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WATERSHED DEVELOPMENT IN INDIA

An Approach Evolving through Experience

JIM SMYLE, CRISPINO LOBO, GRANT MILNE, AND MELISSA WILLIAMS

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CONTENTS

Acknowledgments vii

Abbreviations and Acronyms ix

Preface xi

Executive Summary xiii

Chapter 1: Introduction 1

Chapter 2: India's Turbulent Water Future 3

2.1 World Bank Support to Watershed Development 3

2.2 Defining a Watershed 4

2.3 What Is Watershed Management? 5

2.4 Scales of Intervention 5

2.5 Deciding Between Watershed Management and Other Approaches 7

Chapter 3: Watershed Development in India: Policy and Technical Guidelines 11

3.1 Project Design in the Indian Context 12

3.2 State-specific Contexts for Watershed Development 13

Chapter 4: Good Practices from Project Implementation 17

4.1 Start from the Building Block of the Micro-watershed 17

4.2 Decentralized and Participatory Development 18

4.3 Invest in Participatory, Evidence-Based Micro-Watershed Plans 20

4.4 Ensure Inclusion of all Stakeholders 22

4.5 Invest in Capacity Building and Information Sharing 26

4.6 Link Conservation Efforts to Livelihoods for Sustainability 27

4.7 Monitoring and Evaluation 29

Chapter 5: Challenges for Future Programs 33

5.1 Water: India's Emerging Paradigm Shift in Watershed Development 33

5.2 Whither Watershed Development? 35

5.3 Managing Upstream and Downstream Interrelations 36

5.4 Ensuring Effective Demand 37

5.5 Managing Common Pool Resources 39
5.6 Promoting Effective Interagency Collaboration 40
5.7 Give Due Attention to Economic Benchmarks 42
5.8 Provide Incentives for Sustainability 42
Chapter 6: Lessons and Conclusions 45
Bibliography 49

APPENDIXES

Appendix 1a: Common Guidelines for Watershed Development Projects 1995, 2001, 2011 & 2012 51
Appendix 1b: Water: India's Emerging Paradigm Shift in Watershed Development 59
Appendix 2: Water Resources in Project States: Issues Identified in State Water Policies 65
Appendix 3a: Comparison of Watershed Development Project Designs 69
Appendix 3b: World Bank Support to Watershed Development Projects (1980 to Present) 73
Appendix 4: Novel Satellite and Ground-based Measurement Techniques for Watershed Planning 75
Appendix 5: Institutional Arrangements in the World Bank Watershed Projects 77

BOXES

Box 2.1: Matching Approach to Objectives 5
Box 3.1: Integrated Water Resources Management 13
Box 4.1: The Pros and Cons of Technology-Intensive Resource Mapping 22
Box 4.2: Generating a Demand Pull 24
Box 4.3: Tapping Community Capacity through Paraprofessionals 28
Box 4.4: Implementing a Monitoring, Evaluation and Learning System 30
Box 5.1: Nonwater Investments to Manage Water Externalities 36
Box 5.2: Clean Development Mechanism in Himachal Pradesh 39

FIGURES

Figure 4.1: Activities Carried Out under Concurrent and Discrete M&E 30
Figure A5.1: Grassroots Institutions in Sujala 77
Figure A5.2: Overall Institutional Arrangements for Sujala 78
Figure A5.3: Institutional Arrangements for the HP Program 79
Figure A5.4: Institutional Arrangements for Gramya 81

TABLES

Table 2.1: An Idealized Scheme of Changes in Watershed Management Approach and Focus with Scale 7

Table 2.2: Illustration of Time Lag for Ecosystem Response at Sub-Basin/Basin Scale 7

Table 2.3: Principal Watershed Management Content of the Three World Bank-Financed Projects 9

Table 3.1: Overview of Water Resources Availability in Project States 14

Table 4.1: Micro-watershed Selection Criteria Used by the Three World Bank–Supported Projects. 18

Table A3b.1: World Bank-financed Watershed Development Projects (1980 to Present) 73

Table A3b.2: Objectives of World Bank-financed Watershed Development Projects (1980 to Present) 74

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ABBREVIATIONS AND ACRONYMS

AG	Activity Group
BCM	Billion Cubic Meters
CAG	Common Activity Group
CBO	Community Based Organization
CPR	Common Property Resources
DDP	Desert Development Program
DPD	Divisional Project Director
DPAP	Drought Prone Area Program
DRDA	District Rural Development Agency
ET	Evapotranspiration
EC	Executive Committee
FNGO	Field-level NGO
GIS	Geographic Information Systems
GLDAS	Global Land Data Assimilation System
GOI	Government of India
GP	Gram Panchayat
GPWDP	Gram Panchayat Watershed Development Plans
GRACE	Gravity Recovery and Climate Experiment
Gramya project	Uttarakhand Decentralized Watershed Development Project
HP project	Himachal Pradesh Mid-Himalayan Watershed Development Project
IGWDP	Indo-German Watershed Development Program
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IGA	Income Generating Activities
IT	Information Technology
IWDP	Integrated Wasteland Development Project
IWMP	Integrated Watershed Management Program
IWRM	Integrated Water Resources Management
M&E	Monitoring & Evaluation
MEL	Monitoring, Evaluation & Learning
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MIS	Management Information Systems
MoRD	Ministry of Rural Development
NGO	Non-Government Organization
NWDPRA	National Watershed Development Program in Rainfed Areas
O&M	Operation & Maintenance
PBPS	Performance Based Payment System
PIA	Project Implementation Agency
PNGO	Partner NGO
PRI	Panchayati Raj Institution
PROFOR	Program on Forests
Rs	Indian Rupees
SASDA	South Asia Agriculture, Irrigation, and National Resources
SATCOM	Satellite Communication
SC	Scheduled Castes
SHG	Self Help Groups
ST	Scheduled Tribes
Sujala project	Karnataka Watershed Project
SWAP	Sujala Watershed Action Plan
SWC	Soil and Water Conservation
SWS	Sujala Watershed Sangha
SWS-EC	Sujala Watershed Sangha Executive Committee

TMC	Thousand Million Cubic Feet
USD	United States Dollars
UG	User Group
VWCS	Village Watershed Committees
VGF	Vulnerable Groups Fund
WA	Watershed Association
WC	Watershed Committee
WDT	Watershed Development Team
WOTR	Watershed Organization Trust
WSM	Watershed Management
ZP	Zilla Parishad

PREFACE

This report seeks to review the performance of three watershed projects in India supported by the World Bank and implemented under the banner of the government's watershed development programs. It does this in the hope of providing a useful input into the discussions on how watershed development programs can be more effective instruments for simultaneously achieving both rural development and water resources conservation and management goals. In analyzing the lessons from the three World Bank–Supported watershed development projects, the report sought to capture what has been shown to be good practice (by both national and international standards) in pursuit of large-scale community-led watershed/rural development. It also set out to examine some of the weaknesses, gaps and shortfalls that have become apparent and that could undermine long-term rural poverty reduction, sustainable livelihood and water resources conservation and management objectives. In doing so, the report may make a small contribution to the large community of practice, both inside and outside of India and the World Bank, that is engaged in the pursuit of more effective and efficient, results-based programs in natural resources management. The audiences for this report are Indian policy makers, practitioners in India and globally, and World Bank staff/specialists.

Consultants carried out extensive desk and literature reviews and made field visits to the three projects, from which a draft report was produced. Peer reviewers with long experience and recognized expertise in watershed development programs in India were invited to review and comment upon the draft of the current report.

The report itself is divided into six sections. The **Introduction** provides a very brief overview of GOI's watershed development programs. **India's Turbulent Water Future** sets the stage and provides context on why water resources management is and should be a central concern in watershed development programs; an overview of the World Bank's support to these programs and; how and where, conceptually, watershed management as a tool may make a contribution to better water resources management within the programs. **The Policy and Technical Guidelines** section provides a summary of the national and state perspectives and priorities that were current at the time of the design and implementation of the three projects under review. This is followed by a section on **Good Practices from Project Implementation** that examines the different approaches and methodologies pursued by the projects and sets out to assesses the lessons and good practices both from the Indian and global perspectives. For the latter, the benchmarks against which the national practices are compared were derived from the 2008 World Bank report "Watershed Management Approaches, Policies and Operations: Lessons for Scaling-up" (Dhargouth et al 2008). Based on the learning and experiences of the three projects, the fifth section, **Challenges for Future Programs,** identifies six specific areas where attention is required in order to address the principal gaps and weaknesses encountered in the watershed development projects' design and implementation compared with watershed management. The final section provides a summary of the lessons learned and the principal conclusions drawn from the review.

EXECUTIVE SUMMARY

INTRODUCTION

This report analyses the experiences and lessons from three World Bank–Supported watershed development projects in the Indian states of Karnataka, Himachal Pradesh, and Uttarakhand.[5] The primary reason for the analysis was to guide the development and execution of new watershed programs in India, including new Bank-supported state-level operations in Uttarakhand and Karnataka, and a proposed national project now under preparation. Accordingly, it was important to deepen the knowledge base about large-scale, community-led watershed development in order to share that knowledge with key stakeholders both inside and outside of the World Bank. Another important reason was the immediate and growing concern over water resources and their management in India and the question of how well watershed development programs internalize these concerns. A third impetus was the nexus between rural poverty and rainfed agriculture and the important role that watershed development programs are to fulfill in the development of sustainable rural livelihoods.

India's watershed development programs are one of the Government of India's (GOI) principal tools for poverty reduction in rural areas. Poverty in India is concentrated in the drylands, hilly and tribal areas; one of the ascribed causes for which is the poor performance of India's rainfed agriculture. The influential Parthasarathy Committee report on watershed development programs, in making these points, provided a strong case for Government to utilize these programs for poverty reduction and food security purposes. The report argued:

> *While irrigated agriculture appears to be hitting a plateau, dryland farming has suffered neglect* . . . [however] *while it is the rainfed parts of Indian agriculture that have been the weakest, they are also the ones that contain the greatest unutilized potential for growth* . . . [and poverty reduction impacts would be greatest] *if growth were to be focused on these neglected regions*; and
>
> *In our view, raising the productivity of rainfed areas is an imperative if we are to meet the goal of national food security in the coming years. We have estimated that, even in the most optimistic scenario of further irrigation development in India, nearly 40% of national demand for food in 2020 will have to be met through increasing the productivity of rainfed dryland agriculture . . . and this demands intensive watershed work in these regions.*

Following from this, India's watershed development programs place livelihood security as the overriding goal, *not as an afterthought but livelihoods have to be sustainable and this demands an ecosystems perspective, with central emphasis on ecological balance*.

A central focus and approach of the programs is to capture rainfall and runoff and put it to productive use for enhancing agricultural productivity in rainfed areas. In the marginal drylands of India where millions of rural poor rely on rainfed agriculture for their subsistence and livelihoods, the logic of this approach is inescapable. Yet, as the nature of India's growing water resources predicament and challenges in the 21st century become increasingly apparent, so does the concern that a one-size-fits-all approach to watershed development could potentially run the risk of aggravating competition over already scarce water resources. The nature of this concern is reflected, among other things, within a recent World Bank review of one of the three projects, which noted that *watershed development* [is] *dryland agricultural development by another name* [and] *the sustainable management of water* [is] *very much a secondary objective*.

5 Uttarakhand was formerly known as Uttaranchal until 2006; heretofore the state will be referred to as Uttarakhand.

INDIA'S TURBULENT WATER FUTURE

India's current water development and management system is not sustainable. According to a 2006 World Bank study, overall water balances are precarious with crisis situations existing in a number of basins. The same study suggests that about 15 percent of all aquifers were in critical condition at the beginning of the current decade and that this would grow to 60 percent over the next 25 years given current trends. If these projections are correct, water demands would exceed all available sources of supply by 2050. The most recent estimates predict that rising demands due to increasing population and economic growth may result in about half the demand for water being unmet by 2030; and this without taking into account how problems of poor water quality may exacerbate the situation.

Solutions are needed that address constraints on both the supply side and the demand side and for both ground and surface water. Implementing good watershed management practices and approaches are amongst the opportunities that India has to potentially better manage these factors.

WATERSHED DEVELOPMENT IN INDIA: POLICY AND TECHNICAL GUIDELINES

In this report, watershed management (WSM) is understood to be the integrated use and/or management of land, vegetation, and water in a geographically discrete drainage area for the benefit of its residents. Among the central objectives of WSM is the protection or conservation of the hydrologic services that the watershed provides and the reduction or avoidance of negative downstream and/or groundwater impacts. That is, WSM inevitably concerns itself with the achievement of water resources-related objectives.

The three Bank-supported projects reviewed were designed in accordance with and in support of the specific GOI policies and implementation frameworks current at the time. Under these frameworks, water resources concerns were focused strongly on maximizing the capture and productive use of water resources at the local level. The Guidelines did not contemplate the possibility of the existence of water resources-related externalities nor the possibility that such could result from program interventions. The main selection criteria provided in the Guidelines placed the focus on poor and marginalized populations, marginal and degraded lands, and the alleviation of poverty.

Ultimately, the Guidelines operated on the assumption that the watershed development programs, by following good management practices, would have an overall positive impact in conserving or restoring the integrity of the watershed system (and the hydrologic services that it provides) at the micro-watershed scale and, by extension, at larger-scales as well. Since, however, there were no provisions in the Guidelines for addressing local water resource-related externalities or for aggregating micro-watershed management into a larger (watershed) context, it is not possible to conclude that this assumption was valid.

PROJECT DESIGN IN THE INDIAN CONTEXT

The Guidelines' primary orientation was toward rural development programs with strong, central objectives related to sustainable use of natural resources and poverty alleviation. A high percentage of India's population is rural and a disproportionate percentage of these are extremely poor and reliant upon rainfed agriculture for their livelihood. Overcoming poverty under these conditions required effective, efficient and productive use of the natural resource base; a principal asset of the rural poor. To enhance the productivity and reliability of rainfed agriculture—especially in India's semi-arid and sub-humid regions—the goal became one of maximizing the use of available water (rainfall, surface and groundwater). The main strategy thus became one of detaining and exploiting, to the maximum extent possible, rainfall that fell in and near farmers' fields. With such a strategy, the micro-watershed was a natural unit for planning and investment.

As experience with micro-watershed development was gained, the concept of "ridge-to-valley" treatments became widely accepted by Government, donors and nongovernment organizations, which further strengthened the use of the micro-watershed as the unit of intervention. The basic concept is one of working with the natural hydrology of the watershed from "ridge-to-valley" in order to detain, divert, store (surface or subsurface) and use all available rainwater.

STATE-SPECIFIC CONTEXTS FOR WATERSHED DEVELOPMENT

Between 2002 and 2004 the three project states drafted water policies. While the contexts and conditions vary greatly between the states, the policies demonstrated shared concerns regarding water availability and increasing stress upon and depletion of water supplies as a function of climatic variability, growing population and demand, inadequate management of water resources, and a general lack of water conservation efforts. All three expressed concerns over the institutionally fragmented nature of the mandates over water resources and WSM and stressed the need for much greater attention to the sustainable management of groundwater resources and the conjunctive use of surface and groundwater. In response, they called for a move toward integrated water resources management, proposed the need for institutional reforms, stressed the importance of implementing water resources planning at the basin and/or sub-basin levels, and established that the future modality for watershed development would be decentralized implementation, planning, and operation and maintenance (O&M) at the local levels. The policy objectives of the three states were also similar, each giving the highest priority to water for human consumption and domestic use followed by irrigation. Hydropower development and commercial and industrial uses were given a lower priority.

Given the degree of specificity in the States' policies on water resources issues and concerns, the Government's Watershed Development Programs could have usefully addressed themselves to the states' well-articulated water resources management objectives. Yet, they did not. The Watershed Development Programs provided only a limited menu of options for engagement at the local level with the result that the states' policy goals greatly transcended the scope and focus of the Watershed Development Programs. As an instrument, the Watershed Development Programs provided for putting in place the "bottom-up" component for WSM. What they did not provide, either then or as yet, is a response to the challenge of how to complement the bottom-up approach with a judicious mix of appropriate "top-down" instruments for water resources management within the watershed development context. Over the medium-to-long terms, it is critical that the "bottom-up" is informed and provided context through the development and deployment of broader-scale instruments, such as watershed-based information systems and zoning, land use and water resources planning at the basin and sub-basin levels, stakeholder management systems, and appropriate sets of policies, norms, regulations, and incentives.

GOOD PRACTICES FROM PROJECT IMPLEMENTATION

The review of the three Bank-supported projects in Karnataka, Himachal Pradesh, and Uttarakhand indicated a range of good practices that can continue to shape the design of national watershed programs in India. These include: *Start from the building block of the micro-watershed*. All three projects adopted objective criteria supported by satellite-based systems and socio-economic indicators to identify and prioritize micro-watersheds for treatment. Using objective criteria helped to minimize political interference once the project districts were decided upon. In keeping with the national guidelines, they used a mix of resource, poverty and livelihood-based criteria. The weighting of the criteria reflect the particular priorities of the states; all included ecological considerations. Each states' composite index and ranking system identified and prioritized the neediest sub-watersheds, extending selection criteria beyond purely technical water and resource management concerns.

Decentralized and participatory development. An assessment of the World Bank–Supported projects showed that their participatory and decentralized approaches were reasonably effective in engendering real participation by communities and local governments. A number of key lessons were taken from project experiences. These included: (i) the use of performance-based systems improve implementation at the field-level; (ii) allowing flexibility in applying project design and decision-making to recognize and overcome local constraints; (iii) applying systems of rewards and penalties evenly to all parties; (iv) effectively decentralizing decision-making, responsibility, financial resources and oversight; and (v) strong public scrutiny.

Invest in participatory, evidence-based micro-watershed plans. Once the projects identified a micro-watershed, the action of developing a micro-watershed plan depended on the nature of land ownership, land quality and land use patterns in the project areas. The three projects had in common three broad processes for micro-watershed planning and the formulation of proposals: (i) the collection of detailed

socio-economic and natural resources data, information on land use and existing management regimes, and beneficiary preferences and expectations from all local stakeholder categories; (ii) the systematic collation and analysis of data and information collected, which in the case of Sujala, involved the use of proprietary IT-enabled tools; and (iii) the use of basic cadastral and thematic maps (based on remote sensing data) with Geographic Information Systems (GIS) applications to inform and facilitate decision making at the micro-watershed level.

Based on these and other inputs, the plans: (i) identified the appropriate conservation and production measures to be supported according to the type of landholding; (ii) provided the estimated investment costs for the treatment measures, including the individual contributions from the farmer and/or other involved stakeholders; and (iii) established the calendar or timeframe for the implementation.

Another good practice was the allocation of budgets to the local communities, giving them a firm knowledge of available resources and budgetary constraints. This helped to make planning realistic as communities were able to plan and prioritize in a meaningful manner. Also, appropriate mechanisms to allow for flexibility between planning and implementation were built in to allow communities the ultimate decision and to deal with the inevitable lags between planning and implementation and the learning that comes with experience.

Ensure inclusion of all stakeholders. All three projects paid a great deal of attention to the challenges of stakeholder inclusion and participation. Generally speaking, the efforts and attention by the projects paid off in terms of consensus building on local priorities, "democratizing" access to project resources and equitable sharing of project benefits. To foster inclusiveness, practices were adopted to provide a reasonable degree of confidence that vulnerable families and households were identified in each project village and that specific project interventions and instruments could be correctly targeted to assist them.

The projects all prioritized the inclusion of disadvantaged and vulnerable groups, especially women and the landless, from their inception. This was important as watershed development programs tend to have a natural bias in favor of those who own and have access to land and other natural resources. The projects organized the poor from marginalized households into self help groups (SHGs) or common activity groups (CAGs). The incentives to their mobilization were participation in thrift and credit or asset accumulation groups, access to capacity building, opportunity to become mainstreamed into local decision making institutions, direct access to resources (financial, managerial, technical, market access, information) needed to carry out income generating activities (IGAs), and inclusion in the development and management of common property resources (CPRs).

Invest in capacity building and information sharing. Capacity building for all stakeholders and, in particular, the beneficiaries and their CBOs was seen as a high priority to ensure successful implementation and to achieve objectives. Substantial resources were directed in all three to enhance the knowledge and skills of all actors and inculcate the behaviors and attitudes necessary to a people-centered, participatory approach. Capacity needs assessments were carried during the preparation processes and early on in the projects so that detailed training modules could be developed and tailored to the particular needs of the various project actors.

All three projects developed fairly effective strategies for communication for and amongst their stakeholders, the general public, the respective political establishments and the concerned line agency departments at the state level. A variety of instruments were utilized for building capacity and dissemination. Modern IT approaches were tested and extensively deployed in the case of the Sujala project, including the use of teleconferencing and satellite communication programs (SATCOM), along with more traditional media such as radio programs. Training manuals and teaching aids were developed for the different target groups. Multiple media were also extensively utilized for both training and communications purposes.

Link conservation efforts to livelihoods for sustainability. The linking of livelihoods to watershed development objectives was a critical element in the projects' successes. Planning processes were focused on seeking opportunities for livelihood development and improvement for all stakeholder groups. Special attention was paid to achieving the inclusion of vulnerable groups and considerations for social inclusion

and equity were balanced with technical objectives. As the land management interventions primarily benefited those relatively better-off segments of the population with landholdings, it was a best practice for the projects to address equity concerns and include significant resources targeted at income and employment generation activities for the aforementioned vulnerable groups. Participatory planning processes went beyond land management/use to include livelihoods, rural infrastructure, opportunities for women's self-help groups and tribal development.

Monitoring and evaluation. The Sujala project's system stands out as a best practice as it utilized Monitoring & Evaluation (M&E) outputs to improve project performance by integrating a decision support system into standard progress tracking. This is especially important in the multilevel matrix management structures that characterize most WSM projects.

The projects undertook a total of five sub-activities: (i) input-output monitoring done on a weekly, monthly, quarterly and annual basis—to track physical and financial progress; (ii) process monitoring to track trends in project implementation, done on a monthly or semi-annual basis; (iii) community self-assessments to evaluate themselves and overall project performance, undertaken on a semi-annual basis; (iv) impact assessments on natural resources and socio-economic and institutional development at the household, community and micro-watershed/sub-watershed level, carried out in three stages (baseline, mid-term, and at the closing); and (v) thematic and assessment studies on specific management and project related concerns. The use of IT-enabled and technology-assisted systems was common to all three projects.

CHALLENGES FOR FUTURE PROGRAMS

Water: India's emerging paradigm shift in watershed development. The Planning Commission presented its proposed new water resources strategy for the 12th Five Year Plan. Entitled "Sustainable Water Security at a Time of Climate Change", the presentation began with a review of the deepening water crisis in India, noting that policy makers had been for too long in "*denial mode*" regarding the dimensions, severity and urgency of India's water resources issues. It went on to discuss the more recent and sobering assessments by independent researchers suggesting that India's water budget is much tighter than current assumptions hold and that mining of groundwater is occurring over very large parts of the country. One of the main messages of the presentation was that *business-as-usual will not do*. Subsequently, the Planning Commission's strategy document for the 12th Five Year Plan—"Faster, Sustainable and More Inclusive Growth—An Approach to the Twelfth Five Year Plan (2012–17)" (GOI, 2011)—reiterated the gravity of the situation regarding water resources and put forward a series of strategic priorities for water resources management. These included: (i) the maintenance of existing surface water bodies; (ii) groundwater management; (iii) aquifer mapping; (iv) stakeholder-based aquifer management; (v) reforms in major and medium irrigation; (vi) pricing of groundwater; (vii) regulatory changes for groundwater; (viii) environmental management (for water resources); and (ix) climate change (and water resources).

Following from the above and a systematic review and evaluation of the prior Five Year Plan's watershed development programs, the 2012 Common Guidelines for Watershed Development Projects were formulated. The Guidelines include specific instructions regarding: (i) the use of remote sensing data for assessment of runoff, for locating water harvesting and storage structures, assessing program impacts on the ground, to assess periodic changes in geo-hydrological potential, soil and crop cover, runoff etc. in the project area and for baseline surveys; (ii) hydro-geological surveys and aquifer mapping of the watersheds; (iii) development or strengthening of local mechanisms and systems for common property resource management, especially groundwater; (iv) efforts to establish detailed resource-use agreements for surface water, groundwater, and common/forest land usufruct among UG members; and (v) the setting up of institutional mechanisms to ensure sustainability in use of resources, especially common-pool resources (for example, groundwater).

Whither watershed development? It is clear that under the 12th Five Year Plan the intention is for watershed development projects to actually contemplate water and water resources management. The new framework provides the potential for making significant advances

in overcoming many of the gaps and weaknesses identified through the learning generated by the three projects. In particular, the new framework (i) provides for the integration of water resources management—both surface and groundwater—into local level planning as well as in broader scale planning at the watershed level; (ii) continues decentralization of the programs to the states and proposes the devolution of responsibilities and strengthened involvement of civil society; (iii) proposes more realistic approaches to the management of common pool resources (including surface and groundwater); (iv) integrates several existing GOI programs (for example, Mahatma Gandhi National Rural Employment Guarantee Act) with the watershed development programs; and (v) brings greater attention to the problems of post-project sustainability.

Managing upstream and downstream interrelations. Because the micro-watershed approach is carried out in isolation, there is no certainty that at a larger scale the goals of protecting and conserving hydrologic services and/or managing negative downstream and groundwater impacts are being met. The micro-watershed projects largely measure progress on increasing local capture and consumption of water resources rather than on sustainability of management and avoidance of downstream impacts from the enhanced capture and consumption. This is not unusual for projects prepared several years ago; today with improved tools and models, hydrological objectives and indicators can be more easily incorporated and measured.

Ensuring effective demand. There will always be tension between "top-down" and "bottom-up" and effective development schemes require a judicious mix of the two. Getting the balance correct so that "bottom-up, demand-driven" approaches to policy implementation are in line with the prevailing policy, regulatory, administrative and other normative frameworks will be inevitably complicated and require iterative, learning-based processes. As a result, one person's "bottom-up, demand-driven" approach can be another's "top-down, supply-driven" approach. Government's programs have specific objectives and will offer a limited set of instruments, using those that are thought to be "the best" for achieving those objectives. Under these circumstances, voluntary participation—arguably an essential ingredient of achieving real and effective demand—may not always be a reflection of actual demand, particularly amongst the rural poor where options and opportunities are limited and the initial choice comes down to opting in or going without. To this challenge, there is no durable solution. Rather it is one more factor to be recognized and accommodated when designing a demand-driven program with their limited menus of options.

Managing common pool resources. Water as a common pool resource remains among the most serious, unresolved issue. There is a broad recognition and understanding of the problems around allocation and scarcity; however, addressing the larger issues of the political economy of water resource allocation is a challenge far beyond the scope of micro-watershed development projects. In that context, it becomes incumbent on all projects and programs to specifically include instruments, processes and mechanisms to ensure that they are not aggravating the problem. Depending on how critical water availability issues are, basic water balance and water accounting tools may suffice for micro-watershed level interventions.

Promoting effective interagency collaboration. If micro-watershed programs are to effectively contribute toward achieving higher-level objectives at the watershed, sub-basin and/or basin-levels, effective institutional mechanisms will have to be developed for this purpose as well as to measure and monitor outcomes and impacts. While it is a necessary condition to rationalize both the local and state-level organization and coordination, it is arguably more important to make significant progress first in the local planning and implementation frameworks. Doing so provides both the impetus and logic for identifying the practical reforms needed to make the state agencies both accountable and responsible for harmonizing and coordinating their efforts with the other state agencies with whom they have overlapping and/or interdependent mandates. Furthermore, the development and organization of the local framework helps clarify what the roles and responsibilities of the state-level agencies should be—and thus the types of reforms and reorganization required—to promote sustainable use of water resources in a decentralized environment.

Give due attention to economic benchmarks. The projects monitored certain financial aspects—household income, income generating activities, agriculture/livestock/horticulture income—all good practices and extremely important for assessing the likelihood of sustainability. Ultimately profitability and financial viability are also essential to obtaining improvements in natural resources management. Often neglected is the validation of technical/extension messages to ensure they are not placing project participants at financial risk. Such analysis is also critical for evaluating the efficiency of project interventions and approaches, for analyzing policy options, to test assumptions and to validate that the programs benefits outweigh its costs to society. Project support in this particular area would have been critical and potentially very influential on government's overall approach.

Provide incentives for sustainability. Sustainable WSM requires an incentive structure that continues beyond the project period, supported by economic instruments that assign costs and benefits according to public and private goods. At the project formulation and inception stage, all three projects considered post-project maintenance of assets and made provision for this by attempting to ensure that beneficiaries continue to receive a stream of benefits post project. This concern extends beyond project created works and assets to those of sustaining the organizational structures that have a role in ensuring continuity of assets and other project impacts.

LESSONS AND CONCLUSIONS

The use of the micro-watershed as the basic unit for planning and intervention was largely appropriate, but. . . . Because the micro-watershed approach was carried out in isolation, the larger scale goals of protecting and conserving hydrologic services and/or managing negative downstream and groundwater impacts remain to be addressed.

A micro project (at the sub-watershed level or micro-watershed level) should be planned for at least five to seven years in order that sufficient social capital is built up. It takes time and close accompaniment to develop vibrant and representative local institutions which are most necessary to ensure continued maintenance of created assets in the post project period. In the early stages, few resources are required as it is the community that must first demonstrate its desire (demand) to participate.

Projects involving multiple agencies work best where institutional arrangements leverage the comparative advantages of each of the partners. In a situation where good NGOs are available, it is preferable to engage NGOs to mobilize and build the capacities of the villagers. Where NGOs have the requisite technical and managerial expertise, then it is preferable to give them the entire task as they can then efficiently calibrate and dovetail various aspects of a project and be held accountable for outcomes. This would leave project authorities free to focus on monitoring and overall management of the project.

Programs need to adopt integrated water resources planning at the micro-watershed level. Micro-watershed development planning focused on the productive aspects of water utilization and not on water resources planning *per se*. Planning does not systematically consider drinking water supply, water quality, or overall water availability and allocation (or, where relevant, include any other locally important uses). These are important local concerns.

Linking livelihoods to watershed development objectives was a best practice among the three projects. All stakeholder groups in the communities and watersheds participated—including vulnerable groups of women, tribals, landless and marginal farmers—and planning sought opportunities in livelihood development and improvement for all, balancing technical objectives with considerations of social inclusion and equity.

Natural resources based projects should be undertaken with a focus on developing sustainable livelihood options for the majority, if not all, of the beneficiaries. It is better to focus first on already existing and functioning livelihoods in order to improve their

earning potential; followed by developing new opportunities in agriculture, nature-based and allied sectors while also training youth in acquiring market demanded skills and competencies.

The projects made strong contributions in the institutional aspects of WSM. The projects sought to strengthen the framework for local action within a context of decentralization and support to state-level harmonization of efforts between disparate agencies with mandates over water resources and WSM. The only shortfall may have been in not extending support to the policies articulated by the states of *water resources planning at the basin and/or sub-basin levels* and *greater attention to the sustainable management of groundwater resources*.

Transparency and public accountability, especially in regards to works and monies, is the key to smooth implementation and harmonious social relations. CBOs that have continued to function effectively post-project have been those that consistently applied principals of transparency and accountability. Effective conflict resolution mechanisms were also key to maintaining group cohesion and momentum.

The three projects all represent global good practice on social issues, given their focus on poverty, strengthening local governance and institutions, concerns (and effective approaches) for dealing with issues of equity and inclusion of vulnerable groups, and for their strong emphasis on improving livelihoods.

The inclusion, empowerment and mainstreaming of women, the poor and vulnerable groups into the decision-making processes is crucial to the sustainability of the project. These groups draw upon common pool resources for their survival and unless they directly benefit from the development of these resources, they will have no incentive to protect or sustainably manage these assets. Youth constitute the largest demographic group in any village, and are a vulnerable group in terms of employment and livelihood opportunities, especially those from poor households who constitute the majority amongst them. Future watershed-based development projects should consider them also as a vulnerable and priority target group.

