. K. Tyagi, Chairman Sub-Group II, Member Agricultural Scientists Recruitment Board, New Delhi
3. Prof. P. S. Ramakrishnan, Chairman Sub-Group III, UGC Emeritus Professor, School of Environmental Sciences, JNU, New Delhi
4. Dr. N. K. Sanghi, Chairman Sub-Group IV, Watershed Support Services and Activities Network, Street No.1, Secundrabad – 500017, Andhra Pradesh
5. Dr. K. Radhakrishnan, Chairman Sub-Group V, Director, National Remote Sensing Agency, Hyderabad
6. Dr. J. S. Samra, Chairman Sub-Group VI, Deputy Director General (NRM), Indian Council of Agricultural Research, New Delhi
7. Shri A. K. Mukherjee, Chairman Sub-Group VII, Ex-Director General, Ministry of Environment & Forest, New Delhi
8. Shri Prem Narain, Joint Secretary (NRM), Member-Convener, Deptt. of Agric. & Coopn. Ministry of Agriculture, Krishi Bhawan, New Delhi



Prof. R. B. Singh  
Ex – Member  
National Commission on Farmers  
Government of India  
Ministry of Agriculture

Dear

As you know, I was asked by the Planning Commission, GOI, to chair the Working Group on Natural Resources Management for the XI Plan. The “uncut” final Report was submitted to the Planning Commission on February 5, 2007. The contents have since been somewhat rearranged and augmented with additional background information, with no change in recommendations and action points.

The Report highlights that degradation and erosion of natural resources, namely, land, soil, water, forest, biodiversity (plant, animal and microbial genetic resources), livestock and fisheries along with air and sunlight – those parts of the natural world that are used to produce food and other valued goods and services and which are essential for our survival and prosperity, are one of the root causes of the agrarian crisis in the country. No current or intended use of natural resources should condemn our children to endless toil or deprivation.

The Working Group, as contained in the Report, critically examined the status and management scenario of the natural resources especially under rainfed conditions, identified the major challenges and issues in watershed based management of natural resources, particularly the equity, sustainability, productivity, income and livelihood issues. New modes of governance and prospects of congruence and synergy among various NRM programmes, and new approaches, strategies and policy options and actions to overcome the challenges have been suggested for the XI Plan.

I take this opportunity to put on record the valuable contribution made by Shri Prem Narain, Joint Secretary (NRM), Ministry of Agriculture, Government of India, New Delhi, who served as the Member Convener of the Working Group. I wish to express my gratitude to Dr. S. N. Das, Chief Soil Survey Officer, All India Soil and Land Use Survey for his constant technical and logistic support in finalizing the Report.

I am sure, you will kindly ensure operationalization of the recommendations towards achieving sustainable management of our natural resources, especially land, soil, water and bio-resources.

Yours sincerely,

(R.B. SINGH)

Sh. P. K. Mishra, IAS  
Secretary to the Government of India  
Department of Agriculture Cooperation  
Ministry of Agriculture  
Krishi Bhawan, New Delhi – 110001