The manner in which agency personnel interact with the community sets the tone for the project and determines its outcome. Respect, commitment, and integrity bring forth enthusiasm, cooperation and transparency from the community. A participation-based project must be sensitive to this aspect and make special efforts to inculcate these values into its procedures, interactions, and "way of doing business."

Performance-based payments systems, in order to be effective, must involve all stakeholders in their design and formulation and should be fairly administered, transparent, and sensitive to emergent and unanticipated events. All parties to the agreement, including government functionaries, should be held equally responsible and accountable. Since disputes will inevitably arise, there should be a conflict mediation mechanisms. In order to reduce discretion and arbitrariness, the system can be supported by an IT-enabled Decision Support System introduced at all decision making various levels.

The projects followed good practices in monitoring certain financial impacts such as household income, income generating activities, and income from improvements in agricultural production. Lacking, however, was any economic analysis to evaluate project efficiency, to test assumptions, or validate the programs' investment and incentive schemes for purposes of policy analysis. Given the objectives of utilizing the projects to influence state-level programs and approaches, a systematic approach to evaluating economic aspects in addition to the financial aspects could possibly have strengthened the projects' influence on Government's overall approach.

Chapter 1 INTRODUCTION

Watershed development is deeply rooted in the culture and social structures of India. In part this results from the country's highly seasonal rainfall patterns, with 50 percent of precipitation falling in only fifteen days and over 90 percent of the annual flow volumes in rivers occurring in just four months. Throughout history, the people of India have adapted by either living along river banks or by carefully harvesting, storing, and managing rainfall, runoff, and stream flows. These water management traditions extend back over thousands of years. The first known rainfall measurement devices were employed some 2,400 years ago by Kautilya, an Indian teacher, philosopher, and royal advisor (Hubbart 2008) and over 1,500 years ago the Cheras, Cholas, and Pandyans constructed thousands of minor irrigation tanks. Historically, most of India's water management has been at the community level, relying upon diverse, imaginative and effective methods for harvesting rainwater in tanks and small underground storages (Briscoe and Malik 2006).

In more recent history the Government of India (GOI) began a series of programs aimed at drylands development, based largely on traditional water management approaches and, by the late 1980s, these began to utilize micro-watersheds as the basis for planning and intervention. The first to adopt a "watershed approach" for drylands development were the Drought Prone Area Program (DPAP) and the Desert Development Program (DDP) in 1987. In 1989, the Integrated Wasteland Development Projects scheme (IWDP) followed suit. Subsequently, a fourth major program based on the watershed concept was initiated through the Ministry of Agriculture's National Watershed Development Program in Rainfed Areas (NWDPRA). All of these programs shared a common objective of land and water resource management for sustainable production. In recognition of their shared objectives but disparate approaches, in 1994 the GOI established a common set of operational guidelines, objectives, strategies, and expenditure norms for these "watershed development" projects (GOI 1994). Today, the GOI's watershed development programs are a centerpiece of its rural development efforts in the rainfed agricultural areas of the country.

Since the Guidelines for Watershed Development Projects became operational in 1995, there has been a massive country-wide increase in the number and financing for community-based projects for micro-watershed development. These projects are based largely upon rainfall and runoff harvesting schemes that involve such practices as rehabilitating and building small check dams and tanks, and groundwater recharge structures. Due to the perception that they have been successful instruments for rural development, a high and increasing importance has been placed on these programs. Evidence of their perceived importance is GOI's having steadily increased their financing over the years.

In constant (2012) dollar terms, each of the last two Five Year Plans, the GOI has more than doubled the financing for watershed development programs over the preceding Plan's. For the 11th Five Year Plan (2007–2012), a total of some USD 2.4 billion of financing was provided to the Ministries of Agriculture's and Rural Development's programs in support of watershed development. This compares to USD 1.2 billion under the 10th Five Year Plan, which itself was a 154 percent over the financing under the 9th Five Year Plan. Most recently, in 2010, the Ministry of Rural Development (MoRD) consolidated its various watershed development programs into one comprehensive Integrated Watershed Management Program (IWMP). Since then, the average annual financing for the IWDP's watershed development projects has increased by almost 43 percent to over

USD 503 million/yr as compared to the prior three year period (2007–2010).[6] For the current 12th Five Year Plan, the GOI has signaled the intent to significantly expand even further its financing for watershed development (Shah 2013).

As the size and scope of the watershed development programs have grown, so also has the scrutiny over them as regards and in light of the growing concerns over the state and future of India's water resources. Because the watershed development programs are one of the principal instruments of government for improving rural land and watershed management, their potential to contribute to the better management and conservation of water resources has also come to be of high interest. Both in 2006 (GOI 2006) and again in 2012 (MoRD 2012), technical committees were formally constituted by GOI to review the watershed development programs. In both instances the committees called for radical shifts in the programs' approach to watershed and water resources management, particularly as regarded the internalization of water resources issues, such as groundwater depletion and conservation of surface water resources. These concerns have been echoed by other observers of India's watershed development programs (Kerr 2002; Lobo and Smyle 2010; Independent Evaluation Group Public Sector 2011) who had concluded that these programs have generally been more about rural development than about watersheds and water resources management *per se* and suggested that the programs would benefit from articulating and pursuing more focused water resources objectives.

A darker picture of this challenge emerged in the World Bank's water sector study (Briscoe and Malik 2006) that noted the proliferation of the micro-watershed projects in terms of *a large and active movement which sees community "rainwater harvesting" as the solution, everywhere and for almost all problems*. The study went on to warn that . . . *these projects "take hold" only in areas where water is already very scarce* . . . [and] *communities will only participate* . . . *if they can use the water, primarily to irrigate their crops. This means that the rainwater harvesting schemes have two impacts—increased storage of water, and increased use of water. Since there are already very low outflows from most of the highly-stressed basins, this means that the net additional storage is probably small. The result, in zero-sum cases, is that the new uses mean yet another set of additional claims on limited water, claims which are honored only by reducing the availability for some anonymous downstream user.*

Some steps are being taken in the direction of improving water resources management within the watershed development framework. The new 2012 Common Guidelines for Watershed Development Projects recognized the need to clearly prioritize the objectives of watershed projects as regards water resources. The impetus cited for doing so was increasing local conflicts over the allocation of scarce water resources:

> . . . *the record of watershed projects on* [alleviating chronic drinking water shortages] *has been mixed. Many studies show that the increased water made available by these projects gets diverted to irrigation, often at the cost of drinking water needs. Since irrigation and drinking water needs are often met from the same aquifer, situations arise where after two crops have been taken, there is shortage of drinking water in summer. It is important that drinking water is re-asserted as the first charge on the water resources of the watershed and that protective irrigation for drought-proofing is accorded the next priority. Only in this way can the interests of the resource-poor and small and marginal farmers be protected.* (GOI 2012)

The new Guidelines thus place drinking water security as the paramount goal for watershed development projects. The targeting strategy was also updated under the 2012 Guidelines to place the chronic shortage of drinking water as the first criteria for selection of villages under the programs.

6 Figures derived from Department of Agriculture and Cooperation (2013) and MoRD (2013) reports.

Chapter 2 INDIA'S TURBULENT WATER FUTURE

For 150 years, India's investments in large-scale water infrastructure have complemented its traditional water harvesting infrastructure and brought water to water scarce areas and benefited the poor. However, India's current water development and management system is not sustainable. According to a World Bank study (Briscoe and Malik 2006), overall water balances are precarious with crisis situations existing in a number of basins. The same study suggests that about 15 percent of all aquifers were in critical condition at the beginning of the current decade and that this would grow to 60 percent over the next 25 years given current trends with the result that water demands would exceed all available sources of supply by 2050. The most recent estimates predict that rising demands due to increasing population and economic growth may result in about half the demand for water being unmet by 2030; and this without taking into account how problems of poor water quality may exacerbate the situation (Planning Commission GOI 2013).

Aquifer depletion is concentrated in the most populated and economically productive areas of India. This is not news to the GOI and the State governments; they are painfully aware of the situation. However, there are political, economic, and social pressures that make managing water resources complex and difficult. Solutions are needed that address constraints on both the supply side and the demand side and for both ground and surface water. Implementing good watershed management practices and approaches are amongst the opportunities that India has to potentially better manage these factors.

2.1 WORLD BANK SUPPORT TO WATERSHED DEVELOPMENT

The World Bank's involvement in India with watershed development began in 1980 with the Kandi Watershed and Area Development Project. This was quickly followed by two more rainfed agriculture/watershed development projects in 1983 (Rainfed Area Watershed Development Project and the Himalayan Watershed Management Project). Then, in the 1990s, the World Bank financed a total of three more "integrated watershed development" projects; two at the start of the decade (1990) and one at the end (1999). In the decade between 2000 and 2009, again the World Bank–Supported the implementation of another three "watershed development" projects. It is these latter three that are the focus of this report, yet it is also interesting to reflect on how each "generation" of watershed project from the 1980s to the 2000s have evolved based on learning from the prior generation. Very briefly, and at the risk of oversimplification, the projects of the 1980s were heavily focused on natural resources management issues and watershed degradation, justified primarily by downstream impacts (sedimentation, flooding) and technical interventions to resolve these concerns. In the 1990s, the focus shifted to participatory natural resources management, with interventions targeted toward improvements in rural production systems and agricultural sector livelihoods with a primary justification being sustainable use of natural resources for local livelihoods. The projects beginning in the 2000s are explored in much greater detail throughout the rest of the report, but for purposes of this general comparison, it could be said this generation was more focused upon the potential for sustainably improving incomes of the rural poor through strategies for decentralized governance and participatory development of the communities' asset base, especially their natural assets. The primary justification now being inclusive economic growth and sustainable livelihoods. A final observation on the three generations of projects is that whereas the 1990s and 2000s projects have primarily been rural development-oriented, the 1980s projects were more focused on perceived hydrologic externalities and technical interventions for watershed management. The inadequacies of that too-restrictive

technical focus subsequently gave rise to the later projects more "people-centric" approaches. Appendix 3b provides a brief overview of the World Bank's support for and to watershed development between 1980 and the present.

Since 2001, the World Bank has supported the implementation of three watershed development programs in the Indian states of Karnataka, Himachal Pradesh, and Uttarakhand. The Karnataka Watershed Project (also called *Sujala* or Sujala project) began in 2001 and ended in 2009. The Uttarakhand Decentralized Watershed Development Project (also called *Gramya* or Gramya project) and the Himachal Pradesh Mid-Himalayan Watershed Development Project (or HP project) began in September 2004 and October 2005, respectively, with the Uttarakhand project closing in 2012 and the Himachal Pradesh project scheduled to end in March 2016.

These projects invested approximately USD 276 million for development on 1.2 million ha in over 6,000 villages, directly impacting almost 800,000 households. They cut across diverse human, institutional and topographical landscapes, from the semi-arid lowlands and plains of Karnataka to the middle and upper Himalayan hill ranges of Uttarakhand and Himachal Pradesh.

Given the different contexts and the different developmental thinking prevailing at the time each was initiated, the projects adopted different approaches and strategies to arrive at roughly the same objectives. In assessing the lessons and good practices from these three, it is necessary to identify those watershed management practices in India which would also constitute good practice from a global perspective. To do so requires benchmarks against which the national practices may be compared. For this purpose, the 2008 World Bank report "Watershed Management Approaches, Policies and Operations: Lessons for Scaling-up" (Dhargouth et al 2008) is a primary source for deriving a framework to identify global good practices. This report provides a stocktaking of global experiences, based upon the knowledge and lessons from sixty-nine watershed management projects, financed by the World Bank between 1990 and 2004, distilled by that 2008 report. The report assessed outstanding issues and key lessons, provided an in-depth literature review of the state of knowledge and practice in watershed management, and was subjected to an in-depth peer review process. Further, the universe of watershed management projects it reviewed, on average, faced similar situations and had similar objectives to the three reviewed here.

2.2 DEFINING A WATERSHED

A watershed is an area that supplies water by surface or sub-surface flow to a given drainage system or body of water. Size is not a factor in the definition. Watersheds vary from a few hectares (or less) to millions of square kilometers (for example, Ganga river basin). If a "watershed" does not discharge directly into the ocean, then it is actually part of a larger watershed that does.

Where a watershed is defined by surface drainage, a groundwater basin or catchment's is not necessarily so defined; that is, surface water and groundwater boundaries do not necessarily coincide. Shallower, surficial aquifers may and often do follow the same boundaries that define surface-water watersheds. Deeper aquifers, however, are less likely to follow surface features. For these, the groundwater divide or boundary between two adjacent groundwater basins is the high point in the water table, and is constituted by a geologic or hydrologic, rather than a topographic, boundary.

While watersheds are one of the most basic units of natural organization in landscapes, they seldom if ever coincide with units of social, economic, or political organization. Thus, organizing efforts and activities around watersheds are best pursued only when strictly necessary and relevant, such as when land or water-related externalities are of sufficient concern to drive development objectives and priorities. India's 1995 Common Guidelines for Watershed Development Projects took a pragmatic approach to resolving any such issues of "institutional" versus "natural" boundaries by defining "operational watersheds" that align largely to village boundaries. This tactic—based on socially, politically, and/or administratively meaningful units—has been successfully applied throughout the world, especially where decentralized approaches are taken and local governments are seen as principal actors and stakeholders. The Report of the Technical Committee on Watershed Programs in (GOI 2006) India went further and stated:

> *Since we believe the watershed program is primarily a social program, and also because VWCs [Village Watershed Committees] within each Gram Panchayat [GP] are to be the ultimate*

*implementing agency, the final selection of implementation area must be according to the GP boundaries, to which [*watershed*] boundaries are to be approximated.*

2.3 WHAT IS WATERSHED MANAGEMENT?

Watershed management (WSM) is the integrated use and/or management of land, vegetation, and water in a geographically discrete drainage area for the benefit of its residents, with the objective of protecting or conserving the hydrologic services that the watershed provides and of reducing or avoiding negative downstream or groundwater impacts. That is, WSM is ultimately about achieving water resources-related objectives.

In practice, one can observe that there are basically two approaches taken to WSM, which we will call here a "targeted approach" and a "mainstreamed approach". The former has very specific objectives and indicators related to water resources and hydrologic outcomes, and the management interventions and the instruments applied are designed to address these. The latter has broader goals and objectives, such as sustainable land and natural resources management, poverty reduction, and/or rural development. Here, WSM practices are integrated (mainstreamed) into planning and investment. Most development-oriented WSM programs—certainly those in India—are of this latter type. Irrespective of the approach, a number of factors are (or should be) common to the two approaches:

- Clarity of objectives regarding WSM issues and desired outcomes regarding water resources and the interactions with land use and vegetation;
- Appropriate matching of management and instruments to the defined hydrologic objectives (box 2.1);
- Adapted interventions that match local conditions—watershed hydrology,[7] natural resources use, climate and environment, and the social, economic, and institutional situation; and
- Strong stakeholder management and communications in all phases (for example, problem identification; planning, prioritization, and goal setting; decision-making; implementation; follow-up).

7 How water moves through a watershed is the product of the interactions between a number of factors, which include the watershed's underlying geology, climate and precipitation patterns, slope, soils, vegetative cover and land use. "Watershed hydrology," as a term, encompasses these interactions.

BOX 2.1: Matching Approach to Objectives

Many WSM projects start out with a series of hydrologic objectives, but subsequently fail to pursue them in any substantive form. A common example is "soil conservation to reduce sedimentation downstream from agricultural watersheds." If sedimentation is an issue, it cannot simply be assumed that on-farm interventions will resolve the problem. Rather, there must be efforts to evaluate and identify the principal sources of sediments so that appropriate interventions may be designed to address those specific sources and their causes. Such an evaluation may (unsurprisingly) find that agriculture is not the primary source of sediments from rural watersheds. Quite commonly road systems, stream bank erosion and the mobilization of sediments stored in flood plains and riparian zones are the main culprits. Concern for sustainable land management and soil productivity are ample justifications for supporting on-farm soil and moisture conservation; a "WSM project" is not required to address these. However, if off-farm and downstream impacts are real issues, the approach and instruments must be relevant to and support the stated WSM objectives.

2.4 SCALES OF INTERVENTION

The scales of interest for a WSM program can be described in terms of hierarchy, physical magnitude and/or time. Hierarchical relationships within the watershed of interest can be physical (for example, first order-streams originate from an accumulation of rainfall runoff and second-order streams are formed by the intersection of two first-order streams) or socio-cultural (such as households, kinship groups, tribes, and ethnic groups) or political (for example, administrative boundaries and groupings from the farmer's field to the nation to groups of nations). From a physical magnitude standpoint, the size of the biophysical unit (watershed)—often measured in hectares or square kilometers—takes on great importance when considering the impacts (externalities) of upstream land managers and water users on those downstream. As impacts or externalities are attenuated over some area and distance due to other factors and interactions taking on greater importance (for example, geology, soils, buffering capacity of the stream and/or groundwater system, and rainfall patterns), impacts felt strongly at a local scale may manifest only weakly or not at all at another scale. Impacts that manifest strongly over relatively short distances may include such

things as the physical destruction from a landslide or flash flooding whereas others that may manifest across much larger areas and distances include impacts of the over-exploitation of groundwater on regional scales, such as loss of dry season flows and the dropping aquifer levels. In temporal terms, there can be significant time lags between a cause and an effect.

From a physical magnitude standpoint, most WSM programs have tended to adopt the micro-watershed as the basic unit and focus for management. This has proven to be a flexible, practical, and economical unit for project intervention. Within a micro-watershed all stakeholders can be readily identified and included in participatory processes to establish a consensus vision on needs and priorities. Management at this level is not overly complex, so local capacity can be built to plan and manage the interventions and to administer funds for the execution of plans. At this level, the links between water and land resources and stakeholders' income, livelihoods, and welfare are readily apparent (and temporally, more immediate), which facilitates the identification of potential win-win management scenarios that can provide positive incentives and align local stakeholder's interests with broader watershed protection and conservation goals. Finally, collective action at the micro-watershed level can result in lower costs and better use of financial and human resources, especially for the management of common property resources (CPRs).

However, as has been the norm in India's watershed development programs, the micro-watershed approach when done in isolation—that is, carried out as a patchwork of individual micro-watershed interventions and lacking prioritization or planning within the context of the larger watershed—has severe limitations as an instrument for water resources management. An isolated approach will be uncertain of achieving broader goals of protecting and conserving the hydrologic services of interest and/or of managing negative downstream or groundwater impacts. Simply following "good land management practices" and maximizing the local capture of rainfall and runoff at the micro-watershed scale does not guarantee that the aggregate impacts of all the micro-watershed projects will be hydrologically beneficial for the watershed or groundwater aquifer as a whole.

In thinking of the management of water resources beyond the micro-watershed, issues of scale are once again important to consider. The relative ability to influence and manage some hydrologic factors varies across scales. At local scales, WSM interventions (positive and negative) can have very strong and immediate impacts. For example, a strong rainstorm on a freshly ploughed field can cause in-field irrigation ditches to silt up overnight and cause the loss of tens of tons of productive topsoil. Moving to minimum tillage and introducing vegetative hedgerows would be one set of measures to avoid this problem in the future. At this scale, cause and effect are tightly linked and management responses can have almost immediate impacts. At a larger scale and a greater distance, however, what the farmer and his neighbors do or do not do in their fields is only very weakly related, if at all, to the growing delta that is beginning to block access to a downstream, coastal port. The range and extent of interventions that might be called for in order to save the port could be far more costly than the alternative of ignoring the problem and allowing the loss of access to the port, that is, at this scale, the ability to influence and manage the causal factors could be beyond the technical and/or economic capacity to do so.

The purpose of table 2.1 (on the next page) is to provide an illustrative example of how changes in scale—physical magnitude and hierarchy—introduces changes in focus, management approach, instruments and in the key stakeholders who must be involved.[8] Objectives as well may, and often do, change with scale. For example, at the local (micro-watershed) scale, the objective may be to improve livelihoods by intensifying and diversifying agricultural production in an environmentally sustainable manner. However, at the watershed scale, the objective might be flood prevention, protecting water quality for human consumption, and/or maintaining environmental flows. In this example, interventions at the micro-watershed scale may require special orientation to ensure compatibility with broader watershed objectives.

The impacts of WSM interventions also can have significant time lags, with scale being one determining factor in the length of the lag—that is, the smaller the scale, the more immediate the impact.

8 The role of stakeholders is necessary but not sufficient in designing proper intervention in the overall performance of watershed activities. Equally important is to ensure an informed, science-based design that departs from an understanding of the hydrology of the watershed, irrespective of scale. Ultimately, designs of interventions requires both technical expertise and reliable ownership by the concerned communities.

TABLE 2.1: An Idealized Scheme of Changes in Watershed Management Approach and Focus with Scale

WATERSHED MANAGEMENT UNIT	INDICATIVE SIZE (ha)	INFLUENCE OF RURAL LAND USE ON WATERSHED HYDROLOGY	HIERARCHY OF POLITICAL STAKEHOLDERS	TYPICAL MANAGEMENT FOCUS/INSTRUMENTS
Micro-watershed	1–500	Very Strong	Those with land & resources rights (statutory & customary/traditional)	Participatory planning; best management practices; site design
Sub-watershed	500–5,000	Very Strong to Strong	Local government w/ principal local stakeholders	Stream classification; land use planning/zoning; land, water resources & stakeholder management
Watershed	5,000–25,000	Strong to Moderate	Local or multiple local governments with principal local & regional stakeholders	Watershed-based zoning; land use & water resources planning; stakeholder management; policy, norms, regulations & incentives
Sub-basin	25,000–250,000	Moderate to Weak	Local, regional or state governments with principal regional stakeholders	Basin planning; stakeholder mgmt.; policy, legal framework & incentives
Basin	>250,000	Weak to Very Weak	State, multistate, or federal governments with principal regional & state stakeholders	Basin planning; stakeholder management; policy, legal framework & incentives

TABLE 2.2: Illustration of Time Lag for Ecosystem Response at Sub-Basin/Basin Scale

	TIME-LAG (YEARS)											
ECOSYSTEM FUNCTIONS	0	10	20	30	40	50	60	70	80	90	100	>100
Water Quality/Hydrology		■	■	■	■	■	■	■	■	■	■	■
Soil Quality			■	■	■	■	■	■	■	■	■	■
Soil Structure			■	■	■							
Upland Soil Erosion	■	■	■									
Channel Erosion		■	■	■								
Riparian Shade				■	■	■	■					
Downstream Sedimentation		■	■	■	■	■	■	■	■	■	■	■
Groundwater Recharge	■	■	■	■	■	■	■	■	■	■	■	■

As adapted by J. Kerr, 2007 from Gregory et al, 2007.

For example, sediments from inappropriate practices in the upper watershed may take decades or centuries to work their way through the watershed. Most WSM projects assume they can have short-to-medium term impacts, but it is important to understand that a problem encountered today may be the result of a causal factor that no longer exists or that a solution implemented tomorrow may take years or decades to achieve its desired downstream objective (table 2.2).

2.5 DECIDING BETWEEN WATERSHED MANAGEMENT AND OTHER APPROACHES

As previously discussed, WSM is ultimately about achieving water resources-related objectives. Thus, by taking a WSM approach it is implied that one intends to deal with the myriad interactions of land, water, and people within complex systems. Doing so effectively will add institutional complexity and costs in terms of time and effort to what might be achievable through other approaches for rural development and natural resources management. Implementation often requires more elaborate decentralized and participatory approaches with organizational setups that involve numerous agencies and more complex financial and incentive arrangements. Given the inherently higher transaction costs, there should be a clear rationale and justification underlying the decision to pursue a WSM approach. It is not a panacea that can or should be applied to every situation where natural resource and/or rural poverty problems exist. Where such a rationale does not exist, it will make more sense to follow approaches that are based on more socially, politically, administratively or ecologically relevant land units or affiliations. In India this is a point that is beginning to receive attention and become a focus of discussion. Watershed-based approaches are applied almost universally in rainfed agricultural areas where issues of natural resource management and poverty exist.

In the case of the three World Bank–Supported projects—consistent with India's Watershed Development Program Guidelines—the approach that was undertaken was one of watershed development rather than of WSM; that is, a mainstreamed, rather than a targeted, approach. This meant that the projects' would seek to internalize good practices and concerns for WSM into broader planning for poverty alleviation, rural livelihoods, increased agricultural production and incomes, and sustainable land/natural resources management. The principle means for the projects to achieve these broader ends were through maximizing the local capture of water and intensifying and diversifying agricultural and livestock production using that water. This gave the projects clear water resources management objectives,[9] which were to be met through the assumption that good agricultural and land management practices would result in good overall management of watersheds and their water resources.

This approach had two principal trade-offs. First, it pre-determined and imposed a generalized water resources management goal—that is, in all three states, under all conditions and, in all micro-watersheds and communities maximizing the local capture of water and intensification of productive use were the driving water resources management objectives.[10] This is a *one size fits all problem* . . . [in that the approach] *was developed for the semi-arid zones and is being blindly applied in both low and high rainfall areas*.[11]

This is a common, and recognized, problem of the watershed development programs that effectively blocks local communities from prioritizing other types of natural resources options and interventions. Second, because this approach focuses on the individual micro-watersheds in isolation from their downstream (or upstream) neighbors, there is no certainty that at a larger scale the goals of protecting and conserving hydrologic services, and/or managing negative downstream and groundwater impacts are being met.[12] This latter is not just a theoretical concern, especially in a country where demands on water resources are expected to exceed supply by 2050. Relevant to the risks inherent in an "isolated micro-watershed development approach," the World Bank's 2005 study on water resources in India (Briscoe and Malik 2006) observed that *while traditional technologies such as rainwater harvesting and tanks can play an important local role, they also create new and additional demands which often clash with existing uses, and they sustain the wishful thinking that supply-side options are what will "solve the problem."* A more recent Planning Commission report (GOI 2011) echoes this same point: *Water resources in many parts of the country are under severe stress leading to excessive exploitation of groundwater. There is some scope for increasing water availability* . . . [and] *these opportunities must be fully exploited,* [but] *the real solution has to come from greater efficiency in water use*. Table 2.3 presents a summary of the WSM aspects of the projects as designed.

9 An objective that was described by a number of participants as using each drop of rainfall as close as possible to where it falls.

10 Example: Visits to project communities resulted in the impression that a significant number of them felt that increasing domestic water supply was a critical need. The projects' response to potable water supply or water allocation issues were, however, indirect—and this despite the three states' policies that placed a higher priority on water for human consumption than for irrigation. In fairness, some micro-watershed investments did indirectly provide increased access and availability of water for domestic use. The Gramya project (2012) reported increased access to domestic water, resulting from soil and water conservation measures. Reportedly, the time spent in collecting water was significantly reduced with a sharp increase (48 percent) in the number of households taking less than 1 hour to collect water and a similar decrease (39 percent) in the number of households taking between 1–2 hours.

11 Dr. Suhas Wani, Principal Scientist, ICRISAT/Hyderabad, personal communication.

12 In Karnataka, micro-watershed plans were aggregated at the sub-watershed level; however, the aggregation was mechanical—that is, simply packaging the individual micro-watershed plans into a "sub-watershed" plan.

TABLE 2.3: Principal Watershed Management Content of the Three World Bank-Financed Projects

	KARNATAKA	HIMACHAL PRADESH	UTTARAKHAND
Overall WSM objectives	• Strengthen capacity of communities within project cycle & of implementing department for participatory management within a watershed planning framework	• Implementation of watershed treatment activities as prioritized in Gram Panchayat Watershed Development Plans (GPWDP)	• GPs & other relevant local institutions have developed sufficient capacity to design, prioritize, implement, operate & maintain watershed treatments
Hydrologic/ water resources objectives	• Groundwater recharge • Water management for crop production (in situ soil moisture conservation & irrigation)	• Adopt integrated WSM framework . . . using water as the nucleus for community-based rural development	• Integrating land-water use with the objectives of moisture retention and biomass production
WSM-related institutional objectives	• Strengthen capacity of communities for participatory planning, implementation, management & maintenance • Have implementing department operate in a more socially inclusive manner within framework of watershed development plans	• Panjayati Raj Institutions & other local village level institutions have capacity to plan, implement, monitor & maintain the watershed treatments • Awareness & capacity building of all stakeholders including line departments in participatory natural resource management	• Communities mobilize & prioritize watershed & village development technologies • GPs directly implement watershed treatments & village development investments • Strengthening User Groups (UG)/subcommittees at revenue village levels
Specific instruments to achieve WSM objectives	• Land management (Soil & Water Conservation [SWC], productive revegetation with perennials) • Establish Micro-WSM Groups • Development participatory micro-watershed development plans • Capacity building of local actors	• SWC (vegetative measures) • Protection & reclamation of land (agro-forestry/ silvi-pasture) • Improve moisture regime (vegetative & mechanical measures) • Water harvesting structures • Water use efficiency improvements (irrigation, promotion of conservation) • Establishing common interest groups • Information, education & communication • Local-level capacity building • Human resource development of implementing agencies • Knowledge management • Harmonization of watershed approaches (state-level)	• SWC on arable lands • Development of non-arable lands (forest, pasture, bunds, vegetative barriers)
WSM-related indicators	• Groundwater recharge: increased cropping intensity; % irrigated area increase; # wells recharged • Soil erosion reduced • Micro-WSM groups & development plans • SWC measures • Watershed research & extension plans • Remote Sensing Center assisting with Geographic Information System (GIS) & prep of treatment plans for project watersheds	• Influence on state policies & guidelines for watershed development • 2,500 UGs established & taking care of resources in a sustainable manner • Two-thirds of GPs with tribals or nomads have representation in watershed committees	• 15% increase in availability of water for domestic and/ or agriculture use. • 20% improvement in administrative capacity of GPs. • Water quantity & quality indicators to be incorporated • % of activities in local plans addressing water resource management

Source: World Bank Project Appraisal Documents.

Chapter 3 WATERSHED DEVELOPMENT IN INDIA: POLICY AND TECHNICAL GUIDELINES

The three projects under review were designed in accordance with, and in support of, GOI's policy implementation framework for watershed development. The Government has had a number of programs using watershed development approaches over the years—including, the Drought Prone Area Program (DPAP), the Desert Development Program (DDP), the Integrated Wasteland Development Program (IWDP) scheme all in Ministry of Rural Development (MoRD), and the National Watershed Development Program in Rainfed Areas (NWDPRA) under the Ministry of Agriculture. Each program had its own guidelines, norms, funding patterns, and technical components according to their goals, but they shared the common objectives of land and water resource management for sustainable production and a focus on local or micro-watersheds as the unit for planning and intervention. A technical committee constituted by MoRD studied the implementation and impact of the programs and recommended a common set of operational guidelines, objectives, strategies, and funding norms for these micro-watershed development projects, integrating the features of the three programs under MoRD. Based on that review a set of Watershed Development Guidelines were promulgated in 1995. Among others, the Guidelines defined the objectives of "watershed development" as being *[T]o promote the economic development of the village community, encourage restoration of ecological balance in the village, and improve the economic and social condition of the resource poor and the disadvantaged.*

Revisions to the Guidelines in 2001 expanded the focus to include: (i) marginal and degraded lands; (ii) mitigating adverse effects of extreme climatic conditions; (iii) economic development of natural resources; (iv) sustaining project outcomes through community involvement, empowerment and capacity building, and the use of simple, easy, affordable locally-based technical solutions and institutional arrangements; and (v) employment generation and poverty alleviation.

Though implicit, WSM objectives—in the form of enhancing water resources availability and distribution—are found within the Guidelines. The 1995 Guidelines call for optimizing water use, mitigating the adverse effects of drought, equitably distributing water resource development benefits, alleviating drinking water shortages, harvesting and storing water for domestic and agricultural purposes, and enhancing groundwater recharge. The 2001 Guidelines, for their part, direct that attention should be given to in situ conservation of soil and water, water harvesting and storage for domestic and agricultural purposes, enhancing groundwater recharge, renovation and augmentation of water resources for drinking water and irrigation, and alleviation of drinking water shortages.

The Guidelines, however, did not provide any criteria for prioritization and selection of watersheds nor did they prescribe priority interventions that would, in themselves, necessarily lead to improvements in "WSM". Neither did they contemplate the possibility that they would be applied in situations where water resource-related externalities could already exist or possibly result from program interventions. Just one criterion—prioritizing watersheds where communities face acute shortages of drinking water—speaks to a direct WSM concern. However, only very limited attention was given in the Guidelines to planning or investment for the alleviation of drinking water shortages. All other selection criteria in both the 1995 and 2001 Guidelines focus on poor and marginalized populations (scheduled castes and tribes), marginal and degraded lands, and the alleviation of poverty. The addition in 2001 of *mitigating adverse effects of extreme climatic conditions* as a goal added implicit elements of water conservation and allocation. As such, WSM in India's watershed development programs could be said to be an implicit rather than an explicit goal.

Ultimately, the guidelines operated on the assumption that the watershed development programs, by integrating good management practices and concerns into the planning/investment/implementation cycle, would have an overall positive impact in conserving or restoring the integrity of the watershed system (and the hydrologic services that it provides) at the micro-watershed scale and, by extension, at the larger-scales as well. But, is this necessarily a good assumption? Given that there were no provisions in the 1995 and 2001 guidelines for identifying, prioritizing or addressing local water resource-related externalities or for aggregating micro-watershed planning and interventions into a larger (watershed) context, it would not be possible to conclude that this assumption was, or is, valid. However, it may be fair to conclude that the Watershed Development Guidelines did not address downstream benefits or costs.

3.1 PROJECT DESIGN IN THE INDIAN CONTEXT

For the design of the three projects under consideration, GOI's Common Guidelines for Watershed Development Projects provided both the policy and technical/implementation frameworks. The Sujala project in Karnataka, the HP project in Himachal Pradesh, and the Gramya project in Uttarakhand were designed and prepared between 2000 and 2005. Each reflects the different iterations of the Government Watershed Development Guidelines current at the time of its preparation.[13] The Sujala project was prepared under the 1995 Guidelines while the other two were prepared under the 2001 Guidelines.

The Guidelines' primary orientation was toward rural development programs with strong, central objectives related to sustainable use of natural resources and poverty alleviation (GOI 2006; GOI 1994; GOI 2001). Both the 1995 and 2001 (revised) Guidelines defined the micro-watershed (on the order of 500 ha) as the unit of planning and intervention. This definition evolved over time from earlier experiences in rural development where agriculture was the principal focus. A high percentage of India's population is rural and a disproportionate percentage of these are extremely poor and reliant upon rainfed agriculture for their livelihood. As summarized by one author: *The watershed development program assumes importance in India where 60 percent of the cropped area is rainfed and is characterized by low productivity, water scarcity, degraded natural resources and widespread poverty* (Palanisami et al 2009). Overcoming poverty under these conditions required effective, efficient and productive use of the natural resource base; a principal asset of the rural poor. To enhance the productivity and reliability of rainfed agriculture—especially in India's semi-arid and sub-humid regions—the goal became one of maximizing the use of available water (rainfall, surface, and groundwater). To do so, emphasis was placed upon increasing irrigation potential through investments, for example, in tubewells, groundwater recharge, surface storage (in farm ponds/tanks) and in-field practices to enhance soil moisture recharge/conservation and thus provide additional moisture directly to rainfed crops. The main strategy thus became one of detaining and exploiting, to the maximum extent possible, rainfall that fell in and near farmers' fields. With such a strategy, the micro-watershed was a natural unit for planning and investment.

As experience with micro-watershed development was gained, the concept of "ridge-to-valley" treatments became widely accepted by Government, donors and NGOs (Non-Government Organizations), which further strengthened the use of the micro-watershed as the unit of intervention. Over the past decade, the "ridge-to-valley" approach has become idealized as the means for achieving the rural development goals of the watershed development programs. By seeking to maximize the capture of rainfall and runoff—a "WSM" goal—the watershed development programs hope to provide adequate, "additional"[14] water resources for productive use. The basic concept is one of working with the natural hydrology of the watershed from "ridge-to-valley" in order to detain, divert, store (surface or subsurface) and use all available rainwater. In practice, the focus tends to be on (i) the natural drainage lines with the construction of check dams, weirs, recharge and/or detention structures, and so on; and (ii) structural treatments in farmers' fields (for example, bunding). However, the concept and approach also includes broader land treatments and land uses (for example, in-field agronomic and conservation practices, reforestation/re-vegetation, perennial crops, and improved pasture) as well as natural resources conservation. More recently, the perception that the variability and frequency of abnormal climate trends is on the increase

13 Sujala in 2000/01, Gramya in 2003/04, and HP project in 2004/05.

14 "Additional" is only from the perspective of those capturing that water and its benefits. In practice, the interventions are simply changing the way that rainfall and runoff were previously partitioned and allocated.

(Ramachandran et al 2006) has added further justification to the use of the micro-watershed unit and watershed development as a tool for adaptation to climate change.[15]

3.2 STATE-SPECIFIC CONTEXTS FOR WATERSHED DEVELOPMENT

As watershed development projects, the three projects' objectives were oriented toward the broader goals of sustainable land and natural resources management, poverty alleviation, and rural development. They did not entertain any specific objectives related to water resources and/or the hydrologic interactions of land, land use, and vegetation.[16] As the watershed development programs were (and are) one of the principal instruments of Government for improving rural land and WSM, it is relevant to inquire here if the inclusion of more focused water resources objectives might have been usefully included in the three projects. One means of looking at that question is to review the states' water policies that were under development during the project design phase.

Between 2002 and 2004 the three states drafted water policies.[17] While the contexts and conditions vary greatly between the states, the policies demonstrate shared concerns regarding water availability and increasing stress upon and depletion of water supplies as a function of climatic variability, growing population and demand, inadequate management of water resources, and a general lack of water conservation efforts. All three expressed concerns over the institutionally fragmented nature of the mandates over water resources and WSM. In response, they called for a move toward integrated water resources management (box 3.1), proposed the need for institutional reforms, stressed the importance of implementing water resources planning at the basin and/or sub-basin levels, and established that the future modality for watershed development would be decentralized implementation, planning, and operation and maintenance (O&M) at the local levels. They also stressed the need for much greater attention to the sustainable management of groundwater resources and the conjunctive use of surface and groundwater.

BOX 3.1: Integrated Water Resources Management

Integrated Water Resources Management (IWRM) is a comprehensive, participatory planning and implementation tool for managing and developing water resources in a way that balances social and economic needs, and ensures the protection of ecosystems for future generations. Water's many different uses—for agriculture, for healthy ecosystems, for people and livelihoods—are the subject of an open, flexible process that brings together decision-makers across the various sectors that impact water resources and all the relevant stakeholders to set policy and seek to make sound, balanced decisions in response to the specific water challenges faced. The four principles on which IWRM is based are the 1992 Dublin Principles for Water:

- *Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.*
- *Water development and management should be based on a participatory approach, involving users, planners and policymakers at all levels.*
- *Women play a central part in the provision, management and safe-guarding of water.*
- *Water has an economic value in all its competing uses and should be recognized as an economic good as well as social good.*

Source: Adapted from *GWP Tool Box for IWRM* (undated) and *Integrated Water Resources Management, Wikipedia* (undated).

Despite the similarities in policy, these states face different conditions. For instance, Karnataka is one of India's drier states. Rainfall is highly erratic and the rainy season is short. About two-thirds of the state receives less than 750 mm of rainfall. In Karnataka, population growth and rising demand, urbanization, and industrialization contribute significantly to increasing water stress. The State's policy recognizes that it will face *acute crisis within the next two decades . . .* [with] *serious destabilization of the water sector affecting the hydrology, economy and ecology of the State,* if the water management situation does not change. For its part, Himachal Pradesh gets significantly more annual rainfall than Karnataka

15 For example, the late onset and/or early withdrawal of monsoons, longer dry seasons, shifts in peak rainfall periods, increased rainfall intensities and incidences of droughts and floods.

16 See appendix 1a. Summary of Common Guidelines for Watershed Development Projects 1995, 2001, 2008, 2011 & 2012.

17 Himachal Pradesh and Karnataka ultimately finalized and adopted their policies (International Environmental Law Research Center, undated). Uttarakhand, however, apparently never did. Nonetheless, the Uttarakhand draft, along with the other states' official policies, are useful for illustrating the concerns and priorities at the time of the three projects' preparation and implementation. The States' policies are summarized in appendix 2.

TABLE 3.1: Overview of Water Resources Availability in Project States

AS OF 2003	KARNATAKA	HIMACHAL PRADESH	UTTARAKHAND
Groundwater Usage / Net Annual Groundwater Availability[1]	70%	30%	66%
Irrigation Potential Created / Ultimate Irrigation Potential (Major & Medium Schemes)[1]	85%	27%	81%
Irrigation Potential Created / Ultimate Irrigation Potential (Minor Schemes)[1]	46%	53%	97%
Taluks (Karnataka) and Blocks (Himachal Pradesh, Uttarakhand)[2] :			
% affected with semi-critical, critical or overexploited groundwater	47%	None	Undetermined[3]
% of total affected that are classified as "overexploited"	79%	—	—

[1] *Source:* Ministry of Water Resources. Water Availability and Potential. www.wrmin.nic.in/index1.asp?linkid=143&langid=1
[2] *Source:* Ministry of Water Resources, Central Groundwater Board. State Groundwater Profiles. www.cgwb.gov.in/gw_profiles/st_ap.htm
[3] Only five of the state's 13 districts have had developed groundwater use maps. In those districts, two blocks are classified as over-exploited and the others as having semi-critical status

but it is concentrated within a three to four month period. Heavy rainfall and high runoff result in seasonal scarcities. Domestic and industrial demand in the rural areas is projected to increase sharply in the coming years as economic conditions improve. This, in turn, has led to concerns about water quality degradation from untreated or inadequately treated industrial effluents and sewage. As for Uttarakhand, the state has moved from surplus to acute scarcity in 50 short years. This radical shift is attributed to decreasing water flow from glaciers, severe erosion, flooding, population increase, increased demand for non-domestic use, and a lack of attention to the natural resource base (Development Center for Alternative Policies 2005). Table 3.1 provides an overview of the water situation in each state.

The policy objectives of the three states are similar, each giving the highest priority to water for human consumption and domestic use followed by irrigation. Hydropower development and commercial and industrial uses have lower priority.

To achieve their water policy objectives:

- In Himachal Pradesh, the position is that *it* [is] *imperative that there is increased emphasis on improving planning for management and conservation of these resources* . . . [and to] *create a vision for the water resources development and management* . . . [where] *development and management of river basins . . . or sub-basins . . . involving multi-disciplinary units that prepare comprehensive plans.*
- In Karnataka, the policy calls for *water resources planning, development and management* [to] *be carried out, adopting an integrated approach for a hydrological unit such as river basin as a whole or for a sub basin, multi-sectorally, conjunctively for surface and groundwater incorporating quantity, quality and environmental considerations . . .* [to] *establish Water Resource Data Information Center and collaborating arrangements with concerned Departments/ Agencies . . . develop protocols for data sharing and exchange . . . establish direct access by water management units to water resource data center's databases and decision support systems like GIS and MIS* [Management Information Systems] . . . *make water accounting and audit mandatory . . . assess overall water resource availability, current and future problems and conflicts . . . develop integrated, conjunctive basin management plan using participatory approach.*
- Finally, in Uttarakhand the draft policy is reported to have called for the management of water resources in an integrated and holistic manner; the systematic consideration of surface and groundwater quality and quantity; for addressing interactions between water, land, and the environment; and for reconciling economic necessities with ecological imperatives (Upadhyay 2006).

Given the range of water resources issues and concerns raised by the States' policies, it appears that GOI's Watershed Development Program could indeed have usefully addressed itself to specific objectives of water resources management. The States' water policies called for significant institutional and policy reforms as well as investments in diverse areas—such as institutional development, capacity building, water resources planning and regulatory frameworks, information and monitoring systems, research, stakeholder management, and so on—to move toward a vision of integrated management of the

States' water resources. The Watershed Development Program, however, provided only a limited menu of options that primarily were for engagement at the local level. In result, the needs expressed through the policies greatly transcended the scope and focus of the Watershed Development Program.

At the same time, however, it is also important to recognize that the Watershed Development Program is a major instrument and opportunity for putting in place the "bottom-up" component for IWRM. What transcended the scope of the Program then, and to this day still presents a challenge for national and state-level actors concerned with watershed and water resources management is how to complement the bottom-up approach with a judicious mix of the appropriate "top-down" instruments. Over the medium-to-long terms, it will be critical that such instruments as watershed-based information systems and zoning, land use and water resources planning at the basin and sub-basin levels, stakeholder management systems, and appropriate sets of policies, norms, regulations, and incentives are developed and deployed.

Chapter 4 GOOD PRACTICES FROM PROJECT IMPLEMENTATION

This section outlines the WSM practices from the three World Bank–Supported projects that constitute best practices and/or provide design and implementation lessons for future projects. As the three World Bank projects substantially conformed to the national-level Common Guidelines for Watershed Development that were in effect at the time of their preparation, they had many aspects in common. They all shared the broad objective of reducing poverty, and doing so through watershed-based natural resources management, livelihoods promotion, capacity building and institutional development. In each, selection criteria prioritized those micro-watersheds with predominantly poor and marginalized populations and with significant problems of land degradation. Yet they each also had certain unique objectives. The Sujala project had additional objectives to develop (i) in-house capacities and (ii) a model to support large-scale replication within and outside the state. In the case of the Himachal Pradesh Mid-Himalayan Watershed Development Project (HP) and Gramya projects, their specific objectives were similar: (i) strengthen the system of Panchayat Raj Institutions (PRIs), (ii) bring about harmonization of approaches across various watershed projects being implemented in the state, and (iii) convergence and dovetailing of on-going schemes. The different contexts, imperatives, needs and challenges resulted in structurally and operationally different approaches being adopted in the three projects. Together, they provide a range of valuable learning, experience, and practices that could facilitate successful implementation of large-scale participatory watershed development programs in a variety of contexts.

As a means of evaluating the India projects and drawing out lessons and learning, the benchmarks for good practices identified by the World Bank (Dhargouth et al 2008) in a global stocktaking of World Bank-financed projects are used here. These address seven different areas or themes: (i) the micro-watershed as a building block; (ii) decentralized and participatory development; (iii) participatory, evidence-based micro-watershed planning; (iv) stakeholder inclusion; (v) capacity building and information sharing; (vi) sustaining outcomes through linking conservation to livelihoods; and (vii) monitoring and evaluation (M&E).

4.1 START FROM THE BUILDING BLOCK OF THE MICRO-WATERSHED

India has long focused on the micro-watershed as the building block in its watershed development programs, an approach that allows the concerns of all stakeholders to be integrated in a package of land, water, and infrastructure interventions that respond to priority needs. The use of the micro-watershed as the basic unit for planning and intervention, as per GOI's guidelines, was appropriate in all of the projects. Flexibility in defining micro-watersheds, however, is required. While the guidelines would have micro-watersheds defined as a unit of about 500 ha, in the projects the average size of the micro-watersheds and sub-watersheds ultimately selected were many times larger than this. Reflecting operational considerations (for example, terrain, hydrology, administrative units, efficiency, and so on), the average sizes of the micro-watersheds were approximately 1,900, 3,100, and 5,200 ha in Himachal Pradesh, Uttarakhand, and Karnataka, respectively.[18]

All three projects adopted objective criteria supported by satellite-based systems and socio-economic indicators to identify and

18 Karnataka's larger average size was also a function of the aggregation of local micro-watershed plans at a sub-watershed level. In this fashion, implementation and institutional arrangements could be put in place at that larger-scale in order to better support the implementation of the local micro-watershed plans and achieve some economies of scale. As previously noted, this aggregation was mechanical and did not provide a "sub-watershed management" framework that both informed and was informed by the micro-watershed plans.

TABLE 4.1: Micro-watershed Selection Criteria Used by the Three World Bank–Supported Projects

KARNATAKA	HIMACHAL PRADESH	UTTARAKHAND
• Extent of waste lands (20 points) • Silt index & erosion hazard (20 points) • Extent of irrigated/dry area (10 points) • Rainfall (20 points) • Schedule Castes (SC)/ Schedule Tribes (ST) population (20 points) • Proportion of agricultural laborers (10 points)	• Altitude (between 600 m and 1800 m) • Ecological degradation • Poverty (more than 30% below poverty, SC/ST percentage, marginal workers percentage, population density, women's literacy) • Backwardness (scarcity villages, distance from motorable road, public utilities, and so on) • Potential for treatment, watershed work (including arable land & population) • Compactness of the area • Social capital (status of village level institutions, level of conflicts, & co-operation, and so on) • Farming systems (irrigated area, livestock status, availability of fuel wood & fodder)	• Altitude (between 700 m and 2000 m) • Ecological degradation/ Erodibility Index (50 percent weight) • Poverty (25 percent) • Backwardness (25 percent)

prioritize micro-watersheds for treatment. Using objective criteria helped to minimize political interference once the project districts were decided upon. As table 4.1 details the selection criteria used by the projects. In keeping with the national guidelines, they used a mix of resource, poverty, and livelihood-based criteria. The weighting of the criteria reflects the particular priorities of the states; all included ecological considerations. Each states' composite index and ranking system identified and prioritized the neediest sub-watersheds, extending selection criteria beyond purely technical water and resource management concerns. Excluded from consideration were areas deemed to be protected areas, such as national parks and sanctuaries, and those covered by other watershed schemes.

4.2 DECENTRALIZED AND PARTICIPATORY DEVELOPMENT

Although effective participation imposes demanding requirements, participatory approaches and the use of community WSM plans have been shown to be effective in empowering communities and in gaining their buy-in (ownership) of WSM programs. The approach requires appropriate sequencing, careful attention to inclusion, political commitment and sustained capacity building for all stakeholders (including government). Decentralization is an ongoing process in many countries, just as it is in India. Thus local-level participatory approaches for governance of resources, planning, management, and technical functions must be careful to reinforce—rather than conflict with—the broader policies and processes as regards decentralization of responsibilities for local development and natural resources management. The roles and responsibilities of elected government, technical agencies, nongovernment organizations and community organizations must be rationally defined and carefully managed. Decentralized and participatory programs are complex, but they are key to building effective partnerships at different levels. Such processes are time-consuming and gestation periods can be lengthy, particularly where joint management of common resources is intended. In recognition of this, design and implementation must also allow the flexibility for each micro-watershed to evolve and progress along its own development path.

An assessment of the World Bank–Supported projects showed that their participatory and decentralized approaches were reasonably effective in engendering real participation by communities and local governments. In great measure this was due to the projects' mechanisms and resources transfers that supported the broader local development agendas. The projects' approaches to resources governance, planning, management, and technical assistance reinforced the pre-existing and ongoing broader processes of decentralization. Some key lessons can be taken from project experiences. These are detailed below.

Performance-Based Systems improve implementation at the field-level. Sujala's project structure was designed to work in a decentralized context and operate through partnerships between government, NGOs, communities, and other stakeholders from the micro-watershed to the state levels. This required all stakeholders to adhere to principles of mutuality, complementarity, transparency and fairness. To operationalize these principles, in 2007 the project introduced a new system of performance based payments (PBPS). The PBPS was designed to (i) hold the local-level project implementers accountable (that is, the District Watershed Development Office and participating NGOs); (ii) incentivize good performance; (iii) sanction non-performers; and (iv) bring about uniformity and

parity in service contract agreements. The PBPS helped improve performance at the field level and sped up completion of the project within its extended time frame. Some of the good lessons from this experience that could benefit future projects include:

- Ensure that the actors responsible for delivery have adequate staff and resources to meet project milestones. If that is not possible, then make the milestones realistic relative to the available capacity. Both the field-level NGOs (FNGO) and the District Watershed Development Office had too few personnel to meet the original (overly optimistic) project targets.
- Watch for potential structural and procedural bottlenecks that could affect program outcomes and design the program to either work around them or take them into account when setting milestones. Some of the issues encountered included (i) the transition from a line of credit-based payment systems to one of treasury checks, severely delayed the process of making payments to community groups and NGOs; (ii) additional new requirements—such as producing certified bank statements for remittance of local contributions—further delayed claim submissions; and (iii) a payment structure that reimbursed the District Watershed Development Office for expenditures incurred in completing certain tasks and that left FNGO payment dependent upon the prior completion of those tasks by the Government functionaries. This resulted in inordinate delays in the release of funds to the FNGOs that, in turn, led to staff turnover among the FNGOs that adversely affected the quality of project implementation.[19]

Allow flexibility in applying project design and decision-making to recognize and overcome local constraints. Sujala decided early on to reduce, if not eliminate, mechanical equipment for civil works in order to promote local employment and limit the potential for leakage. However, in several project areas where soils were hard, local labor was not adequate for constructing the works. The resultant delays in physical progress were mistakenly interpreted as poor performance, and the FNGOs had their payments either reduced or delayed. The project eventually allowed the use of machinery to deal with the harder soils. The initial PBPS Agreement acknowledged that circumstances beyond the control of the stakeholders could delay progress, and defined a category of "no fault" payments for such situations. In practice, however, such circumstances as these were not acknowledged quickly enough and payments to FNGOs were unnecessarily and unjustly delayed.

Apply the systems of rewards and penalties evenly to all parties. Sujala's PBPS system ostensibly applied equally to both NGOs and government agencies. In practice, however, while FNGOs could easily be sanctioned through their project contracts, government officials were largely untouchable. As a result, FNGOs were held disproportionately responsible for implementation problems. Systems of performance incentives must be designed to work within the administrative and regulatory environments of each participating institution. While the project could not sanction government officials as easily as NGOs, it could have used other performance incentives. For instance, in the World Bank–Supported Hydrology II project, a central, public website tracked and showed the progress (or lack thereof) of dozens of state and federal agencies. Agencies with consistently high performance were rewarded in very public ways. Such systems of introducing productive competition among public agencies and offices could work in circumstances such as those faced by Sujala.

Sujala introduced the PBPS two years before the end of the project, so is it possible that many of the challenges it encountered might have been worked out had it had a longer operational window. Overall, the PBPS appears to have been an effective instrument for incentivizing improved implementation of project processes and guaranteeing deliverables. However, for it to have fully delivered on its promise, all parties to the agreement would have had to be held equally accountable for fulfilling their expected roles and functions.

Effective decentralization means effectively decentralizing decision-making, responsibility, financial resources and oversight. The HP and Gramya projects supported the states' decentralization efforts through utilizing a Panchayat-based approach for implementation. Because of the enabling policy environment, the decentralization approaches avoided being ambiguous or

19 The bulk of FNGOs did not have the financial wherewithal to sustain themselves for more than a couple of months at a time.

half-hearted. Using the example of the Gramya project: to the extent possible, the project was implemented through local institutions that were statutory bodies whose existence is enshrined in legislation and would thus endure beyond the life of the project. As a principal, the creation of parallel institutions at the local level was to be avoided. The project placed the responsibility for approval of Gram Panchayat Watershed Development Plans (GPWDPs) with the *Gram Sabhas* and the implementation responsibility with Gram Panchayat. All local-level interventions were managed, planned and implemented by the communities and the GPs. The villages/communities were the owners and the role of Government and NGOs was as facilitators. Funds for watershed treatments were allocated to each GP on the basis of area under GP's jurisdiction and population of the GP. To promote broad participation, equity principals were operationalized by, among others, seeking to ensure that 50 percent of members were women in the village-level committees. Fiscal autonomy was given to the local governments so that they could withdraw and disburse funds directly from the watershed account. Local oversight mechanisms, such as having elected women ward members of the GP co-sign withdrawal and disbursement authorizations, were put in place. Incentives for good performance by local institutions were provided as was a systematic program for local capacity building in support of each actor's roles and responsibilities. This approach successfully enhanced local participation. During the project, attendance in *Gram Sabha* meetings doubled and the participation of women increased fivefold. Assessments showed that an average of 79 percent of total households in a GP had been involved in the preparation of GPWDP; that 49 percent of the community was aware of the GP budget and expenditures; and 91 percent were aware of project objectives, activities and methodologies. Key elements for making the decentralized, participatory approach work included the involvement of women as social mobilization workers and in project governance, targeted assistance for vulnerable groups—the Vulnerable Group Fund for livelihood activities, and participatory M&E.

Strong public scrutiny goes hand-in-hand with decentralization. Social auditing processes carried out through participatory M&E proved to be an important tool and mechanism for supporting communities' aspirations as regarded their desired outcomes from the projects. It also helps to deter bad practices and motivate higher delivery standards. In the Gramya project, communities expressed keen interest in participatory M&E and fully supported the exercises as evidenced by their majority presence and participation. Community members (men, women, and vulnerable groups) were highly participative and unabashedly sought clarifications for any doubts, especially those involving expenditure under the project. The participatory M&E process opened project accounts to scrutiny by the communities; including all vouchers, bills, and account books. Participatory M&E evolved as a public forum for seeking redress of grievances and resolving conflicts around issues of project implementations (for example, delays in payments or works, nonperformance of project staff or committee members, and so on).

4.3 INVEST IN PARTICIPATORY, EVIDENCE-BASED MICRO-WATERSHED PLANS

Once the projects identified a micro-watershed, the action of developing a micro-watershed plan depended on the nature of land ownership, land quality, and land use patterns in the project areas. Thus, the approach taken by Karnataka, where over 85 percent of the landholding are private and cultivated, differed from that taken by Himachal Pradesh and Uttarakhand, where over 65 percent of land is public and only 25 percent is arable on average.

In Karnataka, Sujala Watershed Action Plans (SWAP) were based on the Participatory Net Planning approach.[20] The plans: (i) identified the appropriate conservation and production measures to be supported, which varied according to the type of landholding; (ii) provided the estimated investment costs for the treatment measures, including the individual contributions from the farmer and/or other involved stakeholders; and (iii) established the calendar or timeframe for the implementation. In Uttarakhand and Himachal Pradesh, the GPWDPs focused on estimating the quantities and costs of the specific activities along with the global contributions from the participating ward or revenue village. Detailed plans were drawn up for each discreet activity at the time of implementation.

20 The Participatory Net Planning methodology was developed in the early 1990s by the Watershed Organization Trust and deployed in a large bilateral watershed project, the Indo-German Watershed Development Programme (IGWDP). Its use has since spread widely, suitably modified to accommodate local situations.

While the approach adopted for HP and Gramya projects has proven appropriate given the predominance of public lands, the addition of the Participatory Net Planning methodology for private agricultural lands where productivity enhancement or market-linked production is a goal, might have been beneficial.

Despite the different situations and approaches, the three projects had in common three broad processes for micro-watershed planning and the formulation of proposals:

- The collection of detailed socio-economic and natural resources data; information on land use and, in the case of Common Property Resources (CPRs) on the existing management regimes; and beneficiary preferences and expectations from all stakeholder categories (land owners, landless and women, Community Based Organizations [CBOs] and User Groups [UGs]);
- The systematic collation and analysis of all data and information collected, which in the case of Sujala, involved the use of proprietary IT-enabled tools;[21] and
- The use of basic cadastral and thematic maps (based on remote sensing data) with GIS applications to inform and facilitate decision making at the micro-watershed level.

All of the projects supported multiyear planning (three year plans in Sujala project and five year plans in the HP and Gramya projects) that incorporated data collection, analysis, and resource mapping. However, the emphasis and use that each project gave to these informational and analytical inputs appears to have been be largely determined by each projects' overarching objectives.

In Sujala's case, the SWAP incorporated most all of the components of an integrated micro-watershed plan[22]—such as Soil and Water Conservation (SWC) measures; horticulture; forestry; farming system intensification (integrated pest management; integrated nutrient management; integrated moisture management strategies); and livelihood enhancement plans for vulnerable groups, all of which are subsequently vetted against any likely adverse impacts on the physical and social environment (see box 4.1). In the cases of the HP and Gramya projects, the focus was less on high-tech inputs and more on participatory planning through public meetings. Meetings were carried out at all levels, starting at the wards and building up through the GP (HP project) or revenue village (*Gramya*). Ward meetings sought the participation of all the adult members on the voter list of the GP, including women and elders, the ward representative, community groups (SHGs [Self Help Groups], Mahila Mandals, Nav Yuvak Mandals), and the Watershed Development Coordinator/front line staff of the cluster (operational area) in which the GP or revenue village fell. In keeping with their goals of strengthening the PRI system, harmonizing approaches, and converging with on-going schemes, a greater emphasis on processes for developing micro-watershed plans was emphasized in these projects.

Additionally, a very good practice followed by the projects was the allocation of budgets to the local communities, giving them a firm knowledge of available resources and budgetary constraints. This helped to make planning realistic. Without such knowledge it is impossible for the communities to plan and prioritize in a meaningful manner. A situation in which communities are not given a firm budget around which to plan is a situation where someone other than the community will decide on the priorities. This makes community plans no more than "wish lists" and undermines the development of self-governance/decision-making capacities.

Finally, as has been mentioned previously in other contexts, flexibility must be incorporated as a critical element of participatory project design and demand-driven implementation. Although projects will have targets for inputs, outputs, and outcomes, these targets must be flexibly interpreted to allow the communities to have the ultimate decision over the choice of investments. Often the lag between planning and implementation and the learning that comes with experience will result in the need to adjust targets. Thus, appropriate mechanisms to allow for such flexibility in the implementation are necessary.

21 To manage the large amount of data and information collected in the planning process, Sujala developed a customized software package called *Sukriya*. This is a bilingual software package that enables quick, uniform, and systematic creation of beneficiary-wise databases that provide for the generation of a variety of analytical and assessment reports. The project also developed two other GIS-enabled software packages: *Sukriya Nakshe*, which allows for about 150 different types of activities to be depicted at micro-watershed level in a "pick and drop" mode and *Nakshe Vivara*, a map viewer tool that facilitates the display of various resource maps and allows the overlay of user defined layers with a specific query facility.

22 The principal exception being water resources/hydrologic impacts within and downstream of the micro-watershed.

BOX 4.1: The Pros and Cons of Technology-Intensive Resource Mapping

Resource maps play an important role in understanding the problems and prospects of an area as well as the spatial nature and interrelationship that existed between different resources. As part of SWAP development, Sujala used remote sensing and other ancillary data, to generate various resource maps such as, land use and cover, soils, slope, land capability, erosion status, hydro-geomorphology, drainage pattern, groundwater prospects, transport network and settlement locations, and superimposed them on cadastral maps of the micro-watersheds, thus making pertinent information available for resource management planning.

The project used this information to make technical recommendations such as, identification of sites/areas for surface water harvesting, groundwater recharge zones, check dams and other water harvesting structures, plantations and fodder banks, horticulture plots, and so on.

This process provided a complementary input for field-level decision making, on a relatively micro-scale (five km^2) across all sub-watersheds and helped to improve SWC impacts in enhancing productivity, while maintaining the ecological and environmental integrity of the micro-watershed. However, even after exhaustive consultations, farmers and stakeholders can and do change their minds fairly frequently and for a variety of reasons. Therefore, action plans may on occasion have to be totally set aside and reformulated as changes occur in the field and amongst the stakeholders. While project designs may seek to build in adequate flexibility to avoid the need for formally updating plans, nonetheless in certain instances approved plans will need to be scrapped and a new one completely developed. In Sujala, program rules allowed for variations of up to 10 percent in the overall SWAP, however, even this degree of flexibility was generally exercised by project authorities, resulting in instances of investments either not being undertaken or left incomplete.

It is the case that detailed, stakeholder approved and implementable action plans can be developed without the types of high end (and somewhat costly) information inputs that Sujala had at its disposal. Nevertheless, for large scale projects there is available technology (remote sensing, GIS, watershed models, decision-support models, and so on) that can facilitate integrated planning at the larger scale. Specifically, these technologies can allow local planning outputs (for example, micro-watershed plans) to be aggregated up into coherent larger-scale plans (for example, into sub-basin plans), which ensure that project support to local objectives and plans is consistent with broader scale policies, objectives, and plans.

In Sujala, the technology inputs allowed for participatory processes in which important details and information could be presented in user-friendly formats (thematic maps) that added both substance and quality to the planning processes that otherwise would have been missing. These inputs helped all parties arrive at a common understanding of the potential and constraints of the micro-watershed that was both more precise and objective. It also facilitated the selection of investments by providing a more objective means of prioritizing within the broad list of demands that often result from community participation processes (for example, a shopping list of works) those interventions which are technically feasible and for which site characteristics are suited.

4.4 ENSURE INCLUSION OF ALL STAKEHOLDERS

Fostering inclusion is neither easy nor straightforward. Inclusion is not a neutral concept as it involves shifts in decision-making power between the state and local communities and between different segments of the community. Inclusive participatory processes generally require rules that promote equity in participation and decision making and these must be tailored to the specific development and distributional outcomes desired. Success in developing inclusive processes tends to be more likely where:

- The purposes for seeking broad stakeholder participation are of common interest to all or most of the key stakeholders;
- The processes and organization are flexible and enough time and resources are provided for capacity building and genuine empowerment; and
- There exist income and livelihoods incentives.

In the case of the three World Bank–Supported projects under review, a great deal of attention was paid to the challenges of stakeholder inclusion and participation. Generally speaking, the efforts and attention by the projects paid off in terms of consensus building on local priorities, "democratizing" access to project resources and equitable sharing of project benefits. Among others, the projects sought to ensure that the concerns of all stakeholders, including with respect to water resources,[23] were highlighted in the planning processes. A "ridge-to-valley" approach was taken for sequencing watershed treatments, which ensured that the poor

23 This process extended only to any locally-felt externalities. It remains to be tested whether this same process would hold up to externally imposed constraints on water allocation and use—for example, from operating within a broader watershed management framework where maximizing local capture and consumption of water would conflict with downstream rights or prior uses.

more often benefited first since, if they have lands, they are usually on the hillsides and upper reaches. To foster inclusiveness, practices were adopted to verify that the official lists of households below the poverty line were also recognized as such within the community and to ensure that families' economic status was correctly assessed. By taking such approaches, there was a reasonable degree of confidence that vulnerable families and households were identified in each project village and that specific project interventions and instruments could be correctly targeted to assist them (see box 4.2).

An important element in reaching the poor and ensuring that their voice and concerns were included was the use of baseline surveys prior to the planning processes. Families were interviewed to determine their baseline economic and social status, and to understand their needs with regard to livelihood options. This also provided important insights into village dynamics and the existing resources in a community. This also allowed all three projects to earmark resources and correctly target them to the poor, vulnerable, and landless in order to provide incremental support for income and employment generation schemes (including off-farm and non-natural resource based alternatives). It also allowed assessments of the extent to which benefits accrued to the poor from the projects' overall investments in public goods (for example, small roads, potable water supply, sanitation systems, community buildings, school buildings, cattle troughs, and so on) as prioritized by the village-level processes.

The projects all prioritized the inclusion of disadvantaged and vulnerable groups, especially women and the landless, from their inception. This was important as watershed development programs tend to have a natural bias in favor of those who own and have access to land and other natural resources. Without attention to the poor and landless, inevitably the greatest benefits will flow to those who are relatively better off, that is, those with the greatest access or ownership. The projects organized the poor from marginalized households into SHGs or common activity groups (CAGs). The incentives to their mobilization were participation in thrift and credit or asset accumulation groups, access to capacity building, opportunity to become mainstreamed into local decision making institutions, direct access to resources (financial, managerial, technical, market access, information) needed to carry out income generating activities (IGAs), and inclusion in the development and management of CPRs. In fact, all three projects envisaged SHGs taking over the development and management of CPRs or otherwise having a stake in the sharing of usufruct benefits. In the HP project, an experiment was initiated in some project villages to hand over treatment, conservation and management of forest lands to SHGs, entitling them to a share of the usufruct benefits as per existing statutory provisions.

While all three projects adopted the SHG route to promote women's empowerment, given their different frameworks and circumstances, each had different strategies for doing so. To facilitate the integration of SHG members in the institutions supported by the Sujala project, they were enjoined to become members of the Sujala Watershed Sangha (SWS), by paying the membership fee and to actively participate in all proceedings. Additionally, the SHGs had institutional representation on the Executive Committee (EC) of the SWS. Fifty percent of the membership positions in the EC were reserved for women. Moreover, out of 11 EC members (out of a total of 14 members), one each had to represent small farmers, SC/ST, the landless, and artisans. Either the president or the secretary of the EC had to be a woman.

The HP project had no institutional requirements beyond those already mandated through existing, statutory provisions (for example, 33 percent of seats are reserved for women in the GP and there are reservations for other social groups as well). However, additional training was offered and conducted for women PRI members in order to help them be more effective in representing women's interests and to make their voices heard.

In the Gramya project, once the GPWDPs were developed and consolidated by the Water and Watershed Committees, they were submitted for approval to the all-women's body called the *Mahila Aam Sabha*. This body comprised all adult, voting-age women at the level of the GP; in effect, a body similar to the *Gram Sabha* but without the constitutional status and sanction that the latter enjoys. This helped to both identify and prioritize those issues of greatest concern to local women. Only once the *Mahila Aam Sabha* approved the proposal, was it forwarded to the *Gram Sabha* for approval. After the proposal cleared the *Gram Sabha*, the GP forwarded it to the Divisional Project Director (DPD) for sanction. The GPs were assisted in this effort by the FNGOs and/or partner NGOs (PNGO) as well as the multidisciplinary project team and DPDs. *Mahila Aam Sabhas*

BOX 4.2: Generating a Demand Pull

All three projects were premised on people's participation, stakeholder buy-in, and post-project sustainability. These outcomes can only be realized if they are demand-driven, not supply-led. This "demand pull" of a potential project needs to be assessed in some way.

Among the three projects, Sujala attempted to use an entry point activity during the initiation phase, when the project moved into a new area, to establish rapport and win the confidence of the people. This also served as a means of assessing "demand pull" at the outset. However, depending on the manner in which entry point activities were undertaken, they could be more or less effective as an approach to testing, organizing, and building social and institutional capital. It was learned that where an entry point activity intervention needs be undertaken, a "capacity building event"—an instrument and occasion to train CBOs in some of the skills necessary to properly implement a project[a]—is an effective tool to begin to develop a relationship and secure initial villager "buy-in". Subsequently, the entry point activity could be undertaken after awareness building had resulted in the formation and establishment of CBOs that meet project requirements. This approach, however, is not yet the norm. As such, the risk exists that the entry point activity could become an exercise whose sole purpose is to access resources, rather than serve to demonstrate that participatory approaches and joint efforts are possible and lead to tangible benefits, as well as to build the confidence needed to take on a heretofore unknown activity of "participatory watershed planning."

Another approach is one that was used with great effect in the Indo-German Watershed Development Program (IGWDP)[b] in Maharashtra. It is called "self-selecting conditionalities."[c] This approach is based on the philosophy and assumption that when people really want something, they are willing to do what it takes to secure it and, once they do, they are much more likely to look after their acquisitions as they themselves have invested in it. The design principal that flows from this is the importance that felt needs be well demonstrated and that ownership be created at the very start of a project in order to sustain the stream of project benefits long after closure.

In the IGWDP, communities that wanted to participate were required to provide four days of *shramdaan* (voluntary labor) on an SWC work, in which at least 70 percent of the population participated. The landless and single parent poor households were excluded from this requirement and the work had to be accomplished within a given period, generally three to four months. Communities can meet this requirement only if they have a need strong enough to compel them to set aside their differences and come together and if they perceive that the project can address their needs at least in the short term. Those target villages that fall within the micro- or sub-watershed of interest, but are either unwilling or incapable of meeting this initial requirement despite mobilization efforts, may yet receive some project benefits in the form of those minimal physical interventions needed to safeguard downstream activities. Because the relationship between the watershed community and the potential project is integral to the success and sustainability of the project, this, or an equivalent approach to assess and validate demand is desirable.

[a] Such as decision making, planning, budgeting, responsibility sharing, managing conflicts, making purchases, maintaining books and records, managing the event to inaugurate the created facility, and so on.

[b] The IGWDP-Maharashtra is a large-scale NGO facilitated bilateral program that operates in the rainfed regions of the state.

[c] These also included technical and social parameters such as whether a project was a clearly defined watershed, the extent of irrigation, the land holding pattern, willingness to enforce social disciplines such as ban on free grazing on treated areas, ban on adopting water guzzling crops, on bore wells, and so on.

are now regularly organized throughout the project where they function as a platform for bringing up issues of concern to women, identifying needs, and redressing grievances.

Another innovation by the Gramya project to ensure the de facto involvement of women in governance was to make one of the female members of the Water and Watershed Committee sub-committee at the GP-level a cosignatory with the *Gram Pradhan* for the operation of the local project account. Normally, the Panchayat Secretary, a government functionary, is the mandatory bank account cosignatory for any government-funded project and this had been the case initially with the local project account.

All three projects also made specific provisions for vulnerable groups. Livelihood activities and IGAs routed through SHGs and CAGs have been the preferred format for channeling project resources, capacity building services, and benefits to the vulnerable individuals, families and groups.

In the Sujala project, after the mid-term review, it was decided to substantially increase the project component of IGAs and reserve them exclusively for SHG members, all of whom belonged to vulnerable families. Originally, only three and one-half percent of project funds were allocated to livelihood and income generating activities, but this was raised to almost 13 percent by the time the project closed. This was in addition to the already substantial amounts dedicated to capacity building, institution linkage building and market facilitation. Allocations and disbursements were done on the basis of a Vulnerable Group Sub-Plan that was developed within a year of the initiation of the project and appended to the SWAP.[24] A revolving fund of Rs 75,000 per SHG was also disbursed. In fact, the project ensured that unit costs (per hectare) for investment on SC/ST and marginal farmer's lands was equal to or greater than the average per hectare project cost. To avoid undue favoritism, an investment ceiling of Rs 75,000 per farmer was also put in place.

In the HP project, the Mountain Livelihoods Enhancement Fund component comprised 15 percent of total project outlays.[25] This fund was accessible to anybody who became a member of a CAG (an SHG undertaking an income generating/livelihood activity is also considered a CAG). The fund consisted of two sub-components:

- The "Support for Livelihoods Enhancement" subcomponent that was exclusively meant for the poor and vulnerable groups[26]
- The "Agri-Business Development" subcomponent

For the first subcomponent, a grant of up to 90 percent of estimated costs was allowed and for the second subcomponent, up to 50 percent The project was successful in ensuring that the majority of the Mountain Livelihood Enhancement Funds went to vulnerable groups, in addition to the other funds spent separately under the Tribal Action Plan. Beneficiaries could also participate in skills training and entrepreneurial development programs that included exposure visits, the provision of on-site technical support, assistance to access banking services and in marketing. No funds were disbursed without an acceptable business plan and/or project proposal and without the beneficiary undergoing training related to their chosen livelihood activity. Such livelihood related sub-plans were made a year after the project began and became a part of the GPWDP and were included in the Annual Work Plan and Budget of the GPWDP.

Similarly the Gramya project, in addition to its Tribal Action Plan, established a Vulnerable Groups Fund (VGF). To access the fund, eligible individuals and families had to be members of an SHG and have participated in thrift and credit activities for at least six months. Other prior conditions included having undergone certain capacity building, skill development and entrepreneurship development programs as well as having prepared a sub-plan for the identified income generating activity.[27] The SHGs were networked with each other for mutual support. Once they reached a certain level of maturity and economic activity, the project encouraged them to join together based on common activities. While capital expenditures for such livelihood activities were subsidized, the working capital was provided through a revolving fund to the concerned SHGs, which would onlend to the entrepreneurs on terms established by the individual SHGs.

So that all beneficiaries could afford to participate in project supported activities and reap roughly equal benefits, all three projects allowed for differential (smaller) contributions from those participants classified as "vulnerable" and required the payment of equal wages to men and women for equal work. Transparency in the amounts paid was also required, by directing that payment rates for individual labor (for example, piece rates and volumetric rates) be publicly displayed.

24 Around 250 livelihood opportunities were identified covering the following categories: traditional/handicrafts, trade and commerce, industries and production, services and agriculture/nature-based. In practice, around 75 types of these livelihoods were most in demand. And of these, 70 percent of them are farm and livestock-based.

25 Activities undertaken include production (milk production/dairy, weaving, poultry, floriculture, mushroom cultivation), processing (fruit juices, honey making, dairy products, pickle making, papad making), trade (vegetable vending, meat, milk, grain and oil vending, kirana shops) and services (auto/electronics/electrical repairs, para-vets, transport, cold storage, tailoring).

26 It is also called the "Vulnerable Group Fund" and is meant for women, tribals, landless, small and marginal farmers.

27 Some of the activities taken up are: vegetable production/fruit preservation, herbs production, fibre handicraft, livestock production, mushroom cultivation, forest/horticulture nurseries, farming of medicinal plants, tools for artisan activities, vegetable production, dairy unit (jointly owned/individually operated processing plants), stitching and tailoring, individual/jointly-owned shop or stall, marriage band, food processing plant, fisheries, catering unit, pickle making, plate/rope making (jointly-owned plant), tent house, carpet making.

4.5 INVEST IN CAPACITY BUILDING AND INFORMATION SHARING

All three projects envisaged a people-driven, integrated watershed development program facilitated and supported by NGOs (in the case of the Sujala and Gramya projects), project authorities and functionaries, and both private and public, specialized institutions. Capacity building for all stakeholders and, in particular, the beneficiaries and their CBOs was seen as a high priority to ensure successful implementation and to achieve objectives. Substantial resources were directed in all three to enhance the knowledge and skills of all actors and inculcate the behaviors and attitudes necessary to a people-centered, participatory approach. Capacity needs assessments were carried during the preparation processes and early on in the projects so that detailed training modules could be developed and tailored to the particular needs of the various project actors.

All three projects developed fairly effective strategies for communication for and amongst their stakeholders, the general public, the respective political establishments and the concerned line agency departments at the state level. The communications and outreach actions were conceived as part of the overall design package for capacity building, awareness creation, knowledge dissemination, and promotion of successful approaches and good practices. The Sujala project was particularly successful in ensuring widespread publicity, information dissemination, and generation of interest amongst national ministries and official development agencies (multilateral and bilateral).

A variety of instruments were utilized for building capacity and dissemination—for example, classroom and village-based training, study tours/exposure visits, on-farm demonstrations, and farmer field schools. Modern IT approaches were tested and extensively deployed in the case of the Sujala project, including the use of teleconferencing and satellite communication programs (SATCOM)[28], along with more traditional media such as radio programs. Training manuals and teaching aids were developed for the different target groups (CBOs, technical staff, field personnel, project functionaries, and so on). Multiple media were also extensively utilized for both training and communications purposes, consisting of wall paintings and "magazines," project newsletters, posters, illustrated literature, short videos and audio clips, banners, street plays, folk plays *(jathas)*, radio jingles, flip charts, and pamphlets. In the Gramya project, monthly community newsletters (called *Hamara Akhbaar*) were launched as local initiatives to be produced at the GP-level. The communities were assisted by FNGOs and the PNGO[29] and the DPDs. The newsletters comprise single page broadsheets which can be copied and shared with nearby GPs. Interesting stories in the newsletters are shared throughout the project on a quarterly basis through a project-wide newsletter, *Gramya Darpan*.

In the Sujala project almost 100 distinct training modules were developed, covering technical, social, managerial and financial aspects of the project. Technical training topics included watershed development, SWC technologies, forestry, horticulture, integrated crop management, care and management of livestock, environmental and social impact assessment, CPR management, quality control and joint forest management. Social training modules covered institutional and social requirements of participatory watershed development, such as visioning, conflict resolution, negotiations, stakeholder roles, gender, and equity. Managerial and financial training topics included leadership, how to conduct meetings, bookkeeping and accounting, self-assessment of CBOs, participatory rural appraisal techniques, stress management, and so on. Course content was designed to apply to needs and learning abilities for all levels of stakeholders.[30]

28 SATCOM is a unique approach where two-way audio and one-way video broadcasts were made through satellite media to all the five project districts simultaneously from the State Institute of Rural Development, Mysore, on a regular basis. Good practices and success stories were disseminated and stakeholders were enabled to share their experiences with a far wider audience than they would otherwise have had access to.

29 At the state level, a PNGO was appointed for a period of five years. The role of the PNGO was to advise and support the Watershed Development Department in all matters related to the program, train local NGOs in discharging their roles, develop strategy papers on subjects relevant to the project, produce, share, and provide support in training material development, and provide systems support.

30 The course content for SHGs, consisted of six modules that deal with watershed development, the role of CBOs, details on SHG formation and management, SHG book-keeping and financial management, equity and inclusion of vulnerable groups, IGAs, sub-plan preparations, leadership, decision-making, conflict resolution and linkages building and relationship management with other institutions. The course content for Activity Groups (AGs) consisted of 11 modules which deal with an introduction to Sujala, the concept of watershed development; the role of CBOs in particular the Area Group, SWS, and EC; record keeping, book-keeping and financial management; SWAP preparation processes; preparation of sub-plans for vulnerable groups; SWAP implementation and monitoring; leadership development, conflict resolution, decision making and linkage building with other institutions.

At the micro-watershed level the bulk of training was conducted by NGOs. Multiple other agencies were involved in conducting training at other levels. In addition to the NGOs, there were also the Watershed Development Department, Antrix,[31] Center for Continuing Technical Education (Karnataka), Karnataka Livestock Development Agency, Karnataka Milk Federation, the District Resource Group, Karnataka Remote Sensing Applications Center, the University of Agricultural Sciences, and a private chartered accountant firm as well as other specialized agencies and experts as needed. In the Gramya project a similarly detailed capacity building agenda was developed and delivered through FNGOs and PNGOs.

For its part, the HP project developed 11 generic modules that broadly covered the same topics as those found in the Sujala project. The approach here however was for the project to directly provided training, utilizing the project staff to organize and conduct community-level training.[32] A central purpose of the training program was to enhance the core administrative capacity of the PRIs in areas of planning, budgeting, financial management, and reporting. This required making substantial investments in staff development and the appointment of specialized personnel at all levels who could conduct and administer the capacity building program. The training was largely operational in orientation, and the project has developed a number of manuals for standardizing and ensuring the quality of the content of the training, as well to facilitate the updating of courses as required.[33]

One indicator of the impact that the capacity building has had is the number of community members who have completed the training program, have demonstrated success as local functionaries and then subsequently stood for and won elections to the GP and other local bodies. Previously, most of these people would hardly have entertained the idea of standing for elections. In total some 66 community members that worked with the Gramya project as motivators, assistant accountants, and members of the Revenue Village Committees, Vulnerable Groups, farmer interest groups, and SHGs were elected as Gram Pradhans, heads of village councils or ward members in the Panchayat elections in 2008.

Another useful indicator of the growing capacity of the GPs (and by implication the quality of training imparted) is the increasing volume of funds being channeled through them. Up to March 2010, in the HP project an amount of Rs 407.8 million had been disbursed to GPs for works and in the Gramya project an amount of Rs 47.6 million for capacity building and training purposes.

All three projects periodically reviewed and refined the content and methodologies applied in their training programs. The Sujala project, for instance, had a formal system of pre- and post-training evaluations that were carried out at the field-level on a randomized basis. Feedback on the training schedule, content and process was captured through the monthly meetings, reports, and teleconferences. This led to the finding that that what was of the greatest interest to project participants, that demonstrated concrete and lasting impacts and, which had the broadest dissemination (spread and uptake) effect were the study tours/exposure visits, Farmer Field Schools and village-based trainings that focused on addressing the immediate needs of beneficiaries. Examples of this latter include livestock management, soil nutrient, pest and disease management, and integrated crop moisture management.

4.6 LINK CONSERVATION EFFORTS TO LIVELIHOODS FOR SUSTAINABILITY

It is critical, and feasible, to conserve resources and improve livelihoods in the same project. When conservation actions generate income, then sustainability is more likely in the long run. This is not an easy goal to achieve, however, since conservation is not always in the interest of some or all stakeholders and local interests may conflict with downstream interests. To manage these potential conflicts, project approaches should:

- Undertake stakeholder analysis to identify potential winners and losers, address equity concerns in distribution of costs and benefits, assess losses to be incurred by different community groups because of conservation practices;
- Focus on generating positive income streams for affected stakeholder groups through intensification, diversification,

31 Antrix Corporation Limited is the marketing arm of the Indian Space Research Organization for promotion and commercialization of space products, technical consultancy services, and transfer of technologies developed by the organization.

32 The services of agencies, both governmental and NGO, were engaged to train project staff.

33 Such as Community Operational Manual, Financial Manual for GPs, Technical Manual, Engineering Manual, Guidelines for Nursery Raising and Seedlings Specifications, Staff Induction Manual, and so on.

downstream processing and marketing, and alternative livelihoods;

- Provide a technical analysis of the potential for improving resource conservation within livelihood systems and financial and economic analysis to establish the basis for project incentives, identify interventions, and to provide clarity on if and how subsidies and other incentives will create sustainable WSM outcomes;
- Design participatory approaches to developing and adopting new technologies and local research and development to construct least-cost and maximum-benefit technical packages;
- Provide relevant stakeholders a secure stake in the benefits from improved management of common pool resources and provide viable income alternatives where restrictions to access or use are involved; and
- Promote interventions that reduce risk to livelihoods, such as improving water sources.

The linking of livelihoods to watershed development objectives was an area of best practice in all three projects. All stakeholder groups in the communities and watersheds participated, including vulnerable groups (women, tribals, landless, marginal farmers), and planning focused on seeking opportunities for livelihood development and improvement for all. Technical objectives were balanced with considerations for social inclusion and equity. As the land management interventions primarily benefitted those relatively better-off segments of the population with landholdings, it was a best practice for the projects to address equity concerns and include significant resources targeted at income and employment generation activities for the aforementioned vulnerable groups.[34] In two of the projects, innovative approaches were developed to help villages develop internal service providers for veterinary services and accounting (see box 4.3). Participatory planning processes went beyond land management/use to include livelihoods, rural infrastructure, opportunities for women's self-help groups and tribal development. The HP and Gramya projects emphasized market-oriented alternatives, diversification and improvement of non-farm and non-timber forest products, as well as, improvements to intra-village connectivity for market access in addition to the agricultural production. The HP project managed a special fund exclusively for poor and vulnerable groups that supported the development of micro-enterprises for value-added processing, alternative products, trade, service provision, and so on.

BOX 4.3: Tapping Community Capacity through Paraprofessionals

The Sujala project introduced a barefoot veterinarian service, called *Gopal Mitras*, to strengthen livestock extension support services. Para-vets were supported in all project watersheds in order to ensure local availability of basic animal health services as well as to create a livelihood opportunity for the rural unemployed with an aptitude for such a vocation. The para-vet service met a keenly felt, unfulfilled need. Demand for services was good from the outset but greatly expanded as substantial reductions began to result in livestock mortality rates and the convenience of having nearby animal health services convinced livestock owners to use the services. All *Gopal Mitras* had mobile phones to make it easier for people in more distant villages to call them. Earnings by the *Gopal Mitras* were estimated to be between Rs 3,000–6,000 per month.[a]

In the HP project, the introduction of para-accountants to support GPs in project implementation was proven so useful that the chief minister decided that para-accountants would be appointed in all GPs where watershed projects were being implemented. The project also developed para-technicals in other skill areas relevant to the project and the individual villages; examples include organic farming, dairy, floriculture, high value crops, and marketing. Called *jankars*, they are local individuals who are nominated by the community and then trained by the project.

[a] The poverty line in 2009–10, based on the monthly per capita consumption expenditure, was Rs 673 for rural areas and Rs 860 for urban areas (*Times of India* 2012).

Implicit in the support for the non-farm/non-timber income generation activities was the assumption that the development of these alternatives would indirectly reduce pressure on the natural resources base and/or provide increased income for farming households so they could continue the improved production practices being introduced to enhance sustainability.[35] One example is the Gramya project's support for production of pine needle briquettes for provision of an alternative energy source and thus conserve the

34 This came later in Sujala.

35 It does not appear that these assumptions were tested during the projects, either to define what might be the more successful linkages between improving resource management and livelihood systems or to establish if and how the investments and other incentives were (or were not) leading to sustainable resource management outcomes.

existing trees and shrubs that would otherwise be utilized for fuel. This was initiated in 117 villages involving 3,500 households. Pine needles, otherwise unutilized and whose accumulation in local forests constitutes a fire hazard, are being briquetted and used in a stove specially made for the purpose. It is hoped that, if the initiative catches on, it will reduce pressure on forest resources, improve air quality in kitchens and homes, reduce drudgery, and result in more "own time" for women. The potential impact and relevance of this initiative can be significant given the fact that 80 percent of the project area lies in the Chir pine zone.

In terms of livelihoods, people in the project areas in both HP and Gramya depend largely on rainfed agriculture, livestock, and forests. The mountainous region is subject to unpredictable meteorological events, having limited connectivity and poor soils. The focus of both projects was to stabilize and increase agricultural production. To accomplish this goal, an emphasis was placed on practices considered to enhance sustainability as well as increase productivity—organic crops, vermicomposting, integrated pest management, Low External Input Sustainable Agriculture, and so on. The overall strategy was to meet household food requirements while diversifying into more market–oriented production. Attention was also given to improving income opportunities from non-farm livelihoods and non-timber forest products. Improving intra-village connectivity was an essential activity in order to increase market access and reduce input costs. Increasing diversifying opportunities and enhancing household incomes was critical given the paucity of income sources in these regions, requiring many households to depend upon migration and remittances in order to survive.

The Gramya project in particular has focused on market-linked agriculture, with the goal of helping farmers access those markets that the larger, traditional suppliers do not reach so that the farmers may obtain higher prices. The project disseminates technologies, provides advisory services to farmers, produces and distributes quality seeds and seedlings, and establishes linkages between farmer interest groups and suppliers to process and market off-season vegetable and high value crops. The project also unites producers and progressively builds their capacities to handle key components of the value chain so that they bring larger volumes to market, giving them greater negotiation power and, ultimately better prices and greater individual income. The agribusiness initiative has resulted in increased agricultural productivity, greater returns to farmers, reduction in losses and more stable income flows as farmers are dealing directly with end purchasers.

4.7 MONITORING AND EVALUATION

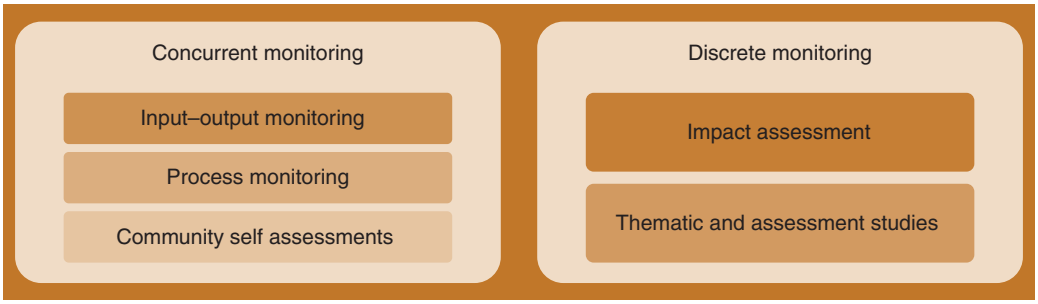
Establishment of M&E systems to track on-site achievement of economic, environmental, and institutional objectives is something expected of all projects. However, the Sujala project's system stands out as a best practice as it went a step further to ensure that M&E outputs were utilized to improve project performance by integrating a decision support system into standard progress tracking (see box 4.4). As one senior project official explained, *Monitoring, Evaluation and Learning (MEL) in Sujala is an integral part of the project's day-to-day operations rather than a periodic off-line activity. It is a continuous activity, not only to facilitate effective project implementation, but also to generate learning processes.* This is especially important in the multi-level matrix management structures that characterize most WSM projects.

To the extent possible monitoring systems should rely on low-cost, easy-to-use, and effective techniques for collection of (i) quantitative data—physical indicators and household surveys; and (ii) qualitative data—interviews and observations of stakeholders about perceived progress and challenges in project implementation. Participatory M&E is a very useful way to collect information about projects, analyze information, and get stakeholders more involved. Hard, statistically-based data assessments should be matched with feedback from stakeholders. Remote sensing offers good opportunities to generate data at a low cost, and the use of maps is a good way to have an overview of project progress and to communicate with stakeholders.

The projects undertook two broad types of M&E for learning purposes: concurrent and discrete. Figure 4.1 illustrates the kinds of activities carried out under each type, of which there were a total of five sub-activities:

- Input-output monitoring—done on a weekly, monthly, quarterly and annual basis—to track physical and financial progress of components against specified indicators. The system was integrated across all levels from the GP to the district or division up to the state. It also served as an early warning system to trigger corrective measures.
- Process monitoring tracked trends in how the project was being implemented and informed project management on

FIGURE 4.1: Activities Carried Out under Concurrent and Discrete M&E



needs for adjustments to project orientation and implementation. This was done on a monthly or semi-annual basis or whenever required by the Sujala project and on an occasional or needs basis by the other two.

- Community self-assessments functioned as a periodic "mirror" to be held up before the various CBOs (Area Groups, SHGs, SWS-Executive Committee, Up-*Gram Sabhas*, GPs) to help them evaluate themselves and the overall project performance against defined indicators. This was an important activity for building ownership, exposing grievances and project gaps, enabling corrective actions, and promoting transparency. These self-assessments were usually undertaken on a semi-annual basis. All three projects developed participatory M&E methodologies, with the Sujala and Gramya projects being particularly noteworthy.
- Impact assessments were carried out to assess the overall impact on natural resources and socio-economic and institutional development at the household, community and micro-watershed/sub-watershed level. The Sujala project carried this out in three stages: at project outset to establish a baseline, for the mid-term assessment and at the closing evaluation. The mid-term and *ex post* assessments measured "before and after" and "with and without project," using non-project, control watersheds.
- Thematic and assessment studies were used periodically, in response to specific management related concerns, to investigate topics related to the projects' specific concerns.

BOX 4.4: Implementing a Monitoring, Evaluation, and Learning System

The Sujala project stands out for its monitoring, evaluation, and learning (MEL) system. Specifically, those elements that made the system excellent were: (i) its systemic, integrated, and comprehensive nature which captured both quantitative and qualitative aspects; (ii) the extensive and intensive use of IT, GIS, satellite based communications and remote sensing; (iii) the judicious blending of conventional participatory and evaluative techniques with modern technologies;[a] (iv) the depth and range of areas, processes and themes covered; (v) the manner in which information gathered was used by the Watershed Development Department and the World Bank to steer the project; and (vi) the involvement of an external independent agency as part of the project structure (not an occasional entrant) tasked with coordinating, supporting and undertaking process, impact and thematic studies.

The MEL system's development and operation were outsourced to Antrix Corporation Limited, the corporate wing of the Indian Space Research Organization. The approach evolved over the course of project implementation, bringing together remote sensing, GIS and the project's MIS, along with a conventional monitoring system (for physical and financial progress monitoring) to provide a state-of-the-art information system for tracking evidence of the project's progress, outcomes, and impacts. According to project management, this system allowed for more efficient and effective implementation, provided timely learning to allow adjustments in implementation and policy/priorities and greatly enhanced transparency and accountability in the project. The impact indicators that were developed and monitored included:

- Natural resource indicators, with changes in: agricultural land use, crop yield and productivity, cropping intensity, cropping pattern, horticulture/forestry, wasteland extent and groundwater level/yield; and
- Socio-economic indicators, with changes in: household income, livestock population, fodder, and fuel wood, migration, employment opportunity, empowerment, and milk yield.

[a] For example: remote sensing, SATCOM.

(continued)

BOX 4.4: (*continued*)

Impacts were evaluated using a combination of qualitative and quantitative indicators at pre-determined intervals to establish the net contribution of the project to poverty alleviation, capacity building, and natural resource regeneration by comparing project and non-project control areas. A combination of approaches—remote sensing, household survey, focus group discussions, participatory observations, thematic studies, MIS data, and case studies—generated monitoring data and the information for impact assessment inputs.[b]

Sujala's MEL system was developed from its outset to both define and validate the effectiveness of methodologies and processes deployed in the project for applicability, adoptability and replicability at larger scales, in addition to meeting the project's more immediate needs.

This 360° approach to MEL resulted in greater poverty focus and inclusiveness by:

- Providing more income and employment opportunities for women, the landless and agricultural laborers;
- Promoting increased equity between small, medium and large farmers;
- Identifying needed changes and improvements in the capacity building modules;
- Fostering greater transparency and accountability at all levels;
- Streamlining procedures and implementation;
- Incentivizing better performance from CBOs, NGOs and government functionaries; and
- Introducing greater cost efficiency in SWC works.

The main reasons for the success of the MEL system include:

- It was embedded as an integral part of project implementation;
- Project managers accepted, supported and used the system;
- A single independent agency coordinated the system throughout the project life cycle;
- Project managers took a longer term view of facilitating large-scale successful replication of similar projects;
- The MEL agency, Antrix, had a field presence (between three to four skilled persons per district) in each of the five project districts;
- Indicators, methods, technologies and feedback mechanisms were all designed through a consultative and participatory process engaging all stakeholders;
- Analysis and documentation sought to uncover problems with a view to finding solutions, rather than assigning fault, in addition to identifying positive trends;
- Information and feedback provided was relevant, evidence-based, and timely;
- Findings were widely disseminated across all stakeholders as were the responses by project management; and
- Trainings were provided to all stakeholders to create a shared understanding of the MEL approach, secure buy-in and facilitate quality and uniformity in data collection.

While the MEL system has proven to be impressive, it did have to overcome several challenges:

- *Apprehensions to new processes and technology and capacity limitations* were largely overcome through trainings and familiarization sessions with the concerned stakeholders and as the system started producing results; and
- *Attitudinal resistance* to such transparent reporting that, for instance, brought out issues of malpractice at times was ultimately reduced through strong project leadership and the consistent insistence on accountability and transparency.

The system still faces challenges, which will be worked upon in a second phase, that other programs may face as the approach is scaled up:

- *Avoiding structural and relational overlaps* between the external agency running the MEL system and internal units addressing quality can lead to differences in interpretation of data gathered and tensions;
- *NGOs can face excessive pressures and workloads* given the burden of obtaining, collating and forwarding information with limited personnel and other requirements of social mobilization and technical assistance; and
- *Impacting the work culture of government departments* since the expectation and requirements of the project often exceeded those placed on staff by other government programs; it was a challenge to introduce new performance standards and convincing staff to be open to scrutiny and learning new lessons.

[b] Antrix used multistage sampling techniques for data collection and randomly selected sub-watersheds based on their agroclimatic zone, general land use, and soil types. Within each sub-watershed, they selected three micro-watersheds based on location criteria to represent ridge, middle, and valley portions of the watershed. Sample size was determined (10 percent) and selection of households based on land holding class (marginal, small, big, and landless) was done using appropriate statistical criteria.

The use of IT-enabled and technology-assisted systems was common to all three projects. The Sujala project used remote sensing data, proprietary software (*Sujala Mahiti, Sukriya, Sukriya Naksha, Nakshe Vivara*), a web-based Management Information System (MIS) and the field presence of Antrix in all the project districts. The HP and Gramya projects installed web-based MIS systems that extended from the divisional level up to the state level.

Data and other information from monitoring were provided in the forms of monthly observation reports, assessment reports, impact reports, feedback reports, evaluation reports, thematic reports, input-output reports, case studies, and special reports. These were all fed back into the system at all levels by means of regular fortnightly, monthly and/or annual review meetings and, through teleconferencing[36] and workshops. Agreed actions and corrective measures/interventions were recorded into the MIS input-output systems and subsequently monitored to ensure compliance or fine tuning, as the case may be. This feedback-action loop enabled the projects to make changes in their implementation strategy and undertaken corrective measures.

36 Extensively and effectively used in Sujala, especially via satellite.

Chapter 5 CHALLENGES FOR FUTURE PROGRAMS

5.1 WATER: INDIA'S EMERGING PARADIGM SHIFT IN WATERSHED DEVELOPMENT

Since the revision in 2001 of the Common Watershed Guidelines, there have been three additional revisions: in 2008, 2011, and 2012.[37] The major, strategic revisions have been those associated with the process of updating the Guidelines for each of the new Five Year Plans, that is, the 2008 and 2012 revision for the 11th and 12th Five Year Plans,[38] respectively. For each of the major revisions there has been a systematic process to capture lessons learned from all levels of implementation through a series of performance assessments, evaluation studies, and programmatic reviews by high-level committees organized by the Ministry and Planning and the Ministries of Rural Development and of Agriculture.

The 2008 Revisions. In 2005 MoRD constituted a special technical committee—the so-called Parthasarathy Committee—to review and evaluate the Ministry's watershed development programs (Drought Prone Area Program [DPAP], Desert Development Program [DDP], and Integrated Wasteland Development Project [IWDP]). Of relevance here were its conclusions related to water resources management within the watershed development programs (GOI 2006):

- *Perhaps the most critical weakness of watershed programs in India is that they operate almost as if groundwater does not exist . . . it appears to play almost no role in watershed planning.*
- *. . . there is a need to recognize and study . . . groundwater* [and] *hydrogeology at the earliest stages of planning. This is important for . . . location of structures, ensuring equity, sustainability . . . and developing a sustainable groundwater use plan as an integral part of the watershed action plan.*
- *There has to be clear prioritization of objectives–drinking water and protective irrigation, along with fodder and fuel must come first.*
- *Watershed development . . . has been . . . preoccupied with supply augmentation. Little attention has been paid to the end-uses . . . it has failed to break with the dominant development paradigms . . . characterized by supply-side solutions . . .* [and so is] *caught in the infinite regress of forever trying to catch up with ever-expanding demand.*
- *What is required is to find ways of not just increasing water supply but much more critically reducing demand and regulating end-uses.*
- *Watershed development is not merely a matter of harvesting rainwater. Its success crucially entails working out collective protocols of equitable and sustainable use of surface water and groundwater, bringing together of scientists and farmers to evolve a dryland agriculture package and a host of other livelihood options, detailed land-use planning at the micro-watershed level and the mobilization of rural communities in the direction of the disadvantaged.*

Despite these sobering findings, in the 2008 revision (GOI 2008) the reforms introduced under the new Guidelines were quite modest when it came to responding to the water resources management concerns raised by the Committee. Instead, the reforms focused primarily on: (i) further decentralization of the programs to the states and the strengthening of local mechanisms and capacity for delivery, implementation and O&M; and (ii) introduction of a sustainable livelihood orientation (defined as *productivity enhancement and livelihoods along with conservation measures*).

Relevant to water resources management, the revised Guidelines (i) allowed for larger project areas (cluster approach) comprising clusters of micro-watersheds of average size from 1,000 to 5,000 ha; (ii) called for *scientific planning . . . to utilize information technology*

37 Appendix 1a provides an overview and summary of all of the five versions of the Common Guidelines from 1995 to 2012 and Appendix 1b provides additional details on the 2008 and 2012 Guidelines that have sought to introduce very significant changes into the watershed development approach and programs.

38 The 11th Five Year Plan covered the period from 2007 to 2012 and the 12th Five Year Plan will cover the period from 2012 to 2017.

[and] *remote sensing inputs in planning, monitoring and evaluation*; and (iii) emphasized the need for following a "sequenced"[39] ridge-to-valley approach, involving the Ministry of Environment and Forest, or the States' forest programs to protect upper reaches. Ultimately, however, the Guidelines viewed the cluster approach as primarily a means *to support economic activities at scale,* rather than for strengthening of the water resources management framework to address the types of concerns raised by the Parthasarathy Committee. As a result, while all states "clustered" at these larger scales, the clustering did not form the basis for a needed landscape level assessment to initiate the planning process at a suitable scale, with a focus on hydrological resources.

As regards to the sequenced ridge-to-valley approach, the Parthasarathy Committee (GOI 2006) had warned that . . . *experience in the field suggests that it would be better to introduce a degree of flexibility in the way the ridge-to-valley principle is applied* . . . [while it is conceptually correct to] *plan various interventions within the watershed, in a ridge-to-valley sequence . . . the actual sequence of treatment may be kept a little flexible and responsive to local perceptions.* The 2008 Guidelines did not, however, respond to this critique and continued with "ridge-to-valley" as a one-size-fits-all approach.

The 2012 Revisions. In early 2011, the Planning Commission presented its proposed new water resources strategy for the 12th Five Year Plan. Entitled "Sustainable Water Security at a Time of Climate Change" (Shah 2011), the presentation began with a review of the deepening water crisis in India and the *need to move decisively beyond* [the] *complacency of 'denial mode.'* It went on to discuss the more recent and sobering assessments by independent researchers suggesting that India's water budget is much tighter than current assumptions hold[40] and the *non-renewable depletion of groundwater levels over large tracts*. One of the main messages of the presentation was that *business-as-usual will not do*.

Later in that same year the Planning Commission's strategy document for the 12th Five Year Plan was made official and published. The report—"Faster, Sustainable and More Inclusive Growth–An Approach to the Twelfth Five Year Plan (2012-17)" (GOI 2011)—reiterated the gravity of the situation as regards water resources and put forward a series of strategic priorities for water resources management. These included: (i) the maintenance of existing surface water bodies; (ii) groundwater management; (iii) aquifer mapping; (iv) stakeholder-based aquifer management; (v) reforms in major and medium irrigation; (vi) pricing of groundwater; (vii) regulatory changes for groundwater; (viii) environmental management (for water resources); and (ix) climate change (and water resources). Further details are provided in appendix 1b.

A systematic review and evaluation of the prior Five Year Plan's watershed development programs was carried out by GOI's Planning Commission, under the auspices of Dr. Mihir Shah and the "Shah Committee" in anticipation of the 12th Five Year Plan. Following from their review, the Committee formulated the 2012 Common Guidelines for Watershed Development Projects. The stated intent of the revisions was to *strengthen the innovative features of the earlier Guidelines but also make certain changes to impart greater flexibility, clarity and momentum to the Integrated Watershed Management Program (IWMP)*. An implicit purpose was to align the Guidelines with the Planning Commission's strategy for the 12th Five Year Plan. Included among the principal changes from the previous Guidelines:

- Project duration shall be five years;
- A stronger emphasis on institution building as required for more effective decentralization of the programs to the States. One percent of program resources are earmarked for institution building;
- Earmarking of 10 percent of individual project resources to deploy *high-quality professional human resources for both social and technical aspects* in order to improve technical content and quality of the individual projects;
- Some modifications to the "sequenced" ridge-to-valley approach to reduce rigidities that were antithetical to a participatory approach and negatively impacted community buy-in;

39 This refers to "multi-tier" sequencing of watershed development by first focusing on the upper reaches or forests "where the water sources originate," followed by "the second tier" or intermediate slopes just above the agricultural lands and then the "third level" or plains/flat areas "where typically farmers are operating." It also refers to the standardized phasing of the Watershed Development Projects into three phases: preparatory, works, and consolidation and withdrawal.

40 The Ministry of Water Resources estimates water supply at 1,123 BCM (billion cubic meters) supply vs. a 634 BCM demand in 2010, rising to 1,180 BCM in 2050. Two other independent researchers from UC/Berkeley and IIT Delhi have estimated current supply as between 654 and 668 BCM; the differences with Ministry of Water Resource's figures ascribed to higher estimates of evapotranspiration and lower estimates of "utilizable" supply vs. total supply.

- An increase in the geographical scale of the individual projects to between 3,000 to 7,000 ha to achieve "economies of scale and proper planning,"
- Establishment of a Central Level Nodal Agency to provide more intensive support to the States as per their request;
- A framework to facilitate working in forest lands, including tribal areas where procedural complexities have been an obstacle.

Of relevance to improving water resources management, the Guidelines also include specific instructions regarding: (i) the use of remote sensing data for assessment of runoff, for locating water harvesting and storage structures, assessing program impacts on the ground, to assess periodic changes in geo-hydrological potential, soil and crop cover, runoff and so on, in the project area and for baseline surveys; (ii) hydro-geological surveys and aquifer mapping of the watersheds; (iii) development or strengthening of local mechanisms and systems for common property resource management, especially groundwater; (iv) efforts to establish detailed resource-use agreements for surface water, groundwater, and common/forest land usufruct among User Group (UG) members; and (v) the setting up of institutional mechanisms to ensure sustainability in use of resources, especially common-pool resources (for example, groundwater).

5.2 WHITHER WATERSHED DEVELOPMENT?

The introduction of the Planning Commission's strategy for the 12th Five Year Plan and the new 2012 Common Guidelines suggests the GOI does seem to signify their intention to operationalize the paradigm shift that was first broached as desirable by the Parthasarathy Committee in 2006. First and foremost, it is clear that the intention is for watershed development projects to actually contemplate water and water resources management. Secondly, the new framework represents substantial progress across the board in meeting the challenges for future programs as previously detailed in this paper. This is a very significant development. In each of the suggested areas for attention the new framework provides the potential for making significant advances in overcoming many of the gaps and weaknesses identified through the learning generated by the three projects. In particular, the new framework:

- Provides for the integration of water resources management—both surface and groundwater—into local level planning as well as in broader scale planning at the watershed level and encourages (and provides financing) for strengthening the institutional capacity and applying the technological and information tools available for doing so;
- The continued decentralization of the programs to the State and the proposed devolution of responsibilities and strengthened involvement of civil society should provide significant advances in ensuring that the projects respond more closely to local demands and felt needs;
- Especially important are the proposed approaches to the management of common pool resources, both from the organizational and institutional perspectives through attention to creation of a framework for working in upper catchments and forest areas as well as strengthening local governance of common pool resources for the specific purposes of achieving consensus on the sustainable use of those resources (including surface and groundwater);
- The integration (convergence) of several existing GOI programs (for example, Mahatma Gandhi National Rural Employment Guarantee Act—MGNREGA) with the watershed development programs as well as the definition of an institutional framework and roles and responsibilities for coordination and facilitation of integration across programs is a good step in the right direction. The additional attention being given to M&E within the new framework could be an important opportunity for promoting and facilitating alignment and integration between the different institutions and programs. Challenges will remain to be successful in aligning the watershed-level planning processes with these other programs while maintaining a true demand-driven approach;
- Brings greater attention to the problems of post-project sustainability. Expected project duration of five years with (hopefully) clear indicators for the consolidation of local organization and capacity for maintenance following project closure should provide better enabling conditions. The recommendations for establishing user fees, if followed and successfully introduced, would overcome one of the principal obstacles to post-project sustainability by providing local, earmarked funding for that purpose.

Some challenges still remain. The as yet "one-size-fits-all" concerns that have been raised by a number of different sources regarding how the ridge-to-valley approach is implemented—concerns going back at least to the Parthasarathy Committee's 2006 observation that it is of dubious relevance in a very large percentage of India's

lands—have not been resolved in the new framework. This could also impinge on the ability of the individual projects to actually respond to local needs and felt externalities if rigidly applied. Nor is there yet obvious attention or priority given to strengthening the M&E frameworks to consider the financial viability and desirability of the interventions being promoted at the individual household and community-levels. Nor is economic analysis considered as a tool for evaluating efficiency of the programs or analyzing differing policy options. To the extent that the programs move toward water resources decision-making that affect water allocation and supply, such analysis will become extremely important. Nonetheless, the new framework broadly demonstrates that learning from experience is a part of the process and that watershed development in India—policy, norms, and implementation—is actively seeking to refine and perfect itself at each iteration.

5.3 MANAGING UPSTREAM AND DOWNSTREAM INTERRELATIONS

Water-related and downstream externalities are the central justifications for applying a WSM approach, yet linking and orienting upstream activities to management objectives at the broader watershed level is a major challenge. If micro-watersheds approaches are to be aggregated up as a basis for management of larger watersheds, then their planning and implementation will have to proceed within the broader context of a watershed (or sub-basin/basin) planning and management process. The larger-scale process, among others, should:

- Identify water resource issues and the links between upstream water and land use and downstream conditions, including groundwater and aquifers where relevant;
- Involve key stakeholders and deal with institutional challenges of interagency collaboration and local-regional level coordination;
- Identify relevant socio-economic and environmental characteristics, issues and parameters; and
- Define broad criteria to target critical watersheds/sub-watersheds and the menu of potential interventions within these.

Incorporating the broader context of existing or potential externalities at a watershed-level (or sub-basin/basin) into project planning was largely beyond the scope of these projects and the Watershed Guidelines under which they were implemented (see box 5.1).

BOX 5.1: Nonwater Investments to Manage Water Externalities

Investing in improved cultivation practices—for example, minimum tillage, crop residue management, planting geometries, development and introduction of more drought tolerant germplasm or alternative crops, and so on—can contribute to the goal of capturing and using water for productive uses. An assessment of the three projects indicates that this received less attention than it could have, especially in the drier and more drought-prone areas. Instead, most of the investment and focus was on the structural interventions along the drainage lines and structures such as bunds in farmers' fields.[a] Still, there were some activities of this type in the projects. For instance, the Sujala project helped farmers to plan appropriate cropping patterns, crop management practices, and irrigation regimes. In collaboration with ICRISAT (International Crops Research Institute for the Semi-Arid Tropics), it introduced agro-meteorological calendars, soil nutrient mapping (soil analysis) and distributed soil health cards to each farmer in selected watersheds. The Gramya project provided crop calendars to farmer interest groups to orient management and cultivation practices for different crops.

It is similarly important to fully understand the potential implications of proposed revegetation schemes when maximizing water resource availability is a goal. In several areas reforestation efforts were being carried out in the upper reaches of the watersheds or in and around recharge areas for local springs to increase the availability of water. However, an extensive body of forest hydrology literature strongly indicates that simply planting trees may actually have the opposite effect—that is, evapotranspiration (ET) rates from trees tend to be higher than for other vegetation types and can result in reduced annual water availability at the local level. A better understanding of the potential hydrologic impacts of changes in the vegetative structure and communities within a watershed (and also the associated land use practices that may increase or decrease infiltration of rainwater) is important to ensuring that technical interventions are compatible with desired outcomes.

[a] While earthen bunds promote some additional absorption of water, they are also designed to channel surplus water off the field and into drains and waterways. It is the loss of this water from the field (and crop root zone) that is one factor explaining why empirical studies comparing bunding to other cultural and vegetative methods find smaller yield increases associated with bunds (Sheng et al 1981).

Because the micro-watershed approach is carried out in isolation, there is no certainty that at a larger scale the goals of protecting and conserving hydrologic services and/or managing negative downstream and groundwater impacts are being met. Micro-watershed development planning focuses primarily on the productive aspects

of water management and not on water resources planning *per se*, so the projects largely measure progress on increasing local capture and consumption of water resources rather than on sustainability of management and avoidance of downstream impacts from the enhanced capture and consumption. This is not unusual for projects prepared several years ago; today with improved tools and models, hydrological objectives and indicators can be more easily incorporated and measured.

The weakest element of monitoring in all three projects was in terms of monitoring of hydrologic impacts. The HP and Gramya projects did install relatively sophisticated sediment monitoring systems in a limited number of sites. The Gramya project installed 12 automated hydrologic/weather stations to measure streamflow discharge and rainfall. Additionally, the HP project installed an advanced system—comprising broad crested rectangular/triangular weirs, automatic digital water level recorders, automatic digital rain gauges, and digital suspended solid analyzers—in three catchments ranging in size from 50 to 200 ha to quantify their suspended sediment loads. These are potentially important contributions (depending on how the data is utilized) that in the future could provide useful information for managing watersheds and their water resources on a larger scale. However this instrumentation will only provide insight into whether the aggregate impacts of all upstream land use changes and management interventions—including not only those physical and conservation measures undertaken upstream through the projects but also any and all other land use changes and interventions from non-project sources—are having net impacts (positive or negative) downstream. They will not provide information on the relative impacts of any particular intervention or set of interventions or allow for observed changes to be attributed to any of them. Nonetheless, they are useful first steps toward quantifying and developing a better understanding of the trends, if not dynamics, in watersheds of interest.

This issue appears to be understood in the States' water policies with their call for water resources planning to include basin or sub-basin aspects and in the new national Guidelines (2008 Common Guidelines for Watershed Development Projects) with the definition of a "geo-hydrological unit" comprising clusters of micro-watersheds as the new unit for planning and intervention. In the case of the latter, an important innovation is the Guidelines' prioritization of the development of shared databases Management Information Systems/Geographic Information Systems (MIS/GIS) for IWRM (including planning, M&E and modeling); targeting over-exploitation of groundwater resources; entering into formal water allocation (surface and groundwater) processes at the local level; and institutional reforms for IWRM. Should the States be able to take full advantage of the new Guidelines to improve their approach to WSM, India could provide globally relevant models for sustainable watershed development in the future.

Another key challenge for understanding the downstream impacts of upstream interventions is to test the projects' implicit assumptions that the successful development of non-farm/non-timber income generation activities would result in the reduction of pressure on the natural resources base and/or provide increased income for farming households so they could maintain the improved production practices adopted through the projects. It does not appear that these assumptions were tested during the projects, either to define what might be the more successful linkages between improving resource management and livelihood systems or to establish if and how the investments and other incentives were (or were not) leading to sustainable resource management outcomes. While there is evidence that livelihood diversification is generally a good thing for rural poverty reduction and that it can improve the quality and sustainability of natural resources management (Ellis and Allison 2004), there is also a large body of evidence that such optimism can as (or more) often be false (for example, see Angelsen and Kaimowitz 1999; Tropenbos International 2005; Roche 2007; Brock 2013). Evaluation of alternative livelihood programs not uncommonly find that alternative livelihoods and additional income do not necessarily translate into reduced resource pressures. In all cases, prior to promoting alternative livelihoods, the root causes of local resource degradation must be understood in order to avoid unintended consequences. And, by understanding root causes, addressing the processes, institutions and politics in an area may have greater overall effectiveness in generating the desired effects on resource utilization patterns than the introduction of an additional income activity on its own.

5.4 ENSURING EFFECTIVE DEMAND

There will always be tension between "top-down" and "bottom-up" as effective development schemes require a judicious mix of the two. Getting the balance correct so that "bottom-up, demand-driven"

approaches to policy implementation are in line with the prevailing policy, regulatory, administrative, and other normative frameworks will be inevitably complicated and require iterative, learning-based processes. As a result, one person's "bottom-up, demand-driven" approach can be another's "top-down, supply-driven" approach. Government's programs have specific objectives and will offer a limited set of instruments, using those that are thought to be "the best" for achieving those objectives. Under these circumstances, voluntary participation—arguably an essential ingredient of achieving real and effective demand—may not always be a reflection of actual demand, particularly amongst the rural poor where options and opportunities are limited and the initial choice comes down to opting in or going without. To this challenge, there is no durable solution. Rather it is one more factor to be recognized and accommodated when designing a demand-driven program with their limited menus of options.

In the case of the watershed development programs, it has been discussed how their objectives have been primarily rural development and natural resources management-related but they rely heavily on the concept of maximizing the local capture and utilization of water to achieve its goals. It has also been mentioned that this approach has been critiqued as a "one-size-fits-all" approach that was developed for dry areas but is now applied everywhere. Clearly meeting rural development and natural resources goals will not always and in all cases be a matter of overcoming water deficit constraints. Just as clearly there will be areas where this is the case. Funds are being offered for watershed development. Local communities can choose to accept them or not. What they cannot do is decide to use the resources for some other rural development approach.

Alone among the three states, the HP project included micro-watershed targeting and selection criteria regarding the existence of some reasonable degree of social capital to provide a basis for local implementation. None of the projects considered local demand—that is, willingness and readiness of the people to undertake the project measures together with the concomitant social and institutional disciplines—as part of the criteria. Instead, the issue of community demand was to be addressed during the community mobilization process. Given the very limited extent to which "demand pull" is currently a factor for selection of villages, it would seem important to consider such, and select villages where the chances of success are greater, that is, where people demonstrate an interest in the "set menu" of support and the ability to manage common pool natural resources. Taking this approach is considered to have been a major contributing factor to the success of the IGWDP, as detailed in box 3.1 of this report. Another alternative would be further reforms in the Guidelines that gave Panchayati Raj Institution (PRIs) more power in deciding how the funds were utilized for rural development and natural resources management purposes. Ultimately, without some approach with self-selecting conditionalities the extent of real demand-pull across the programs will always be questionable.

Other factors as well can be considered to strengthen the demand-driven approach. One that merits attention, but which could be beyond the scope of projects to address, are requirements for cost-sharing.[41] As background: In the Sujala project, despite the efforts to ensure equity and transparency, it was found that the way that wages were being paid to laborers was undermining these efforts. The Sujala Watershed Sangha Executive Committee (SWS-EC) paid the farmers and landowners directly for the works done on their lands. They in turn were responsible to pay the laborers they engaged to carry out the work. Ex-post studies revealed that farmers and landowners had been negotiating lower wages with the laborers who, having no other employment opportunities, accepted the lower wages. In keeping with tradition, they also paid women less for the same work. Moreover, the farmers were able to use the labor savings to partially or fully recover their individual cash contributions that had been required to obtain project grant financing and benefits. The studies showed that the actual net contributions of these farmers and landowners was actually very low.

Ultimately, about 57 percent of the Sujala project funds, excluding project management and coordination costs, were paid out in wages. Clearly, if the project had been as successful as envisaged in ensuring fair and equal wages this would have resulted in better outcomes regarding equity and income for the most vulnerable and needy. It may also have resulted in better (or different) outcomes in regard to the demand-driven nature of project interventions. If it is

41 The problem of underpayment of farmers—relative to the posted, official government wage rates—is a nation-wide issue, not specific to any project or scheme. During the project, authorities in Karnataka made significant but unsuccessful efforts to deal with the issue. The practice is entrenched and endemic.

true that landowners depressed wages and made only a minimal contribution, if any at all, then the project's benefits to laborers were incremental wage labor at prevailing (low) rates and for landowners it was receiving free, or almost so, work on their lands. This problem is an Indian-wide issue and extremely difficult to address, or for any one project to overcome. However, it raises the question if the interventions on farmer and landowners lands were a supply-driven response rather than a felt need. If the former, the sustainability of the works post-project would be doubtful. A mechanism whereby the EC engaged laborers and paid wages directly would perhaps have much better served the Sujala project's purposes of ensuring both equity and a demand-driven approach in response to real needs.

The Sujala project issue was not encountered in the HP and Gramya projects as the private land developments constituted a small proportion of the amounts spent. Funds were given to Self Help Groups (SHGs) and User Groups (UGs) for use on their private lands and the individual members largely undertook the works themselves.[42]

In conclusion, the challenge to strengthening the demand-driven nature of the programs are overcoming constraints of: (i) limited flexibility for the PRIs to suggest alternative investments for achieving rural development and natural resources management goals; (ii) local contributions are diluted due to the fact that while wages are officially inflated, landowners are able to retain a significant percentage for their own benefit; and (iii) there are no strong preconditions that villages have to achieve in order to qualify. Given these conditions, every village will say "yes" to the project whether or not they anticipate useful watershed outcomes or not. This diminishes the prospects of post-project sustainability.

5.5 MANAGING COMMON POOL RESOURCES

Projects require frameworks to assess and address the policy, institutional, and programmatic aspects of land tenure and common pool resources (beyond water), which have long been identified as critical for WSM. Generally too little systematic attention has been paid to handling these issues at the policy, institutional, and program levels. In the three World Bank–Supported projects, strong government commitment and supportive policy and legal frameworks led to successful implementation in those areas where land tenure is private. Success on common pool resource lands, where the Forest Department has the primary institutional mandate, has been more elusive.

The projects have piloted ways to work with the Forest Department and India's more restrictive resource access policies and regulations, and they have recently reached agreements on cooperation to extend activities into forest areas in the upper catchments. Project managers are optimistic about cooperation in the future, especially, for example, in Himachal Pradesh where new BioCarbon Financing through the Global Environment Fund will allow innovative livelihood options, compatible with Forest Department regulations, to be taken up by communities in forest areas (see box 5.2).[43]

Water as a common pool resource remains as perhaps the most serious, unresolved issue. There seems to be broad recognition and understanding of the problems around water resource allocation and scarcity; however, addressing the larger issues of the political

BOX 5.2: Clean Development Mechanism in Himachal Pradesh

A BioCarbon, Clean Development Mechanism project to obtain Certified Emission Reduction credits by expanding forestry plantations on some 4,000 ha of mostly degraded lands (thereby creating carbon sinks) has been launched in some project villages in the HP project. The idea is not only to contribute to atmospheric CO_2 reduction while meeting local needs, but also generate a sustained stream of cash inflows[a] to the concerned local communities. As per conservative estimates, communities are likely to receive between Rs 2,000–2,500 per hectare per year, but actual amount will depend upon the real time growth of plants and carbon stocks accrual. This project is a first for India as well as a first for a World Bank-financed project in Asia to attempt to integrate a climate change mitigation response within the framework of the United Nations Framework Convention on Climate Change.

Source: Ranjan Samantaray, personal communication.

[a] Of total receipts from the Clean Development Mechanism, the Forest Department will retain 10 percent by way of overheads and management costs.

42 The fields are small and terraced with basic conservation measures largely in place.

43 The BioCarbon financing would allow small and marginal farmers to carry out tree planting (with native species) in support of achieving both WSM and their livelihood objectives. In addition, there is an objective of assisting the villagers to sell Kyoto-compliant carbon credits under the Clean Development Mechanism, which would be a first for India.

economy of water resource allocation is a challenge far beyond the scope of micro-watershed development projects. In that context, it becomes incumbent on all projects and programs to specifically include instruments, processes, and mechanisms to ensure that they are not aggravating the problem. Depending on how critical water availability issues are, basic water balance and water accounting tools may suffice for micro-watershed level interventions.

5.6 PROMOTING EFFECTIVE INTERAGENCY COLLABORATION

If micro-watershed programs are to effectively contribute toward achieving higher-level objectives at the watershed, sub-basin and/or basin-levels, effective institutional mechanisms will have to be developed for this purpose as well as to measure and monitor outcomes and impacts. WSM programs will need to work toward an integrated institutional process with three complementary components:

- **A process of watershed planning** to engage on issues of water and land resources dynamics at the landscape scale and within the (minimum) watershed, if not sub-basin or basin scales (see table 2.1), identify critical hydrologic externalities to be addressed and/or services to be conserved and protected, and to establish higher-level objectives. The level and complexity of this planning process will vary, but it may require new institutional arrangements and a broader range of planning tools—basic water balance and water accounting, environmental and social analysis, basin-level hydrological and groundwater modeling, and comprehensive basin-wide IWRM planning framework—adapted to the particular context. New hydrologic and WSM models and tools that do not necessarily require intensive data are readily available to support these processes. Irrespective of the level and complexity, appropriate stakeholder management approaches involving consultations and mechanisms for multisectoral, participatory diagnosis need to be integrated into the process;
- **A bottom-up institutional development and investment process** to set objectives and priorities, negotiate between stakeholders, and to develop and measure the impact of a set of interventions that can fulfill both upstream objectives (at the local community level and also between upstream communities) and broader watershed or basin-wide and downstream objectives; and
- **Improved M&E methodologies** incorporating research, measurement and monitoring to provide the scientific, economic and social knowledge for managing and evaluating WSM programs and for, among others, assessing sustainability and pricing costs and benefits. New modeling and satellite imagery tools can be of great value in this.

The difficulty of achieving WSM objectives across the broad range of institutional actors who are concerned by or who affect watershed hydrology—for example, power, transport, agriculture, forestry, agribusiness, and local governments—can be reduced when these agencies internalize and develop their own sectoral approaches to avoid or mitigate their impacts on water and land resources (for example, within their environmental impact assessment processes, development and specification of best management practices, monitoring indicators, and so on). An (overly-simplified) example of this would be where forest departments implement and enforce good forest road building practices and streamside buffers to protect water bodies; agricultural agencies concentrate on improving crop productivity through in-field management practices that improve moisture conservation and reduce non-point source pollution from sediments and agrochemicals; power and transport sectors avoid inducing development in sensitive areas (riparian zones, aquifer recharge areas, critical watersheds) through extensions of the existing power grid and road networks; and, local governments promote the management and protection of the areas critical for the supply of good quality, potable water.

Within the World Bank–Supported projects, very limited reorientation of the agencies and departments for working together within a decentralized framework has yet been accomplished. All state policies noted the fragmented nature of the institutional mandates in this area. For example, critical state agencies include Water Resources, Groundwater Board, Agriculture, Rural Development, Environment and Forests as well as line departments such as Land Resources and Drinking Water Supply. Some small gains have been made in demonstrating the value and potential for inter-agency coordination through the implementation modalities of the watershed development projects. The most notable ones coming where agency and department staff are seconded to the programs and are integrated into and respond to the projects/programs structures. This provides individual experience and learning on the values

and potentials for better horizontal collaboration and cooperation between agencies. Following their secondment they return to their normal duties in their parent agency. While this transfers knowledge and experience back to the parent agency, it has yet to have any visible impact on the parent agencies' *modus operandi*.

There is, however, the need for continuous efforts to fully institutionalize and make effective the inter-sectoral and inter-agency coordination among state agencies and departments desired for effective WSM. While it is a necessary condition to rationalize both the local and state-level organization and coordination, it is arguably more important to make significant progress first in the local planning and implementation frameworks. Doing so provides both the impetus and logic for identifying the practical reforms needed to make the state agencies both accountable and responsible for harmonizing and coordinating their efforts with the other state agencies with whom they have overlapping and/or interdependent mandates. Furthermore, the development and organization of the local framework helps clarify what the roles and responsibilities of the state-level agencies should be—and thus the types of reforms and reorganization required—to promote sustainable use of water resources in a decentralized environment.

At the local level (micro-watershed and sub-watershed levels) the use of local government units and watershed committees of local stakeholders and multiagency, multidisciplinary technical units (including NGOs in two of the three states) is providing a workable approach for decentralized implementation and service delivery. Local government, technical staff and community organizations and members appear to be working together well enough that planning and implementation are carried out in a reasonably timely fashion with results that, according to the participatory M&E data, indicate acceptance by local stakeholders of the process and the outcomes. There clearly seems to be much that could be learned from these projects on participatory and decentralized micro-watershed development. Moreover, the projects are piloting approaches to mainstream community and government integrated planning and action on watershed related issues:

- **Sustainable Land and Ecosystem Management Program in Uttarakhand.** Additional financing of USD 7.49 million grant from the Global Environment Facility has been secured and it dovetails with the Gramya project. The Program will fund 20 micro-watersheds that have high erosion indexes, which were left behind in terms of socio-economic and other criteria and which have potential for agricultural development. The purpose is to facilitate mainstreaming of sustainable WSM into local governance plans which include: areas of watersheds that cut across GP boundaries; implement alternative technologies for enhancing water availability for agriculture; reduce community dependence on forests for fuel wood; develop a market focused medicinal and aromatic plants sector; gather locally generated knowledge of the impact of climate change and variability on mountain ecosystems, develop coping strategies, and disseminate and upscale new and innovative techniques and approaches for sustainable land and ecosystem management within the state.
- **The Panchayat Incentive Fund in Himachal Pradesh.** In June 2009, the HP project initiated the Panchayat Incentive Scheme to motivate and reward GPs that undertaken successful project activities in accordance with project principles. To reduce subjectivity in making awards, the project introduced a scoring matrix called the Performance Measurement Framework to assess performance on sustainable WSM, mountain livelihoods, institutional development and transparency. A team constituted at the level of the Chief Project Director annually assesses GPs where works have been on-going for at least two years.

  There are two categories of awards—a State-level award called the *Shresth Jalagam Panchayat* Award (Best Watershed Panchayat Award) has three tiers of prizes[44] and a Divisional award called the *Shresth Mandal Jalagam Panchayat* Award (Best Divisional Watershed Panchayat Award) consisting of 11 prizes.[45] Winning GPs can use their prize money only for infrastructure activities within their jurisdiction in accordance with project rules. The Panchayat Incentive Fund underscores the importance of the GPs in undertaking developmental activities, brings them additional resources and publicity which can also attract other resources (from both the public and private sectors), underscores the benefits of accountability in public works, generates a sense of pride and enthusiasm in implementing the project measures well and creates healthy competition amongst project GPs.

44 The first prize consists of Rs 400,000; the second, Rs 250,000 and the third, Rs 150,000

45 Each prize is of Rs 100,000; one for each Division.

5.7 GIVE DUE ATTENTION TO ECONOMIC BENCHMARKS

The projects monitored certain financial aspects—household income, income generating activities, agriculture/livestock/horticulture income—all good practices and extremely important for assessing the likelihood of a particular intervention to be sustained. Ultimately profitability and financial viability are essential elements for obtaining improvements in natural resources management. In addition, it is important to validate that the technical/extension messages being given to the farmers and other project participants are not putting them at financial risk. However, there is no indication that this type of information was used other than for reporting purposes.

There is also a need for stronger economic analysis as a part of the overall Monitoring, Evaluation & Learning (MEL). Such analysis would be critical for evaluating the efficiency of project interventions and approaches, for analyzing policy options, to test assumptions and to validate that the programs benefits outweigh its costs to society. Given the magnitude of the Watershed Development Program, project support in this particular area would have been critical and potentially very influential on Government's overall approach.

5.8 PROVIDE INCENTIVES FOR SUSTAINABILITY

Sustainable WSM requires an incentive structure that continues beyond the project period and that is supported by economic instruments that assign costs and benefits according to public and private goods. At the project formulation and inception stage itself, all the three projects considered post project maintenance of the assets created and made provisions for it—the idea being that beneficiaries should continue to receive a stream of benefits long after the project is over. This concern extends not only to works done or assets created but also to organizational structures to the extent they have a role in ensuring continuity of these assets as well as other project objectives.

The activities undertaken are either of a fixed nature (SWC works, plantations, weirs, and so on) done on private or common lands or of a livelihood type undertaken by individuals or groups. Generally, for assets created on private lands and for livelihood activities or interest groups that generate benefits to the stakeholders it is believed that by virtue of their being well chosen, organized and adequately resourced, they will continue to generate meaningful returns to those involved, which creates an abiding interest in their maintenance and continuity.[46]

The issue arises largely for Common Property Resources (CPRs) and for those groups that were formed specifically to manage these—such as, the SWS-EC and Activity Groups (AGs) in the case of the Sujala project and UGs and Common Activity Groups (CAGs) in the case of the HP and Gramya projects. The Sujala project's strategy was to create O&M funds largely with the AGs, build their management capacities, integrate the SWS-EC as a sub-committee of the GP, and formally link these groups with the various related line departments. However, the project did not make any specific financial provisions,[47] nor generate any substantial funds (through contributions) toward the O&M funds, nor did they succeed in integrating the SWS-EC as a subcommittee of the GP. As a result, a post completion study[48] found that while over 80 percent of SHGs were functioning, only between three to five percent of the AGs and an insignificant number of SWS-ECs had any degree of functionality. The memorandums of understanding entered into between the respective SWS-ECs, the AGs and the GPs were largely a statement of intent rather than an implementable action plan and the concerned line departments were not a party to them.

A serious structural constraint faced by the Sujala project in this regard was the rather short period of three years given per microwatershed. The first six months usually go into mobilizing people which leaves only two and one half years to not only undertake project investments, but also address issues of equity and inclusion while preparing communities and beneficiaries for project withdrawal, which all involves a large number of different actors.[49] One must concede that the overall likelihood of achieving any reasonable degree of continuity of project-supported CPR assets is rather small, a fact borne out by the post-completion study.

In the case of the HP project, each project is implemented over five years giving adequate time for the capacities of groups to be

46 Supported in terms of resources, linkages, and capacity building.

47 Such as in the case of HP/UK or in the case of projects funded by GOI under the IWMP.

48 This study was conducted by Antrix.

49 Many of whom experienced frequent personnel turnover.

built up for the post project period. Moreover, since the projects are implemented through the GPs, which are part of the formal governance structure, the question of institutional continuity does not arise. Provisions exist in the GP Act to make UGs sub-committees of the GP, if required. The HP and Gramya projects made convergence—linking with and accessing additional resources from other line departments and agencies in the private sector—one of their key objectives, thus ensuring that GPs, SHGs, CAGs, and UGs can continue to leverage relationships and resources well past the project.

Most importantly, however, in the HP project, a Village Development and Maintenance Fund established at the level of the GP is mandatory and provisioned with funds equivalent to the required beneficiary contributions, with the exception of those beneficiary contributions required for livelihood activities.[50] The project calculates the full cost of an item, nets the expected beneficiary contribution and pays this amount into the Fund. It is expected that an amount of at least Rs 240,000 would accrue to each GP during the life of the project. Toward the end of the fourth year of project implementation, 'empowerment plans' will be created for each GP, whereby, for each asset, the costs of O&M are calculated along with the corresponding beneficiary contribution/user fees required to cover these costs. These empowerment plans will be developed by the GPs, with the involvement of the concerned line departments where necessary, and made public to ensure transparency.

In the Gramya project, the approach adopted for sustainability is similar to that of Sujala's. It provides no mandatory, structural mechanism, such as the maintenance fund established under the HP project. Still, that the same type of fund was envisaged in the Gramya project, but no project funds were provided for maintenance purposes nor were mechanisms sought to obtain community and beneficiary contributions. This raises doubts about the continuity of such CPR assets in the post project period in this project as well.

50 Livelihood activities are expected to be financially viable and generate the returns necessary to meet recurrent maintenance costs.

Chapter 6 LESSONS AND CONCLUSIONS

The three World Bank projects in Karnataka, Himachal Pradesh and Uttarakhand provide a wealth of lessons and insights on how large-scale government-funded projects can be effectively managed so that project objectives are sustainably achieved. The strategies, tools, and mechanisms developed and the lessons learned should be documented and widely disseminated so that other large-scale watershed development projects can profit from them.

The three projects' objectives were mostly consistent with national-level Common Guidelines for Watershed Development that were in effect at the time of their preparation, emphasizing the development, sustainable use and conservation of the productive potential of the local natural resource base.

The use of the micro-watershed as the basic unit for planning and intervention was largely appropriate, but . . . . Because the micro-watershed approach was carried out in isolation, the larger scale goals of protecting and conserving hydrologic services and/or managing negative downstream and groundwater impacts remain to be addressed. Given that by 2050 India's estimated water demand will exceed all available sources of supply, it is time to begin building from the current micro-/sub-watershed foundation toward IWRM at the basin and aquifer scales. It has taken almost 30 years to get to the current stage of knowledge and experience with micro-watershed development. Getting to holistic management at these larger and increasingly complex scales within the next forty years will be even more of a challenge. Knowledge of the hydrogeology and water use (water balance) is critical to deciding if the current approach is correct at the micro-watershed-level and at the level of the aggregate impacts of the individual micro-watershed developments (that is, at the watershed and sub-basin and aquifer levels). Only the HP project appears to be looking into this aspect, utilizing a simple methodology to account for increased water use.[51]

A micro project (at the sub-watershed level or micro-watershed level) should be planned for at least five to seven years in order that sufficient social capital is built up. It takes time and close accompaniment to develop vibrant and representative local institutions which are most necessary to ensure continued maintenance of created assets in the post project period. In the early stages, the lessons from the IGWDP indicate that little resources are required from the project as it is the community that must first demonstrate its desire (demand) to participate. Capacity building is also crucial for sustainable outcomes to be achieved and progressed, and it should be comprehensive, progressively undertaken and involve all stakeholders in accordance with their requirements.

Projects involving multiple agencies work best where institutional arrangements leverage the comparative advantages of each of the partners. In a situation where good NGOs are available, as in the case of the Sujala and Gramya projects, it is preferable to engage NGOs to mobilize and build the capacities of the villagers. Where NGOs have the requisite technical and managerial expertise, then it is preferable to give them the entire task as they can then efficiently calibrate and dovetail various aspects of a project and be held accountable for outcomes, not just deliverables as would normally be the case where responsibilities pertain only to specified components. This would leave project authorities free to focus on monitoring and overall management of the project.

51 According to personal communications with project staff: (i) an estimate (assumption) is made on what increase in baseflow may be expected from the treatment of the micro-watershed; and (ii) a certain percentage of that increment is "allowed" to be captured and used locally.

Programs need to adopt integrated water resources planning at the micro-watershed level. Micro-watershed development planning seems to focus primarily on the productive aspects of water management and not on water resources planning *per se*. Planning does not systematically consider drinking water supply, water quality, or overall water availability and allocation (or, where relevant, include any other locally important uses). These are important local concerns, for example, in Karnataka where potable water is trucked into some project villages during the "pinch period" of February to June. In Uttarakhand, project staff have noted that domestic water supply is a priority of villagers. Some limited work on water quality is being done by Himachal Pradesh through the micro-watershed planning and investments where, as prioritized by locals, critical areas for protecting potable water quality are closed off and investments in improving sanitation are made.

Linking livelihoods to watershed development objectives was a best practice among the three projects. All stakeholder groups in the communities and watersheds participated—including vulnerable groups of women, tribals, landless and marginal farmers—and planning sought opportunities in livelihood development and improvement for all, balancing technical objectives with considerations of social inclusion and equity. The Karnataka system is a true stand-out not only because of its award winning,[52] state-of-the-art approach but also, and perhaps more importantly, because of the manner in which the MEL system was put to use by project management.

Natural resources based projects should be undertaken with a focus on developing sustainable livelihood options for the majority, if not all, of the beneficiaries. Hence, focus must be given to identifying eligible beneficiaries,[53] existing resources that can be capitalized upon, conducting market surveys, identifying service and resource providers (input, output, technological, financial, capacity building, and so on) together with undertaking value chain analysis so that viable products can be focused on and maximum value captured by the beneficiaries. In this regard, it is better to focus first on already existing and functioning livelihoods in order to improve their earning potential; followed by developing new opportunities in agriculture, nature-based and allied sectors while also training youth in acquiring market demanded skills and competencies.

The projects made very strong contributions in the institutional aspects of WSM. Starting from the community-level, the projects sought to strengthen the framework for local action (planning, investment, management, maintenance, and monitoring) within a context of decentralization. Through support to state-level watershed development agencies[54] the projects also sought to contribute to harmonizing efforts between the disparate state-level agencies with mandates over water resources and WSM. The only shortfall may have been in not extending support to the policy priorities articulated by the states of *water resources planning at the basin and/or sub-basin levels* and *greater attention to the sustainable management of groundwater resources*.

Transparency and public accountability, especially in regards to works and monies, is the key to smooth implementation and harmonious social relations. As the post-project impact study of Sujala has indicated, all CBOs that have continued to function effectively post-project have been those that consistently applied principals of transparency and accountability in the functioning of their group. This extended to all group members, not just the leaders. Effective conflict resolution mechanisms that are accepted and respected by the community and/or other involved stakeholders were also key to maintaining group cohesion and momentum. Conflict resolution mechanisms had to be established at all levels to handle disputes and complaints that often arose during implementation. Those that worked best were those that were perceived as responsive, transparent and fair.

In activities which involve payment of wages to labor, it is preferable that the project designated body (be it a GP, Sujala Watershed Sangha Executive Committee [SWS-EC], or a Village Development Committee) contract the work itself,

52 Antrix was awarded the 2010 Globe Sustainability Research Award, an initiative of the Sweden-based Globe Forum for its work with the Karnataka project *for outstanding work that is both original and practical . . . that has led to sustainable poverty reduction and vulnerability reduction. It has demonstrated clear gains in all three dimensions of sustainable development—economic, social and environmental.*

53 Through wealth ranking, resource, skills and aptitude mapping, and other means

54 Karnataka: Watershed Development Department; Himachal Pradesh: Himachal Pradesh Natural Resource Management Society; Uttarakhand: Watershed Management Directorate

hire laborers and make payment directly. Where this is not feasible, then it may sub-contract the work to only those CBOs that will, by themselves, undertake and complete the designated activity. Where grant funds include labor costs (and the grant amount assumes payment of a fair wage) and these are passed directly to private individuals or groups who will subsequently hire the labor directly,[55] then mechanisms should be in place to check and ensure that laborers are paid as per the project's expectations.

The three projects all represent global good practice on social issues, given their focus on poverty, strengthening local governance and institutions, concerns (and effective approaches) for dealing with issues of equity and inclusion of vulnerable groups, and for their strong emphasis on improving livelihoods.

The inclusion, empowerment and mainstreaming of women, the poor and vulnerable groups into the decision making processes is crucial to the sustainability of the project. Generally, these groups draw upon common pool resources for their survival and unless they directly benefit from the development of these resources, they will have no incentive to protect or sustainably manage these assets. Furthermore, as income or quality of life enhancing benefits increasingly accrue to all groups in a community, especially the poor, not only is social capital enhanced, but the economic, cultural and political life of a community also improves.[56] Youth constitute the largest demographic group in any village today, and they are also a vulnerable group in terms of employment and livelihood opportunities, especially those from poor households who constitute the majority amongst them. It would be necessary in future watershed-based development projects to also consider them as a vulnerable and priority target group, besides women and other groups as is now the tradition.

The manner in which agency personnel interact with the community sets the tone for the project and determines its outcome. Respect, commitment and integrity bring forth enthusiasm, cooperation and transparency from the community. However, for this dynamic to be realized at the field level, it must also permeate the entire delivery structure and mechanism of the project. Participatory processes at the village level will flourish only if the underlying values and behavioral patterns of the entire project delivery mechanism reflect these values. A participation-based project must be sensitive to this aspect and make special efforts to inculcate these values into its procedures, interactions and "way of doing business."

Performance-based payments systems, in order to be effective, must involve all stakeholders in their design and formulation and should be fairly administered, transparent, and sensitive to emergent and unanticipated events. All parties to the agreement, including government functionaries, should be held equally responsible and accountable. Since disputes will inevitably arise, there should be a conflict mediation mechanism set up at all the relevant levels coinciding with the introduction of such a payment system. In order to reduce discretion and arbitrariness, the system should be supported by an IT-enabled Decision Support System introduced at all decision making various levels.

The projects followed good practices in monitoring certain financial impacts such as household income, income generating activities and income from improvements in agricultural production. Lacking, however, was any economic analysis to evaluate project efficiency, to test assumptions or validate the programs' investment and incentive schemes, or for purposes of policy analysis. Given the objectives of utilizing the projects to influence state-level programs and approaches, a systematic approach to evaluating economic aspects in addition to the financial aspects could possibly have strengthened the projects' influence on Government's overall approach.

In conclusion, based on the experience of these three World Bank–Supported projects, watershed development provides a credible approach to a range of tough challenges facing rural India. As a tool, it is most useful in assisting to: (i) increase productivity under difficult rainfed conditions; (ii) arrest and reverse land degradation; and (iii) reduce water stress among project participants in their specific lands and micro-watersheds by capturing and utilizing rainfall and streamflow for productive purposes.

55 Except in the case where specialised works are undertaken (for example, masonry work) as prevailing market rates tend to be fairer for specialized labour.

56 The poor can become powerful drivers of the local economy when they have access to stable and regular sources of income. Moreover, the social and institutional gains achieved during project implementation can only be secured and enhanced post project if the poor perceive that they have also benefited, and that too fairly, from their participation in the project.

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Appendix 1a COMMON GUIDELINES FOR WATERSHED DEVELOPMENT PROJECTS 1995, 2001, 2008, 2011 & 2012

	1995 GUIDELINES	2001 GUIDELINES	2008 GUIDELINES	2011 GUIDELINES	2012 GUIDELINES
Objectives	• Promote the economic development of the village community • Encourage the restoration of ecological balance in the village • Improve the economic & social condition of the resource poor & the disadvantaged	• Develop wastelands/degraded lands, drought-prone & desert areas • Promote economic development & improving socio-economic conditions of resource poor & disadvantaged • Mitigate adverse effects of extreme climatic conditions • Restore ecological balance by harnessing, conserving & developing natural resources (land, water, vegetative cover) • Encouraging sustained community action for O&M of assets created & further development of natural resources • Utilizing simple, easy & affordable technological solutions & institutional arrangements based upon local knowledge & available materials • Employment generation, poverty alleviation, community empowerment & development of human & other economic resources of the village	No specific objectives are articulated, however, the implicit objectives may be summarized as: • Improve rural livelihoods through participatory watershed development with focus on integrated farming systems to enhance income, productivity & livelihood security in a sustainable manner • Develop rainfed areas with a view to conserving natural resources of water, soil & vegetation by mobilizing social capital	Improve rural livelihoods through participatory watershed development with focus on integrated farming systems for enhancing income, productivity & livelihood security in a sustainable manner.	• Increase the availability of surface & groundwater to meet the needs of drinking water, drought proofing & protective irrigation • Regeneration of degraded natural resources, reducing soil erosion & restoration of ecological balance • Improvement of land productivity in rainfed areas • Promote sustainable livelihoods & diversify livelihood options, especially for small & marginal farmers & the asset-less persons, especially women • Strengthen local institutions & people's empowerment, especially of women • Promote location-specific technological solutions based on local resources & local knowledge • Mitigate the adverse impacts of climate change & promote adaptation strategies
Scale	"Micro-watershed" on order of 500 ha	"Micro-watershed" on order of 500 ha	"Geo-hydrological units" averaging 1,000 to 5,000 ha, comprising clusters of micro-watersheds. May be smaller in hilly/difficult terrain areas.	Same as 2008	Watershed projects to be between 3,000-7,000 ha & additional contiguous watersheds taken up to form larger clusters where possible. Smaller sizes may be sanctioned in hilly/difficult terrain areas.
Related hydrologic/ water resources objectives[1]	• Optimize utilization of water & mitigate adverse effects of drought & prevent further ecological degradation • Equitable distribution of the benefits of water resources development • Alleviation of drinking water shortages	• In situ conservation of soil & water • Water harvesting & storage for domestic, agricultural & groundwater recharge purposes • Renovation & augmentation of water resources for drinking water/irrigation	• Upper watershed (headwaters) protection • Development of shared databases, MIS, GIS systems for IWRM (planning, M&E, modeling) • Alleviation of drinking water shortages	• Ridge-to-valley, sequenced approach (first, upper watersheds; second, slopes just above agricultural lands; third, plains & flat areas) • Develop core GIS facilities for planning, M&E, modeling; information network to reach project areas	• Ridge-to-valley approach with flexibility to work initially in lower reaches nearer villages to respond to demand, provide tangible benefits from program early on & achieve buy-in from community.

(continued)

	1995 GUIDELINES	2001 GUIDELINES	2008 GUIDELINES	2011 GUIDELINES	2012 GUIDELINES
Related hydrologic/water resources objectives (continued)	• Water harvesting & storage for domestic, agricultural & groundwater recharge purposes	• Alleviation of drinking water shortages	• Target over-exploitation of groundwater resources • Formal water allocation (surface & groundwater) at local level based on principles of equity & sustainability • Reduce volume/velocity surface runoff • Water harvesting & storage for domestic, agricultural & groundwater recharge purposes • Promotion of water saving technologies, management practices & crop varieties • Institutional reforms for IWRM	• Equip Districts & State Centers with IT & domain professionals • Create National Portal to host data of all watershed projects • Apply GIS data for local project planning (define project boundaries, map treatment areas, assess runoff, ID optimal location for structures, impact assessments that include changes in geo-hydrological potential, soil & crop cover, runoff, and so on • Provision of drinking water • Augmenting groundwater potential • Repair/restoration/upgrading village tanks • Reduce volume/velocity surface runoff • Development of water harvesting • In situ soil & moisture conservation & drainage management • Water-saving technologies (irrigation & cultural practices) • Promotion of use of local, adapted germplasm	• Drinking water security to be paramount goal, followed by protective irrigation for drought-proofing • Increase availability of surface & groundwater to meet drinking water, drought proofing, protective irrigation needs • Repair/restore/upgrade traditional water harvesting structures • Hydro-geological & aquifer surveys to map zones of potential groundwater recharge, storage & sustainable groundwater utilization • Reduce volume/velocity surface runoff • Develop water harvesting structures • In situ soil & moisture conservation & drainage management • Water saving technologies (drip irrigation, cultural practices) • Promotion of local, adapted germplasm • Establish local mechanisms to charge & collect water user fees (excluding charges to landless, destitute or disabled/widow headed households)
Watershed selection criteria	• ≈ 500 ha in size or several smaller, contiguous watersheds with an approximate total area of 500 ha • Acute shortage of drinking water • Large population of SC/STs • Preponderance of wastelands • Preponderance of common lands • Where actual wages are significantly lower than the minimum wages • Contiguous to another watershed which has already been developed/is selected for development • Not previously taken up under any of the programs such as DPAP/DDP/NWDPRA/IWDP • Watershed contained within village boundaries or, if small part is outside, with consent of neighboring village/Panchayat	• ≈ 500 ha in size or several smaller, contiguous watersheds with an approximate total area of 500 ha • Acute shortage of drinking water • Large population of SC/STs • Preponderance of non-forest wastelands/degraded lands • Preponderance of common lands; except where poverty alleviation & employment generation so justify • Where actual wages are significantly lower than the minimum wages • Contiguous to another watershed which has already been developed/is selected for development • Where people's participation (raw materials, cash, labor, and so on) assured for development, as well as, O&M of created assets	• Clusters of micro-watersheds comprising 1,000 to 5,000 ha • Acuteness of drinking water scarcity • Proportion of SC/STs • Preponderance of wastelands/degraded lands • Contiguity to another watershed that has already been developed/treated • Extent of over exploitation of groundwater resources • Willingness of village community to make voluntary contributions, enforce equitable social regulations for sharing of common property resources, make equitable distribution of benefits, create arrangements for the O&M of the assets created • Area of the project should not be covered under assured irrigation • Productivity potential of the land	Same as 2008 Guidelines	• Watershed projects between 3,000–7,000 ha, including contiguous areas as possible to form larger clusters. *Weighted criteria (130 points total)*: • Drinking water shortage (15 points) • % of net sown area that is unirrigated (15 points) • Moisture index/DPAP/DDP Block (15 points) • % of degraded land (15 points) • Productive potential of land (15 points) • Depth of groundwater level (10 points) • % of small & marginal farmers (10 points) • % of SC/ST population (10 points) • Incidence of seasonal or long term distress outmigration (10 points) • Contiguity to another watershed already developed/treated (10 points) • Extent of deviation of actual wages of farm labor from declared minimum wages (5 points)

(continued)

	1995 GUIDELINES	2001 GUIDELINES	2008 GUIDELINES	2011 GUIDELINES	2012 GUIDELINES
Institutional Arrangements	**National-level** • Department of Wastelands Development, MoRD: administration of the DPAP, DDP & IWDP-related watershed development program • Ministry of Agriculture: administration of the NWDPRA-related watershed development programs.	**National-level** • Department of Wastelands Development, MoRD: administration of the DPAP, DDP, & IWDP-related watershed development program • Any other program notified by the GOI	**National-level** • National Rainfed Area Authority: planning; norms & guidelines; evaluation; inter-sectoral & inter-institutional coordination; financing; facilitation of research; knowledge sharing; technical inputs • Line Ministries: oversee watershed development programs, with option to set up a nodal agency at the central level in the department for managing & implementing watershed development projects • National Level Data Center & National Portal: extend, store & generate watershed & land resource information, data & knowledge; collate summary data for country; data archive; data for program & fund flow management	**National-level** Same as 2008 with following exception: • Line ministries delegate powers to states to sanction & oversee the implementation of watershed projects	**National-level** Same as 2011 with following exceptions: • IWMP Steering Committee, chaired by Secretary of Land Resources; members from Planning Commission, National Rainfed Area Authority, technical experts from scientific institutions, voluntary organizations, relevant departments of central/state govt. • National Rainfed Area Authority: role is reduced, no longer charged with overall inter-sectoral & inter-institutional coordination or convergence with other programs • MoRD/Central Level Nodal Agency: technical secretariat of IWMP Steering Committee; facilitate fund flows, technical & implementation support for capacity building, information, education & communication; ensure quality of monitoring system & its implementation thru states; organize system for evaluation/ studies, impact assessments, etc.; support & facilitate knowledge management; facilitate convergence between schemes/ resources of other departments/ministries • Central Watershed Data Center: store & generate information, data, & knowledge; collate summary data country-wide, archival data center for states; coordinate with state centers; provide aggregate picture of country-wide program
	State-level • Watershed Development Implementation & Review Committee: (i) coordination among government Departments, Agricultural Universities, Voluntary Agencies & training institutions; (ii) review & evaluate progress, cost norms, & minimum area requirements • Department of Rural Development: nodal agency serving Watershed Development Implementation & Review Committee	**State-level** • State Watershed Development Committee: (i) coordination among government departments, agricultural universities, voluntary agencies & training institutions; (ii) review & evaluate progress, cost norms & minimum area requirements • Designated Department in State Government: (i) nodal agency serving State Watershed Development Committee; (ii) supervise implementation of Watershed Development Programs	**State-level** • State Level Nodal Agency: (i) sanction watershed projects for the state on the basis of approved state perspective & strategy; (ii) oversee all watershed projects in the state	**State-level** Same as 2008, with exception: • State Level Nodal Agency to also: (i) prepare states' strategic plan for watershed development & for its implementation; (ii) establish & maintain a state level data cell; (iii) provide technical support to Watershed Data Center; (iv) oversee capacity building; (v) approve project implementing agencies (PIAs) selected by locals; (vi) MEL systems; (vii) prepare state-specific process guidelines, manuals, etc.; (viii) coordinate with Nodal Ministry/National Rainfed Area Authority & implement program	**State-level** Same as 2011, with exception: • State Level Nodal Agency has additional responsibilities in developing state specific process/operational guidelines & strategies for human resource management policy. • Watershed Cell cum Data Centers: (i) validate technical, financial & social aspects of detailed project report & recommend for approval; (ii) regular updating of MIS

(continued)

	1995 GUIDELINES	2001 GUIDELINES	2008 GUIDELINES	2011 GUIDELINES	2012 GUIDELINES
Institutional Arrangements (continued)				• Watershed Cell cum Data Centers at district level: (i) oversee implementation; (ii) identify potential PIAs; (iii) facilitate preparation of strategic & annual action plans; (iv) provide technical support to PIAs; (v) develop capacity building plans; (vi) MEL; (vii) ensure fund flows; (viii) reporting to SLNA & Nodal Agency at central level; (ix) coordination with relevant programs; (x) integration of watershed development projects/ plans into District plans; (xi) maintain databases & link to state/national-level	
	District-level • Zilla Parishads (ZPs) (or District Rural Development Agencies [DRDA]), as case may be): (i) implementation; (ii) approve watershed development plans & selection of PIAs; (iii) funds administration & financial management; (iv) supervision of works; (v) establish norms & guidelines for maintenance of accounts, community organization, campaigns, farmers training, exposure visits, etc. • Watershed Development Advisory Committee: advise & assist ZP/DRDA	**District-level** • ZP/DRDA: decide on the suitability or otherwise of the PIA, with caveat that the State Government may change the PIA if desired • Chairman, ZP or DRDA: (i) responsible for overall implementation; (ii) monitor & review implementation; (iii) maintain accounts; (iv) holds signing authority; (v) constitute District Watershed Development Committee • District Watershed Development Committee: (i) ensure coordination at district level, (ii) advise & assist the ZP/DRDA on matters regarding selection of PIAs, members of watershed development teams (WDTs), training, community organization, publicity campaigns & other such items/activities; (iii) approve detailed action plan for watershed development projects in the district; (iv) review progress; (v) assist in resolving management & administrative problems; (vi) guide implementation; (vii) identify policy issues for reference to state government/GOI	**District-level** • District Watershed Development Unit: oversee the implementation of watershed program in each district & maintain separate, independent accounts for this purpose • District Panchayat/ZP: (i) governance in matters relating to the coordination of various sectoral schemes with watershed development projects, (ii) review of progress, settling disputes etc.; (iii) provide valuable support to PIAs & GPs/WCs in technical guidance with the help of their subject matter specialists. Where the Panchayat system is not in operation, this role will be played by the District Watershed Development Unit/ District Autonomous Councils • PIA: responsible for implementation of watershed projects in different districts. These PIAs may include relevant line departments, autonomous organizations under state/central governments, government institutes/research bodies, intermediate Panchayats, voluntary organizations	**District-level** • Watershed Cell cum Data Center: (i) full responsibility for oversight; (ii) work in close collaboration with the District • Planning Committee (DPC). (i) assist District Planning Committee (DPC) in oversight of district program; (ii) collaborate with DPC; (iii) monitoring & evaluation. • District Planning Committee: (i) support to program governance; (ii) approve annual action plans; (iii) integrate the watershed development plans into district plans & oversee implementation. • District Panchayat/Zilla Parishad: (i) intersectoral coordination; (ii) review of progress, (iii) dispute settlement. Where Panchayat system not in operation, role played by the Watershed Cell cum Data Center /District Autonomous Councils. • Intermediate Panchayats: (i) participate in planning; (ii) support PIAs & GPs/ WCs; (iii) provide technical guidance.	**District-level** Same as 2011
	Local-level • PIAs: (i) motivate GPs to pass necessary resolutions to make public contributions; (ii) conduct PRAs to prepare development plans; (iii) community organization & training of communities; (iv) technical guidance & supervision of watershed development activities; (v) manage project implementation;	**Local-level** • GP: (i) be fully involved in implementation; (ii) support & encourage implementation; (iii) ensure funds from other developmental programs supplement & complement; (iv) review & discuss progress; (v) approval of watershed action plan by Gram Sabha	**Local-level** • GP: (i) supervise, support & advise WC; (ii) authenticate accounts/ expenditure; (iii) convergence with other projects/schemes; (iv) maintain asset register; (v) provide office accommodation & other requirements to WC; (vi) allocate usufruct rights to the assets created	**Local-level** Same as 2008, with exception: • Gram Sabha: constitute the WC	**Local-level** Same as 2011, with exception: • Forest Department: PIA in watersheds where >50% is under forests • GP: review of physical & financial progress

(continued)

	1995 GUIDELINES	2001 GUIDELINES	2008 GUIDELINES	2011 GUIDELINES	2012 GUIDELINES
Institutional Arrangements (continued)	(vi) inspect & authenticate project accounts; (vii) action research; (viii) monitor & review overall implementation; (ix) set up institutional arrangements for post-project O&M • WDT: (i) carry out duties of PIA; (ii) work exclusively & full-time for the watershed development projects in 10-12 villages; (iii) be located at the PIA/block or local headquarters/any other small town whichever is the nearest to the cluster of selected villages • Watershed Association (WA): (i) the Gram Sabha of the concerned Panchayat, except where watershed comprises areas under the jurisdiction of more than one Panchayat, then members of the concerned communities will form the WA; (ii) evolve/improve watershed development plan; (iii) monitor & review progress; (iv) approve statements of accounts; (v) form UGs/SHGs; (vi) resolve differences or disputes; (vii) approve arrangements for collection of public/voluntary donations & contributions from community & individual members; (viii) lay down procedures for O&M of assets created; (ix) approve activities within available budget; (x) nominate members of the WC; (xi) take disciplinary action for removal of membership from the WC or UGs & whatever other disciplinary action it deems fit • WC: (i) carry out day-to-day activities of the Watershed Development Projects; (ii) perform such functions as are assigned to it by the WA; & (iii) coordination & liaison with GP, WDT, the DRDA/ZP & government agencies.	• PIAs: (i) supervise & guide project implementation by the WCs; (ii) be responsible for 10-12 watershed projects covering an area ranging from 5,000-6,000 ha (or more if has capacity); (iii) motivate GPs to pass necessary resolutions to make public contributions; (iv) conduct PRAs to prepare development plans; (v) community organization & training of communities; (vi) technical guidance & supervision of watershed development activities; (vii) manage project implementation; (viii) inspect & authenticate project accounts; (ix) action research; (x) monitor & review overall implementation; (xi) set up institutional arrangements for post-project O&M • WDT: (i) carry out duties of PIA; (ii) working exclusively & full-time for the watershed development projects in 10-12 villages; (iii) be located at the PIA/block or local headquarters/any other small town whichever is the nearest to the cluster of selected villages • UGs: Homogenous groups who may be most affected by each work/activity & shall include the persons having land holding within the watershed areas, responsible to take over O&M of completed community works or activities on common property resources • WA: (i) the Gram Sabha of the concerned Panchayat, except where watershed comprises areas under the jurisdiction of more than one Panchayat, then members of the concerned communities will form the WA; (ii) evolve/improve watershed development plan; (iii) monitor & review progress; (iv) approve statements of accounts; (v) form UGs/SHGs; (vi) resolve differences or disputes; (vii) approve arrangements for collection of public/voluntary donations & contributions from community & individual members; (viii) lay down procedures for O&M of assets created; (ix) approve activities within available budget; (x) nominate members of the WC; (xi) take disciplinary action for removal of membership from the WC or UGs & whatever other disciplinary action it deems fit	• WDT: part of the PIA, will guide the WC in the formulation of the watershed action plan • WC: (i) implement the watershed project with the technical support of the WDT; (ii) administer investment funds; (iii) constitute SHGs & UGs	• WDT: (i) assist GP/Gram Sabha in constitution of the WC & their functioning; (ii) organize & nurture UGs & SHGs; (iii) mobilize women to ensure that the perspectives & interests of women are adequately reflected; (iv) conduct participatory base-line surveys, training & capacity building; (v) prepare detailed resource development plans	• Gram Sabha: (i) constitute the WC; (ii) guide identification of beneficiaries; (iii) mobilize voluntary contributions for different activities; (iv) guide development of resource-use agreements, especially for common property resources; (v) facilitate conflict-resolution; (vi) approve detailed project report/watershed action plan for the village; (vii) provide platform for social audit of the project; (viii) approve the activities that can be taken up with the Watershed Development Fund. • WDT: (i) organize watershed communities into UGs & SHGs & their apex bodies; (ii) convergence with other projects/schemes; (iii) develop systems for common property resource management & equitable sharing, especially groundwater; (iv) undertake engineering surveys, prepare engineering drawings & cost estimates for any structures to be built; (v) monitoring, checking, assessing, undertaking physical verification & measurements of the work done; (vi) facilitate development of livelihood opportunities for asset-less persons, especially women; (vii) facilitate adoption of low-cost technologies & build upon indigenous technical knowledge; (viii) organize labor groups of families dependent on wage employment; (ix) facilitate negotiations between WC, UGs & labor groups on timing, rates & nature of labor groups work; (x) pay wages directly to labor groups for work carried out; (xi) maintain project accounts; (xii) arrange physical, financial & social audits; (xiii) put in place impact assessment protocols; (xiv) facilitate conflict-resolution; (xv) set up suitable arrangements for post-project O&M & future development of the assets created during the project period

(continued)

	1995 GUIDELINES	2001 GUIDELINES	2008 GUIDELINES	2011 GUIDELINES	2012 GUIDELINES
Institutional Arrangements (continued)	• Watershed Secretary: Full-time paid employee of the WA responsible for (i) convening meetings of the WA & the WC & carrying out all their decisions; (ii) maintaining all records & accounts of the WC & the WA; (iii) helping the UGs & SHGs to maintain their accounts • Watershed Volunteers: assist Watershed Secretary in their responsibilities	• WC: (i) carry out day-to-day activities of the Watershed Development Projects; (ii) perform such functions as are assigned to it by the WA; (iii) coordination & liaison with GP, WDT, the DRDA/ZP & Government Agencies. • Watershed Secretary: Full-time paid employee of the WA responsible for (i) convening meetings of the WA & the WC & carrying out all their decisions; (ii) maintain all records & accounts of the WC & the WA; (iii) help the UGs & SHGs to maintain their accounts. • Watershed Volunteers: assist Watershed Secretary in their responsibilities			• WC: (i) guide & participate in base-line survey, identification of sites & activities, identification of beneficiaries, in formation of UGs & SHGs; (ii) mobilize voluntary contributions; (iii) thrash out resource-use agreements, especially for common property resources; (iv) enforce regulations on tubewells; (v) facilitate conflict-resolution; (vi) supervise watershed development activities; (vii) ensure payments to labor; (viii) maintain project accounts; (ix) arrange for social audit; (x) initiate steps for post-project operation & maintenance & further development of the assets created during the project period
Role of voluntary organizations	• Five to six "Important Voluntary Associations" at state-level may be members of Watershed Development Implementation & Review Committee • May be PIAs • May run training programs for WDT members	• Two "Prominent NGOs" will be members of State Watershed Development Committee • One NGO representative on District Watershed Development Committee • Eligible for selection as PIA if active & experienced in watershed or similar in rural areas	• Provide services in the areas of awareness generation, capacity building, information, education & communication & social audit, among others • May be PIAs if eligible based on criteria (experience, technical & financial capacity, antecedents, and so on)	Same as 2008	Same as 2011, with exception: • Provide information, education & communication services
Flow of Funds	Government of India/State Governments => ZPs/ DRDAs => Panchayats/Watershed Development Committees	Government of India => ZP/ DRDAs => PIA => (for works) WC	Nodal Ministry/Department => States => Districts => PIAs/WCs	Nodal Ministry/Department => State Level Nodal Agency => Districts => Watershed Cell cum Data Center => PIAs/WC	Same as 2011
Priority Actions	• Watershed treatment/ development plan for all arable/non-arable (including degraded forest, govt., community & private) lands & drainage lines • Emphasis on low-cost, simple & easy to operate & maintain works & activities • In situ soil & moisture conservation measures (contour & graded bunds, fortified by vegetation, bench terracing in hilly terrain) • Drainage line treatment (vegetative & engineering structures) • Small, water harvesting structures (farm ponds, nalla bunds, check dams & percolation tanks) • Nurseries for fodder, timber, fuel wood & horticulture • Block plantations, shelter belts, sand dune stabilization, and so on	• Land development including in situ soil & moisture conservation measures (for example, contour & graded bunds fortified by plantation, bench terracing in hilly terrain, nursery raising for fodder, timber, fuel wood, horticulture & non-timber forest product species) • Afforestation including block plantations, agro-forestry & horticultural development, shelterbelt plantations, sand dune stabilization, and so on • Drainage line treatment with a combination of vegetative & engineering structures • Development of small water harvesting structures such as low-cost farm ponds, nalla bunds, check-dams & percolation tanks & groundwater recharge measures • Renovation & augmentation of water resources, desiltation of tanks for drinking water/ irrigation	• Ridge area treatment • Drainage line treatment (vegetative & engineering structures) • Water harvesting structures such as low-cost farm ponds • Nursery raising for fodder, fuel, timber & horticultural species • Land development including in situ soil & moisture conservation & drainage management measures like field bunds, contour & graded bunds fortified with plantation, bench terracing in hilly terrain, and so on • Crop demonstrations for popularizing new crops/ varieties, water saving technologies such as drip irrigation or innovative management practices; as far as possible varieties based on the local germplasm may be promoted	• Ridge-to-valley principle with multi-tier sequenced approach • Ridge area treatment (reduce volume/velocity surface runoff) • Regeneration of vegetative cover in forest & common land, afforestation, staggered trenching • Groundwater recharge through wells, bore wells & other measures • Drainage line treatment • Water harvesting structures • Nursery raising for fodder, fuel, timber & horticultural species • Building capacity of the CBOs to carry out the new agenda items during post project period • Sustainable management of (developed) natural resources	Same as 2011 with addition of: • Promotion of seed banks & seed villages • Promotion of non-pesticide management systems that use local methods/material to control pest attack • Promotion of agro-processing, marketing arrangements of produce & similar off-farm & informal sector enterprises • Seed capital assistance for groups (in the form of revolving funds among groups) • Supporting community investment initiatives of groups • Income generating activities with natural resources management & pro-poor focus • Developing locally managed alternative food & social security systems

(continued)

	1995 GUIDELINES	2001 GUIDELINES	2008 GUIDELINES	2011 GUIDELINES	2012 GUIDELINES
Priority Actions (continued)	• Agro-forestry & horticultural development • Pasture development (alone or with plantations) • Repair, restoration & upgrading of existing common property assets & structures (from previous public investments) • Crop demonstrations • Basic surveys (contour, hydrological, benchmark, remote sensing, soil classification, land capability, monitoring), design analysis, research/action research/operational research, other technical inputs	• Pasture development either by itself or in conjunction with plantations • Repair, restoration & upgrading of existing common properly assets & structures (from previous public investments) • Crop demonstrations for popularizing new crops/varieties or innovative management practices • Promotion & propagation of non-conventional energy saving devices & energy conservation measures	• Pasture development, sericulture, beekeeping, back yard poultry, small ruminant, other livestock & micro-enterprises • Veterinary services for livestock & other livestock improvement measures • Fisheries development in village ponds/tanks, farm ponds, etc. • Promotion & propagation of non-conventional energy saving devices, energy conservation measures, bio-fuel plantations, and so on	• Land development including in situ soil & moisture conservation & drainage management measures, priority given to local species • Field bunds, contour & graded bunds fortified with plantation, bench terracing in hilly terrain etc. • Crop demonstrations for popularizing new crops/varieties • Water saving technologies (drip irrigation or innovative management practices) • Pasture development, sericulture, bee keeping, back yard poultry, small ruminant, other livestock & micro-enterprises • Veterinary services for livestock & other livestock improvement measures • Fisheries development in village ponds/tanks, farm ponds, etc. • Promotion & propagation of non-conventional energy saving devices, energy conservation measures, bio fuel plantations, and so on	
Funding Pattern	• Watershed treatment/development works/activities–80% • Watershed community organization–6% • Training–4% • Administrative costs–10%	• Watershed treatment/development works/activities–80% • Watershed community organization (including entry point activities)–5% • Training–5% • Administrative costs–10%	• Watershed development works–50% • Production system & micro-enterprises–13% • Livelihood activities for the asset-less persons–10% • Administrative costs–10% • Institution & capacity building–5% • Consolidation phase–5% • Entry point activities–4% • Monitoring–1% • Evaluation–1% • Detailed project report–1%	• Watershed development works–56% • Administrative costs–10% • Production system & micro enterprises–10% • Livelihood activities for the asset-less persons–9% • Institution & capacity building–5% • Entry point activities–4% • Consolidation phase–3% • Detailed Project Report–1% • Evaluation–1% • Monitoring–1%	• Watershed development works–55% • Professional human resources deployment–10% • Livelihoods for asset-less persons–9% • Productivity enhancement activities–7% • Administrative costs–5% • Capacity building–5% • Entry point activities–4% • Activities under consolidation phase–1% • Detailed project report–1% • Evaluation, learning & documentation–1% • Institution building–1% • Monitoring–1%
Project Duration	4 years maximum except up to 5 years where plantations are being established on all or most of the areas, in which case	5 years which includes an initial phase of 9–12 months for establishing the necessary institutional mechanisms	4–7 years (preparatory phase: 1–2 years; works phase: 2–3 years; consolidation phase: 1–2 years)	Same as 2008	5 years (preparatory phase: 18 months; watershed works phase: 3 years; consolidation/withdrawal: 6 months)
Cost Sharing	Local voluntary donations/contributions in labor, raw materials, cash, etc. for developmental activities & O&M; Expected to be minimum 5% on public good/common lands & 10% on private lands	Contribution in cash, labor, & raw materials for development & O&M; Local contributions to be at least 10% for works on individual lands & 5% for works on community lands	• Natural resource management works: minimum 10% on private lands; minimum 5% on SC/ST & small & marginal farmers' lands • Aquaculture, horticulture, agro-forestry, animal husbandry: 40% on private lands & 20% for SC/ST beneficiaries	• Natural resource management works: same as 2008 • Aquaculture, horticulture, agro-forestry, animal husbandry: 20% on private lands & 10% for SC/ST beneficiaries	Same as 2011

(continued)

	1995 GUIDELINES	2001 GUIDELINES	2008 GUIDELINES	2011 GUIDELINES	2012 GUIDELINES
Cost Ceiling	Rs 4,000/ha (approx. $127 in 1995 dollars)	Rs 4,000/ha (approx. $85 in 1995 dollars)	• Rs 6,000/ha (approx. $90 in 1995 dollars). • Being revised to allow for: (i) promotion of livelihoods including improvement of productivity through farming systems; (ii) complete coverage of area under the watershed including common/forest land; (iii) general escalation in cost of material, as well as, minimum wages of laborers	Rs 12,000/ha (approx. $133 in 1995 dollars).	Rs 12,000/ha (approx. $121 in 1995 dollars)

Sources: Government of India 1994, 2001, 2008, 2011, 2012.
[1] Note that these are not necessarily from a statement of objectives within the Guidelines, in some cases they are gleaned from the sections of the Guidelines related to watershed development activities and taken as explicit objectives.

Appendix 1b WATER: INDIA'S EMERGING PARADIGM SHIFT IN WATERSHED DEVELOPMENT

Since the revision in 2001 of the Common Watershed Guidelines, there have been three additional revisions: in 2008, 2011 and 2012.[57] The major, strategic revisions have been those associated with the process of updating the guidelines for each of the new Five Year Plans, that is, the 2008 and 2012 revision for the 11th and 12th Five Year Plans,[58] respectively. For each of the major revisions there has been a systematic process to capture lessons learned from all levels of implementation through a series of performance assessments, evaluation studies and programmatic reviews by high-level committees organized by the Ministry and Planning and the Ministries of Rural Development and of Agriculture.

2008 – A RADICALLY NEW APPROACH?

In 2005, the Ministry of Rural Development (MoRD) constituted a special technical committee—the so-called Parthasarathy Committee—to review and evaluate the Ministry's watershed development programs (DPAP, DDP and IWDP). Their final report, published in early 2006, suggested the need for *a radically new approach* (Shah, 2013) to watershed development under the 11th Five Year Plan. The review was comprehensive, looking at all aspects of the program. Among others it strongly reiterated the premise that the watershed programs are primarily social programs. Of relevance here were its conclusions as regarded water resources management and how its recommendations for, what it considered, urgently needed improvements were ultimately internalized into the 2008 Common Watershed Development Project Guidelines. Among the committee's observations were (GOI 2006):

- *Perhaps the most critical weakness of watershed programs in India is that they operate almost as if groundwater does not exist . . . it appears to play almost no role in watershed planning.*
- *. . . there is a need to recognize and study . . . groundwater* [and] *hydrogeology at the earliest stages of planning. This is important for . . . location of structures, ensuring equity, sustainability . . . and developing a sustainable groundwater use plan as an integral part of the watershed action plan.*
- *There has to be clear prioritization of objectives—drinking water and protective irrigation, along with fodder and fuel must come first.*
- *Watershed development . . . has been . . . preoccupied with supply augmentation. Little attention has been paid to the end-uses . . . it has failed to break with the dominant development paradigms . . . characterized by supply-side solutions . . .* [and so is] *caught in the infinite regress of forever trying to catch up with ever-expanding demand.*
- *What is required is to find ways of not just increasing water supply but much more critically reducing demand and regulating end-uses.*
- *Watershed development is not merely a matter of harvesting rainwater. Its success crucially entails working out collective protocols of equitable and sustainable use of surface water and groundwater, bringing together of scientists and farmers to evolve a dryland agriculture package and a host of other livelihood options, detailed land-use planning at the micro-watershed level and the mobilization of rural communities in the direction of the disadvantaged.*

The 2008 revision of the Guidelines started with the conclusion that the programs' successes—measured in terms of conservation, productivity enhancement, expansion of agricultural areas, employment generation and social improvements—had been sporadic and intermittent during the previous five years. Overall impact of the watershed development programs at the state and national levels was characterized as having *generally been inadequate* and, in

57 Appendix 1a provides an overview and summary of all of the five versions of the Common Guidelines from 1995 to 2012.

58 The 11th Five Year Plan covered the period from 2007 to 2012 and the 12th Five Year Plan will cover the period from 2012 to 2017.

response, the new guidelines were to provide *a fresh framework for the next generation watershed programs* (GOI 2008.). The key reforms introduced under the new Guidelines, while wide ranging, were fairly modest when it came to responding to the water resources management concerns raised by the Parthasarathy Committee. Instead, the reforms focused primarily on: (i) further decentralization of the programs to the States and the strengthening of local mechanisms and capacity for delivery, implementation and O&M; and (ii) introduction of a sustainable livelihood orientation (defined as *productivity enhancement and livelihoods along with conservation measures*).

Relevant to water resources management, the revised Guidelines (i) allowed for larger project areas (cluster approach) comprising clusters of micro-watersheds of average size from 1,000 to 5,000 ha; (ii) called for *scientific planning . . . to utilize information technology* [and] *remote sensing inputs in planning, monitoring and evaluation*; and (iii) emphasized the need for following a "sequenced"[59] ridge-to-valley approach, involving the Ministry of Environment and Forest, or the states' forest programs to protect upper reaches. The guidance provided on planning processes identified the need for hydro-geological surveys to map out zones of potential groundwater recharge, storage and sustainable groundwater utilization and for detailed resource-use agreements for surface water and groundwater among UG members.

The combination of the cluster approach and the call for a more rigorous, science-based planning approach opened the door to larger-scale, strategic water resources planning that incorporated upstream/downstream linkages and externalities not perceived at the micro-planning level. Ultimately, however, the Guidelines viewed the cluster approach as primarily a means *to support economic activities at scale*, rather than for strengthening of the water resources management framework to address the types of concerns raised by the Parthasarathy Committee. As a result, while all states "cluster" at these larger scales, the clustering does not form the basis for what is needed: a landscape level assessment to initiate the planning process at a suitable scale, with a focus on hydrological resources.[60]

As regards the sequenced ridge-to-valley approach, the Parthasarathy Committee (GOI 2006) had warned that . . . *experience in the field suggests that it would be better to introduce a degree of flexibility in the way the ridge-to-valley principle is applied* . . . [while it is conceptually correct to] *plan various interventions within the watershed, in a ridge-to-valley sequence . . . the actual sequence of treatment may be kept a little flexible and responsive to local perceptions.* It also noted that there are *many cases where the ridge-to-valley principle may not apply for other reasons.*[61] It is also important to note that ridge-to-valley represents an idealized concept of watershed hydrology more appropriate to streamflow generation (that is, surface water) than to groundwater.[62] As for water resources management, a too rigid application of the multi-tier, ridge-to-valley framework would be antithetical to a framework for adaptive management that responded to local conditions, existing externalities and felt needs. The 2008 Guidelines thus ran the risks of embodying a type of watershed management orthodoxy representing a top-down, technocratic, one-size-fits-all approach.

2012 – A DEEPENING WATER CRISIS

The next round of systematic reviews and evaluations of the watershed development programs were carried out by GOI's Planning Commission, under the auspices of Dr. Mihir Shah and the "Shah Committee" in anticipation of the 12th Five Year Plan. The Committee

59 This refers to "multi-tier" sequencing of watershed development by first focusing on the upper reaches or forests "where the water sources originate," followed by "the second tier" or intermediate slopes just above the agricultural lands and then the "third level" or plains/flat areas "where typically farmers are operating." It also refers to the standardized phasing of the Watershed Development Projects into three phases: preparatory, works and consolidation and withdrawal.

60 This broader scale of planning is currently being piloted in both the new World Bank-financed Karnataka watershed project (under implementation) and the new Neeranchal national watershed project (in 8 states, now under preparation).

61 The report identifies 10 agro-ecological sub-regions that comprise over 25 percent of India's land area where it believes the watershed guidelines require modification. In two-thirds of those land areas (about 17 percent of India's total land area), the reason for the suggested modifications includes *non-applicability of the conventional ridge-to-valley principle*. The other justifications include *existence of traditional systems, atypical land situation, high poverty and low human development, and need of higher per hectare investment norms*.

62 Groundwater divides or boundaries are geologic or hydrologic and so do not necessarily follow topographic boundaries. Similarly, zones of interest for enhancing groundwater recharge will be identified through soils and geological factors rather that topography, *per se.*

reported that it had *emerged that a number of practical impediments were coming in the way of putting the new paradigm* [represented by the 2008 Guidelines] *of watershed management into practice on the ground and the pace of the program was found to be less than satisfactory* (Shah 2013). Among the key obstacles identified were the lack of adequate resources to actually employ the quality of technical and social professionals required to inform planning processes as regarded hydrological aspects and to assist in building local processes for water resources governance.

A background report from the Planning Commission's Working Group on minor irrigation and watershed management was much less generous in its assessment, referring to the watershed development approach as implemented as being a *flawed solution* (GOI 2011). The report recognized the highly relevant nature of the watershed development programs' menu of activities and interventions for the development of rainfed areas. It also recognized that a watershed-based approach is broadly appropriate for developing rainfed areas. Its main criticisms were leveled at how the programs were implemented: (i) the still fragmented institutional nature of the programs; and (ii) the continuing one-size-fits-all approach. It identified *departmental silos* [with] *no unified mechanism for coordination and convergence* as being responsible for the programs' not achieving their potential and for the greatly reduced on-the-ground impacts and effectiveness. It went on to strongly question how watershed development—the main program for the development of rainfed areas—was being carried out; warning of a *ridge-to-valley fundamentalism* and a *tool-kit approach of sticking on the ground various structures and treatments*.

More compelling than the reviews of the watershed development programs and the Common Guidelines utilized under the 11th Five Year Plan are the strategic views on water resources management that have come out for the 12th Five Year Plan. In early 2011, the Planning Commission presented its proposed new water resources strategy for the 12th Five Year Plan. Entitled "Sustainable Water Security at a Time of Climate Change," the presentation began with a review of the deepening water crisis in India and the *need to move decisively beyond* [the] *complacency of 'denial mode'* (Shah 2011). It went on to discuss the more recent and sobering assessments by independent researchers suggesting that India's water budget is much tighter than current assumptions hold[63] and the *non-renewable depletion of groundwater levels over large tracts*. One of the main messages of the presentation was that *business-as-usual will not do*.

Later in that same year the Planning Commission's strategy document for the 12th Five Year Plan was made official and published. The report—"Faster, Sustainable and More Inclusive Growth–An Approach to the Twelfth Five Year Plan (2012-17)"—reiterated the gravity of the situation as regards water resources and put forward the following strategic priorities for water resources management (GOI 2011):

- **Maintenance of Surface Water Bodies**—focusing on rehabilitation of existing structures and bodies, management of their catchment areas, and groundwater management to increase productivity of land. The Eastern and Northeastern regions, where *ample untapped groundwater resources are available* are prioritized for groundwater management.
- **Groundwater Management**—the proposed approach is to greatly expand the scope of rainwater harvesting and groundwater recharge. Where rainfall and recharge rates are high in the alluvial plains, the focus would be on recharge. In the more rocky areas of Central India, where recharge rates are lower, the focus would be on rainwater harvesting and groundwater recharge, supplemented by the creation of small storage structures (reservoirs, tanks, farm ponds, dug wells, etc.) to impound rainwater. To accomplish this, the government's rural employment program—Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) would be used to support such activities as identified through the IWMP.
- **Aquifer Mapping**—this would include a comprehensive mapping of aquifers, along with their storage and transmission characteristics. The current network of observation wells (60,000 countrywide) would be expanded about five times (300,000). By gaining a more accurate idea of actual groundwater use and aquifer dynamics, both policy and water resources management interventions can be better targeted.
- **Stakeholder-based Aquifer Management**—Based on the aquifer mapping exercises, groundwater management

63 The Ministry of Water Resources estimates water supply at 1,123 BCM supply vs. a 634 BCM demand in 2010, rising to 1,180 BCM in 2050. Two other independent researchers from UC/Berkeley and IIT Delhi have estimated current supply as between 654 and 668 BCM; the differences with the Ministry's figures ascribed to higher estimates of ET and lower estimates of "utilizable" vs. total supply.

plans are to be developed for each aquifer. Promising models for groundwater management partnerships at the village-level have been developed in Andhra Pradesh. The Andhra Pradesh Farmer Managed Groundwater Systems project, supported by the FAO (Food and Agriculture Organization) and implemented by NGOs, employs participatory hydrogeological monitoring, complemented with crop water budgeting to estimate sustainable groundwater use. Reportedly some one million farmers are reached through these efforts, which are to be tested and extended under the 12th Plan.

- **Reforms in Major and Medium Irrigation**—This would include, *inter alia*, a mix of institutional (enhanced coordination across agencies and departments and strengthening of water users associations and devolution of system administration responsibilities to them); developing monitoring capacity through remote sensing over command areas; the reform of water charge structures to better cover O&M; and changes in the staffing pattern of irrigation departments to include a broader range of specialties (for example, social mobilizers) to develop capacity to work with the end-users.
- **Pricing of Groundwater**—While the urgent need for significant changes in the pricing of both water and electricity for groundwater pumping are recognized, so too is the political difficulty of doing so. The initial strategy will therefore be more modest and seek to introduce modest fees for the power used for pumping groundwater. At the very least, State governments are expected to levy a fee on all power for agricultural use and earmark the funds collected for groundwater recharge programs in the same aquifer. Another approach will be to separate the power grid feeders into the irrigation areas from the three-phased power for domestic uses, schools, hospitals and village industries. Doing so would improve the quality of power supply to the villages while allowing rationing of power for irrigation (obtain eight hours or more of quality power on a pre-announced schedule). This approach has been proven in Gujarat and has been taken up already by a number of other states.
- **Regulatory Changes for Groundwater**—A clear legal framework governing the use of groundwater is lacking and so a new groundwater law is to be proposed that would, among others, restrict the mining of groundwater. The need for an overarching Water Framework Law to give teeth to the new National Water Policy is also cited. State-level regulatory bodies are proposed to resolve conflicts among and between the different water uses and users. The formulation and facilitation of the adoption of a model State-level Water Resources Regulatory Authority Bill is also proposed, along with the establishment of a National Water Commission to monitor compliance with the national water strategy.
- **Environmental Management (for water resources)**—Several issues have been flagged by the Planning Commission as regards to water resources. These include: (i) securing the ecology of watershed and catchments; (ii) carrying capacity studies in selected river-basins; (iii) protection of water quality and quantity through pollution control; (iv) restoration of wetlands and lakes; and (v) management of waste water discharges from industrial and commercial establishments into major water bodies.
- **Climate Change (and water resources)**—The proposed approach comprises two National Missions, one for water (to promote the integrated management of water resources and increase water use efficiency by 20 percent) and one for sustainable agriculture (focusing on enhancing productivity and resilience to reduce vulnerability to extremes of weather, long dry spells, flooding and variable moisture availability). On the broader issue of adapting agricultural practices to current and changing climatic conditions and managing water resources in a more comprehensive and an efficient fashion, the strategy proposes developing agro-climatic zone specific water harvesting and management technologies and the genetic improvement of agricultural crops to develop a flexible portfolio of adapted crop varieties.

The 2012 Common Guidelines for Watershed Development Projects were formulated by the Shah Committee, following extensive consultations with the States and relevant stakeholders.[64] The stated intent of the revisions was to *strengthen the innovative features of the earlier Guidelines but also make certain changes to impart greater flexibility, clarity and momentum to the IWMP*. An implicit purpose was to align the Guidelines with the Planning Commission's strategy for the 12th Five Year Plan. The principal changes from the previous Guidelines included:

- Project duration shall be five years. This reduces the maximum allowed project duration by two years due to concerns that longer periods were diluting resources;

64 The new Common Guidelines for Watershed Development Projects 2012 are to be applicable to all watershed projects sanctioned from April 1, 2013 onwards.

- Earmarking of ten percent of individual project resources to deploy *high-quality professional human resources for both social and technical aspects* in order to improve technical content and quality of the individual projects. This responded to the findings of the Shah Committee that the previous five years' program had been hobbled by the lack of technical and social professionals to integrate water resources/watershed hydrology and local water resources governance concerns into the individual projects;
- A standardizing framework for capacity building, in the form of a new national strategy for capacity building to provide *greater direction and momentum*;
- A stronger emphasis on institution building as required for more effective decentralization of the programs to the States; to support greater devolution of implementation and administrative responsibilities to local authorities and communities and; to enhance sustainability of outcomes. One percent of program resources are earmarked for institution building;
- Increasing the role of civil society in project implementation in response to the various reviews that demonstrate the effectiveness of civil society organizations in implementation; including new procurement procedures for increasing transparency in the selection of these organizations;
- Some modifications to the "sequenced" ridge-to-valley approach to reduce rigidities that were antithetical to a participatory approach and negatively impacted community buy-in. The changes allow that *some work may initially be done in the lower reaches nearer the village settlements so that the people can understand the benefits of the program and feel a sense of ownership over it . . . however, in each case, it must be ensured that the ridges/catchments of each water body are fully treated soon thereafter*;
- An increase in the geographical scale of the individual projects to between 3,000 to 7,000 ha to achieve *economies of scale and proper planning*;
- Establishment of a Central Level Nodal Agency to provide more intensive support to the States as per their request. The Agency is to be staffed with professionals whose role is to facilitate implementation of the new guidelines;
- A framework to facilitate working in Forest Lands, including tribal areas where procedural complexities have been an obstacle;
- Provision of a clear list of monitorable indicators and green metrics that will be tracked on a regular basis.

Of relevance to improving water resources management, the Guidelines also include specific instructions regarding: (i) the use of remote sensing data for finalizing contour maps for assessment of runoff, for locating water harvesting and storage structures, assessing program impacts on the ground, to assess periodic changes in geo-hydrological potential, soil and crop cover, runoff, etc. in the project area, and for baseline surveys;[65] (ii) hydro-geological surveys and aquifer mapping of the watersheds to map out zones of potential groundwater recharge, storage and sustainable groundwater utilization; (iii) development or strengthening of local mechanisms and systems for common property resource management and equitable sharing, especially groundwater; (iv) efforts to establish detailed resource-use agreements for surface water, groundwater and common/forest land usufruct among UG members; and (v) the setting up of institutional mechanisms to ensure sustainability in use of resources, especially common-pool resources (for example, groundwater) through the assets created under the projects. This latter is to include the formal allocation of users' right over CPRs; collection of user charges for CPRs; repair, maintenance and protection of CPRs; establishment of local norms and regulatory systems (for example, for control over bore wells, cropping pattern, use of chemical pesticides, payment of user charges, sharing of groundwater resources, and so on) along with effective enforcement and conflict-resolution mechanisms.

WHITHER WATERSHED DEVELOPMENT?

The introduction of the Planning Commission's strategy for the 12th Five Year Plan and the new 2012 Common Guidelines GOI does indeed seem to signify the intention to operationalize the paradigm shift that was first broached as desirable by the Parthasarathy Committee in 2006. First and foremost, it is clear that the intention is for watershed development projects to actually contemplate water and water resources management. Secondly, the new framework represents substantial progress across the board in meeting the challenges for future programs as previously detailed in this paper (see Challenges in main text). This is a very significant development.

65 Baseline surveys will be required for all watershed projects (that is, for the preparation of a Detailed Project Report). The surveys are to include, among others, information on rainfall, temperature, geographical coordinates, topography, hydrology, hydrogeology, soils, forests, demographic features, ethnographic details of communities, land-use pattern, major crops and their productivity, irrigation, livestock, socio-economic status etc.

In each of the suggested areas for attention the new framework provides the potential for making significant advances in overcoming many of the gaps and weaknesses identified through the learning generated by the three projects. In particular, the new framework:

- Provides for the integration of water resources management—both surface and groundwater—into local level planning as well as in broader scale planning at the watershed level and encourages (and provides financing) for strengthening the institutional capacity and applying the technological and information tools available for doing so;
- The continued decentralization of the programs to the state and the proposed devolution of responsibilities and strengthened involvement of civil society should provide significant advances in ensuring that the projects respond more closely to local demands and felt needs;
- Especially important are the proposed approaches to the management of common pool resources, both from the organizational and institutional perspectives through attention to creation of a framework for working in upper catchments and forest areas, as well as to strengthening local governance of common pool resources for the specific purposes of achieving consensus on the sustainable use of those resources (including surface and groundwater);
- The integration (convergence) of several existing GOI programs (for example, MGNREGA) with the watershed development programs as well as the definition of an institutional framework and roles and responsibilities for coordination and facilitation of integration across programs is a good step in the right direction. The additional attention being given to M&E within the new framework could be an important opportunity for promoting and facilitating alignment and integration between the different institutions and programs. Challenges will remain to be successful in aligning the watershed-level planning processes with these other programs while maintaining a true demand-driven approach;
- Brings greater attention to the problems of post-project sustainability. Expected project duration of five years with (hopefully) clear indicators for the consolidation of local organization and capacity for maintenance following project closure should provide better enabling conditions. The recommendations for establishing user fees, if followed and successfully introduced, would overcome one of the principal obstacles to post-project sustainability by providing local, earmarked funding for that purpose.

Some challenges still remain. The as yet "one-size-fits-all" concerns that have been raised by a number of different sources regarding how the ridge-to-valley approach is implemented—concerns going back at least to the Parthasarathy Committee's 2006 observation that it is of dubious relevance in a very large percentage of India's lands—have not been resolved in the new framework. This could also impinge on the ability of the individual projects to actually respond to local needs and felt externalities if rigidly applied. Nor is there yet obvious attention or priority given to strengthening the M&E frameworks to consider the financial viability and desirability of the interventions being promoted at the individual household and community levels. Additionally economic analysis is not considered as a tool for evaluating efficiency of the programs or analyzing differing policy options. To the extent that the programs move towards water resources decision-making that affect water allocation and supply, such analysis will become extremely important. Nonetheless, the new framework broadly demonstrates that learning from experience is a part of the process and that watershed development in India—policy, norms and implementation—is actively seeking to refine and perfect itself at each iteration.

Appendix 2 WATER RESOURCES IN PROJECT STATES: ISSUES IDENTIFIED IN STATE WATER POLICIES

PROBLEM STATEMENT & OBJECTIVES	WATER AVAILABILITY	WATER RESOURCES ISSUES
KARNATAKA[1]		
Problem Statement • The state is endowed with limited water resources that are stressed & depleting; Different sectoral demands are growing rapidly; Increase in population, urbanization, rapid industrialization & rising incomes are putting this resource under stress; Unless water resources are properly developed & managed, the state will face acute crisis within the next two decades; Serious destabilization of the water sector affecting the hydrology, economy & ecology of the State is likely. **Objectives** • Provide [a defined minimum quantity of] drinking water to rural, town, city municipal council & city corporation areas • Create an irrigation potential of 450,000 ha (major, medium & minor schemes) • Creation of additional irrigation in 160,000 ha by individual farmers using groundwater • Improve performance of all water resources projects • Improve productivity of irrigated agriculture by involving users in irrigation management • Harness state's hydropower potential • Provide a legislative, administrative & infrastructural environment to ensure fair, just & equitable distribution & utilization of the water resources to benefit all people	**Rainfall** • Occurrence & distribution highly variable • State-wide average annual: 1,138 mm • Range: 569 mm (east)—4,029 mm (west) • Average # rain days: 55 • Climate: ~ 65% area < 750 mm/yr rainfall • All areas experience scarcity in some years **Surface Water** • Seven river systems (Krishna, Cauvery, Godavari, West Flowing Rivers, North Pennar, South Pennar & Palar) none fully contained within state • Utilization of West Flowing Rivers hampered by difficulties in constructing large reservoirs. Yield estimated as 3,418 TMC[2] at 50% dependability & 2,934 TMC at 75% dependability • Yield excluding West Flowing Rivers estimated as 1,396 TMC at 50% dependability & 1,198 TMC at 75% dependability • Economically utilizable water for irrigation estimated as 1,695 TMC **Groundwater** • Availability estimated as 485 TMC • Deficiency of water for drinking, agricultural & industrial use in dry taluks of North & South interior Karnataka • 72 critical taluks: over-exploitation in 43 & exploitation > 50% in 29 • About 400,000 wells irrigating 750,000 ha • 300,000 wells have dried; shallow wells failing, deep well with declining yields • Area irrigated by groundwater extraction structures is decreasing	• Responsibilities are fragmented, no formal mechanisms or institutional arrangements at state-level to manage water & ensure co-ordination • Demand for drinking water will increase & cannot be met entirely from groundwater sources; may result in conflict with irrigation • Some 4,500 villages where groundwater is unfit for drinking (fluoride, iron or brackishness) • Water quality problems: agro-chemicals, industrial & domestic pollution • Groundwater depletion, water logging, salinization & siltation reducing effective water availability. **Irrigation** • Inequitable distribution of water • Slow pace of development of irrigation potential, but under-utilization of potential created • Land degradation due to excessive use of water • Productivity of irrigation is below potential • Imbalance between expenditure on new construction vs. O&M, rehabilitation & modernization of existing & reclamation of water-logged & problematic lands • Minor irrigation tanks not maintained • Cost recovery non-existent • Projects & water resources planning/ management/investment multisectoral & on basin or sub-basin scale; conjunctive use surface & groundwater with quantity, quality & environmental considerations • Adopt demand management approaches for allocation & planning • Adopt participatory approaches; make needed legal & institutional changes; Goal to shift responsibility to UGs
HIMACHAL PRADESH[3]		
Problem Statement Availability of water is highly uneven in both space & time. Summer months are periods of water scarcity & [at other times] heavy rains regularly cause havoc due to floods. Complex issues of equity & social justice in regard to water usage & distribution have to be addressed. The development & exploitation of the groundwater resources in the state have raised concerns about the need for scientific management & conservation. Expansion of economic activity inevitably leads to increasing demands for water for diverse purposes [whereas the current] major consumptive use of water [is] for irrigation. Domestic & industrial water demand in rural areas is expected to increase sharply as economic conditions improve & more industry comes up. Water quality is [currently] impacted by untreated or inadequately treated industrial effluents & sewage. Technology & training have to play important roles in the development of water resources & their management.	**Rainfall** • Highly variable in both space & time; Drought & floods of concern • Rainfall confined to three or four months/year • Varies from ~ 600 mm in Lahaul & Spiti District to ~ 3,200 mm in Dharamshala District Kangra • Summer (dry) months are periods of water scarcity in many areas • Heavy rains regularly cause floods; Flash floods problematic in the uplands **Surface Water** • The major consumptive use of water is for irrigation • Gross irrigation potential estimated to be 335,000 ha as of 2005, about 62% developed • Acute water scarcity is major problem due to population increase & mismanagement	• Domestic & industrial rural water demand expected to increase sharply • Water quality impacted by untreated or inadequately treated industrial effluents & sewage • Drinking water quality of concern in several river systems • Expanding irrigation is a priority in 125,000 ha • Institutional reforms required for multisectoral planning, decentralized management & people's participation (especially women) • Priority to developing water information system for resource planning • Water resources development & management to be planned at sub-basin to basin scales; multisectoral approach, both surface & groundwater • River basin/sub-basins planning to prepare comprehensive plans for irrigation & harmonizing other water uses

(continued)

PROBLEM STATEMENT & OBJECTIVES	WATER AVAILABILITY	WATER RESOURCES ISSUES
Objectives • To ensure that available water resources are utilized in an efficient manner to meet drinking water needs & irrigation requirements in a manner that also promotes conservation & engenders community participation. . . . [it] seeks to make water everybody's business & catch rain water where it falls or where it can be used optimally. Besides, the harnessing of water for commercial, industrial & hydro-power generation usage must take place in a sustainable manner with due regard to maintenance of water quality	**Groundwater** • Development & exploitation of the groundwater resources in the state have raised concerns about the need for scientific management & conservation	• Water allocation priorities (broadly): (i) drinking water; (ii) irrigation; (iii) ecology/afforestation/ biodiversity/tourism; (iv) agro-industries; (v) hydropower; (vi) non-agro-based industries; (vii) navigation & other uses • Goal is to conserve precipitation in the catchment area itself • Exploitation of groundwater resources to be regulated to not exceed recharge potential • Conjunctive use of surface & groundwater in planning/ implementation • Economic development activities to be planned with due regard to the constraints imposed by water availability • Water zoning to be done in a time bound manner & the economic activities guided & regulated in accordance with such zoning • Master plans for flood control & management in flood prone basins • Drought-prone areas to be given priority; vulnerability reduction (soil-moisture conservation, water harvesting, reduction of evaporative losses, development of groundwater potential, and so on) • Research on effective & economical water resources management
UTTARAKHAND[4]		
Problem Statement Hydrological studies over the last decade confirm the diminishing water resources & the worsening crisis; a diminishing regulatory effect of glaciers; long term decreasing trend of stream discharges; capacities of the lakes have dwindled; surface runoff on the hillsides has shown high increases; there has been increase in floodwater & decrease in base flow; extensive soil erosion & landslips are recurring phenomena in the region; These have resulted in decrease in underground seepage which has directly contributed to the reduction of water availability in springs & streams which are the primary source of drinking water, irrigation & the running of water mills in the state. There has been a change from a situation of water surplus half a century ago to a condition of acute scarcity at present. This period has witnessed a tremendous increase in population & an expansion in the categories of water users, as a result of developmental processes which have occurred without reference to the natural resource base. **Objectives** • One objective . . . [is] that management of water resources . . . be done in an integrated & holistic manner rather than being managed in a compartmentalized approach • Ensure preservation of the scarce water resources & optimize utilization of available resources • Qualitative improvement in water resource management [to] include user's participation & decentralization of authority. • Maintain water quality to established norms & standards • Promote formulation of projects on concept of basin/sub-basin, treating surface & groundwater as a unitary resource, ensuring multipurpose use of the water resource • Among others provide water for: (i) drinking & domestic use; (ii) irrigation; (iii) hydro power generation within constraints imposed by other users; (iv) for industries; (v) navigation, recreation, health and for other uses • Ensure ecological & environmental balance • Promote equity & social justice among individuals & groups of users in water resource allocation & management • Ensure self-sustainability in water resource development • Ensure flood management & drainage as integral part of water resource development	**Rainfall** • Averages 1,523 mm • Range: 1,200 mm/yr (Mid-Hills)–2,500 mm/yr (High Hills) • Reports 30–40% decline in average rainfall over the past 50 years Rainfall pattern during last many years: • Rainfall in monsoon is generally deficient & erratic over the years • Peak rainfall is shifting from the mid-July to mid-August • The total number of rainy days is shrinking • During rainy season, rainfall was erratic/negligible over the years • Peak rainfall in rainy season is shifting towards harvesting season **Surface Water** • ~ 95% of precipitation that converts to surface water is lost due to steep slopes & mountainous terrain • 15 important rivers & more than 12 important glaciers in the state that are valuable fresh water reserves supporting about 200 large & medium sized hydro-projects; hydroelectricity is primary source of power for local economy • Hydrological studies over the last decade corroborate that water resources in the state are decreasing, which would affect surface water availability, as illustrated by: (i) receding glaciers in the Great Himalayan Zone; (ii) long term decreasing trend of stream discharges; (iii) dwindling capacities of lakes; (iv) increasing surface runoff on the hillsides; (v) an increase in floodwater & decrease in base flow water in channels & rivers **Groundwater** Uttarakhand can be divided into two distinct hydrogeological regimes: • Gangetic alluvial plain is the zone for groundwater development; currently 66% of available groundwater (2.10 billion cubic meters) is being extracted (1.39 billion cubic meters) • Himalayan mountain belt has limited potential for large scale development of groundwater (hard rock aquifers with fissure & fracture porosity); springs are amenable to small scale development • Five groundwater "blocks," of which two are classified as "over-exploited," none as "critical" & three as "semi-critical"	Development Center For Alternative Policies (2005): Policy spells out certain important principles of water resources development & management: • Integrated natural resources management through watershed approach • Empowerment of PRIs to plan/construct/ manage irrigation systems • Involvement of local communities in planning & implementation • Planning processes to include traditional rights & systems • Well-developed information system • Planning on the basis of hydrological units • Creation of watershed institutions • Integrated & multidisciplinary approach to the planning, formulation, clearance & implementation of projects; close integration of water-use & land-use policies • Integrated & coordinated development of surface & groundwater resources & their conjunctive use • Encouragement of private sector involvement • Encouragement of water mills & vesting their management with Panchayats • Necessary legislation for preservation of existing water bodies by preventing encroachment, regulation to ensure no pollution on the banks of rivers & streams & deterioration of water quality • Compulsory percentage of budget allocation fixed for water harvesting & water conservation structures **Flood & Disaster Management** Upadhyay, V. (2006): • Management of water resource in an integrated & holistic manner • Water resource development & management for a hydrological unit as per the principle of integrated watershed management • Priority shall be given to identification & rejuvenation of traditional water resources like naula, dhara, guls, ponds, and so on Narula & Bhadwal (2003); cited in Kelkar et al (2008): Referring specifically to the Lakhwar sub-basin, part of the Upper Yamuna sub-basin, where study projected:

(continued)

PROBLEM STATEMENT & OBJECTIVES	WATER AVAILABILITY	WATER RESOURCES ISSUES
• Provide a substantive legal framework for management • Provide an MIS for effective monitoring of policy implementation • Promote research and training facilities in the water resource sector • Provide mechanism for the resolution of conflicts between various users		• Decrease of 20–30% in total flows due to climate change by 2041–60 relative to 1961–90 • Monsoon rainfall likely to become less intense & more sporadic • Potential impacts: (i) groundwater availability reduced by ~30%; (ii) surface water availability reduced commensurately, impacting drinking water for humans & livestock; (iii) declining crop yields due to effects on intensity of irrigation & shifts in start of the monsoon season

[1] *Source:* Water Resources Department, 2002.
[2] TMC: Thousand Million Cubic Feet.
[3] *Source:* Anon 2005.
[4] It was not possible to obtain a copy of the state's draft water policy (completed on June 15, 2004), therefore this section is based on the second-hand information provided from the Uttar Pradesh State Water Policy (Anon 1999) and the following sources: For "Problem Statement in Policy," Development Center For Alternative Policies, 2005; "Objectives," Upadhyay, V. 2006; Anon. 1999 (UP's Water Policy under assumption that substantially similar); "Water Availability," Central Ground Water Board. Undated, & Uttarakhand Watershed Management Directorate 2010.

Appendix 3a COMPARISON OF WATERSHED DEVELOPMENT PROJECT DESIGNS

SUBJECT	KARNATAKA	HIMACHAL PRADESH	UTTARAKHAND
Project development objective[1]	Improve the productive potential of selected watersheds & their associated natural resource base, & strengthen community & institutional arrangements for natural resource management	Reverse the process of degradation of the natural resource base & improve the productive potential of natural resources & incomes of the rural households in the project area	Improve the productive potential of natural resources & increase incomes of rural inhabitants in selected watersheds through socially inclusive, institutionally & environmentally sustainable approaches
WSM objectives[1]	Strengthen capacity of communities within project cycle & of implementing department for participatory management within a watershed planning framework	Support policy & institutional development to harmonize watershed development projects & policies across the state in accordance with best practices	GPs & other relevant local institutions have developed sufficient capacity to design, prioritize, implement, operate & maintain watershed treatments
Related hydrologic/water resources objectives[1]	• Groundwater recharge • Water management for crop production (in situ soil moisture conservation & irrigation)	Adopt integrated watershed management framework using water as the nucleus for community-based rural development	Integrate land-water use with the objectives of moisture retention and biomass production
Related WSM institutional objectives[1]	• Strengthen capacity of communities for participatory planning, implementation, management & maintenance • Have implementing department operate in a more socially inclusive manner within framework of watershed development plans	• PRIs & other local village level institutions have capacity to plan, implement, monitor & maintain the watershed treatments • Awareness & capacity building of all stakeholders including Line Department in participatory natural resource management	• Communities mobilize & prioritize watershed & village development technologies • GPs directly implement watershed treatments & village development investments • Strengthen UGs/subcommittees at revenue village levels
Scale of WSM objectives[1]	Micro-watershed (500 ha) to sub-watershed (5,600 ha)	Ward-level to micro-watershed (size undefined).	Micro-watersheds (size undefined)
WSM-related indicators[1]	• Groundwater recharged; increased cropping intensity; % irrigated area increase; # wells recharged • Soil erosion reduced • Micro-watershed management groups • Micro-watershed development plans • SWC measures • Watershed research & extension plans • Karnataka Remote Sensing Applications Center assisting with GIS & preparation of treatment plans for project watersheds	• Influence on state policies & guidelines for watershed development • 2,500 UGs established & taking care of resources in a sustainable manner • Two thirds of GPs with tribals or nomads have representation in WCs	• 15% increase in availability of water for domestic &/or agriculture use • 20% improvement in administrative capacity of GPs • Water quantity & quality indicators to be incorporated • Percent of activities in local plans addressing water resource management
Specific instruments to achieve WSM objectives[1]	• Land management • Soil & moisture conservation • Productive revegetation with perennials • Establish watershed societies	**Soil & water conservation:** • vegetative measures, using local grasses, shrubs & trees • vegetative field boundaries • protection & reclamation of land: agro-forestry & silvi-pasture in degraded lands **Improve moisture regime:** • vegetative measures—grass seeding, grass turfs, brushwood, checkdams, live hedge & spurs (local vegetation) • mechanical measures—drop structures, crate wire spur structures, drainage line treatments (gully plugging, dry stone check dams, etc.), terrace repair with vegetative reinforcement, improvement of forest area • water harvesting structures (drinking water & supplemental irrigation) • develop new/improve existing water resources • construction of village ponds, tanks, checkdams	**Soil conservation on arable lands:** • bunds • vegetative barriers • agro-forestry **Development of non-arable lands:** • forest regeneration • pasture development • silvi-pasture development • soil erosion bunds • vegetative barriers • with potential to be WSM instruments[2] • potable water supply • upgrading of roads, bridle paths, mule tracks • building irrigation channels

(continued)

SUBJECT	KARNATAKA	HIMACHAL PRADESH	UTTARAKHAND
Specific instruments to achieve WSM objectives (continued)		• roof water harvesting • lift irrigation **Water use efficiency:** • improving conveyance systems, channels & kuhls, sprinkler & drip irrigation • promoting optimal use of available water • Establishing CGIs	
Watershed selection criteria[3]	• Extent of waste lands (20 points) • Silt index and erosion hazard (20 points) • Rainfall (20 points) • SC/ST population (20 points) • Extent of irrigated/dry area (10 points) • Proportion of agricultural laborers (10 points)	• Altitude (between 600 m & 1,800 m) • Ecological Degradation • Poverty (> 30% below poverty line, SC/ST percentage, marginal workers percentage, population density, women literacy) • Backwardness (scarcity villages, distance from motorable road, public utilities, etc.)[4]	• Altitude (between 700 m & 2,000 m) • Ecological degradation/erodibility index (50% weight) • Poverty (25%) • Backwardness (25%)
Principal changes at mid-term review relevant to WSM	• No changes to objectives, indicators or targets • For purposes of achieving greater equity, funds were reallocated to target SHGs & landless	No changes to objectives **Changes in indicators:** • 50% increase in 25 demonstrative streams/springs • 10% reduction in silt load in run-off water **Key areas for attention:** • Extend coverage to all Panchayats in micro-watersheds, but not currently in project GPs, to allow 100% coverage of micro-watersheds • Need to invest more in consolidating drainage line treatment to protect spring & stream flows • Pilot bio-carbon project for small & marginal farmers to establish plantings of local species in support of WSM & livelihood enhancement; making villagers eligible to sell carbon credits under the Clean Development Mechanism	No changes to objectives • Additional villages added for full coverage of project watersheds • Include degraded village forest lands (not in original design) for forestry/soil conservation & increase budget caps to allow comprehensive micro-watershed treatment & ensure watershed conservation goals met **Changes in indicators:** • *15% increase availability of water* . . . indicator changed to 10% increase in percentage of households accessing water for domestic use & 15% increase in irrigated area • Additional Global Environmental Facility funds for Sustainable Land & Ecosystem Management/ bio-carbon investments in 20 micro-watersheds with high erosion & poverty/marginality: (i) to mainstream WSM into local government plans; (ii) to enhance water availability for agriculture & domestic use; (iii) to improve knowledge of impact of climate change to develop coping strategies.
Relevant learning/ lessons for WSM	**From Implementation Completion Report:** • More emphasis needed on groundwater management • Combining WSM with income generating activities & SHG strengthening relevant, but may impact WSM outcomes (pro-poor vs. WSM outcomes) • Positive impact on productive potential & natural resource base, including groundwater (three monitoring wells showed significantly increased water levels) • Sustainability likely much higher where private ownership & incentives to maintain agriculture productivity • Demonstrated capacity of community organizations to be involved in planning, managing funds & implementing project activities • Watershed Development Department developed as effective formal institution, facilitating participatory watershed planning, implementation & M&E • High percentage overall project achievements through investments in soil & water conservation on private, arable lands • Investments in common lands less successful except where managed by SHGs (especially, female SHGs) • Robust M&E system critical success factor in project performance & adaptability • Combine resource mapping with help to take up suitable income generating activities • Policy issue: investing to recharge groundwater while subsidies for pumping exacerbate scarcity	**From Mid-Term Review:** • Increased water availability allows significant expansion & intensification of irrigated lands with subsequent improvements in agricultural yields & household income • Increasing water availability & piloting a bio-carbon component may provide models for climate change adaptation/mitigation • Demonstrated capacity of local governments/ communities to plan, manage funds & implement project activities	**From Mid-Term Review:** • Increase in area with seasonal & off-season vegetable cultivation attributable to joint marketing, improved technologies & water harvesting structures • Demonstrated capacity of local governments/ communities to plan, manage funds & implement project activities

(continued)

SUBJECT	KARNATAKA	HIMACHAL PRADESH	UTTARAKHAND
Relevant learning/ lessons for WSM (continued)	• Combination of watershed & livelihoods interventions adds greater value than separate WSM & rural livelihoods projects • Need to focus on water through basin/sub-basin hydrology & land-use modeling & analyses to set context for local WSM with groundwater management integral component		

[1] *Source:* Project Appraisal Documents.

[2] These may or may not be instruments for WSM. It depends on how they are applied (for example, water supply for human consumption and irrigation tied to water source protection and allocation; upgrading of roads targeting reduction of roads as major sediment sources).

[3] *Source:* Lobo and Smyle (2010).

[4] Additional criteria used were also applied: potential for treatment, watershed work (including arable land and population); compactness of the area; social capital (status of village level institutions, level of conflicts and cooperation, and so on); farming systems (irrigated area, livestock status, availability of fuel wood and fodder).

Appendix 3b WORLD BANK SUPPORT TO WATERSHED DEVELOPMENT PROJECTS (1980 TO PRESENT)

TABLE A3b.1: World Bank-financed Watershed Development Projects (1980 to Present)

PROJECT TITLE	PROJECT ID	TOTAL PROJECT COST (USD MILLION)	STATUS	YEAR APPROVED
Uttarakhand Decentralized Watershed Development Project Phase II	P131235	100.00	Pipeline	TBD[1]
Neeranchal National Watershed Project	P132739	357.00	Pipeline	TBD
Himachal Pradesh Watershed Management Project	P104901	8.00	Active	2012
AF-HP Mid-Himalayan Watershed Development Project	P130944	37.00	Active	2012
Karnataka Watershed Development II	P122486	60.00	Active	2012
Uttarakhand Decentralized Watershed Project Additional Financing	P124354	7.98	Closed	2011
Sustainable Land, Water and Biodiversity Conservation and Management for Improved Livelihoods in Uttarakhand Watershed Sector	P112061	7.49	Closed	2009
Himachal Pradesh Mid-Himalayan Watershed Development Project	P093720	60.00	Active	2005
Uttaranchal Decentralized Watershed Development Project	P078550	69.62	Closed	2004
Karnataka Watershed Development Project	P067216	100.40	Closed	2001
Integrated Watershed Development Project	P041264	135.00	Closed	1999
Integrated Watershed Development Project - Plains	P009860	62.00	Closed	1990
Integrated Watershed Development (Hills) Project	P009882	88.00	Closed	1990
Rainfed Area Watershed Development Project	P009812	31.00	Closed	1983
Himalayan Watershed Management Project	P009797	46.20	Closed	1983
Kandi Watershed and Area Development Project	P009772	30.00	Closed	1980
	Total World Bank Financing	**USD 1,087,690,000**		

[1] The project was negotiated in January 2014, and is likely to be approved by the Bank's Board of Executive Directors in 2014.

TABLE A3b.2: Objectives of World Bank-financed Watershed Development Projects (1980 to Present)

PROJECT NAME	PROJECT OBJECTIVES AND FOCUS
Kandi Watershed And Area Development Project (1980)	Central objective to apply an integrated development strategy to rehabilitate the Sub-Himalayan Shiwalik area. Focus on institution building to strength local capabilities to plan and implement similar projects in the future. Project to improve vegetative cover in upper catchments to regulate run-off, reduce soil erosion; protect agricultural land downstream from floods; and enhance productivity of forest/agricultural land.
Himalayan Watershed Management Project (1983)	Central objective to increase and stabilize crop and forage yields and production of fuelwood and timber in rainfed farming areas. Focus on improved crop and rangeland husbandry practices, SWC measures, research, training and technical assistance. Institution building to strengthen GOI and states' capacities to plan and implement such schemes and invoke people's participation.
Rainfed Area Watershed Development Project (1983)	Central objective to minimize the degradation of Himalayan ecosystems caused by depletion of forest cover, overgrazing and bad land use and decrease erosion and flooding in Gangetic Plains. Focus on establishment of fuel wood, timber and fodder plantations on government, community and private land; soil conservation measures; livestock development; improvement of agricultural extension services; horticultural development; minor irrigation; and research and training. Institution building to strengthen GOI's and government of Uttar Pradesh's capacity to plan and implement such schemes and invoke people's participation.
Integrated Watershed Development (Hills) Project (1990)	Central objective to address environmental problem of watershed degradation by slowing and reversing degradation of the natural environment and reducing flooding caused by degradation. Focus on soil and moisture conservation technology (vegetative technologies), management of non-arable lands, and improved production and income from grain crops, horticulture, fodder, fiber, fuel wood and livestock.
Integrated Watershed Development Project—Plains (1990)	Central objective to stabilize watersheds. Focus on a menu of land treatments, emphasizing soil and moisture conservation (vegetative contour barriers, improved production systems, stabilization of natural drainage lines, nurseries) and sustainable land management systems, including seeking long-term, community based, management solutions for public, non-arable lands. Institutional strengthening of state implementing agencies, including NGOs, and for participatory watershed planning and monitoring capability, research and training.
Integrated Watershed Development Project (1999)	Central objective to improve productive potential using evolving watershed treatment technologies and community participatory approaches. Focus on decreasing soil erosion, increasing water availability, and alleviating poverty through watershed protection and development (watershed treatments, fodder and livestock and rural infrastructure). Institutional strengthening through policy reforms, studies, and human resource development; beneficiary capacity building; income generating activities for women; information management and M&E; and support to project coordination.
Karnataka Watershed Development Project (2001)	Central objective to improve productive potential and strengthen community/institutional arrangements for natural resource management. Focus on participatory watershed planning, development, and protection; participatory farmer-driven research and extension processes; improved practices for agriculture, horticulture, silvi-pasture; extension; livestock improvement and health services; and alternative income generation activities. Institutional strengthening for M&E, environmental, and social assessments, development of a GIS database; and project management and coordination.
Uttarakhand (initially Uttaranchal) Decentralized Watershed Development Project (2004)	Central objective to improve the productive potential of natural resources and increase incomes of rural inhabitants through socially inclusive, institutionally and environmentally sustainable approaches. Focus on participatory watershed development and management (social mobilization, community-driven decision-making and planning for treatment of arable and non-arable lands, soil conservation, upgrading of link roads/paths/tracks), enhancing livelihood opportunities (improved technologies/practices for agriculture, horticulture, silvi-pastoral treatments and animal husbandry, non-government input supply and support services, farmer choice of technologies, agribusiness pilots, small income generating micro-enterprises, training to vulnerable groups) and institutional strengthening for GPs/local agencies and institutions for planning, budgeting, financial management, implementation and reporting, and establishment of incentive schemes to encourage good performance; information, education and communication to increase general awareness/transparency; to state agency for project management.
Himachal Pradesh Mid-Himalayan Watershed Development Project (2005)	Central objective to improve productive potential and increase incomes of rural inhabitants through socially inclusive, institutionally and environmentally sustainable approaches. Focus on watershed development and management (social mobilization, community-driven decision-making) and planning for treatment of arable and non-arable lands, soil conservation activities, upgrading link roads/paths/tracks; enhancing mountain livelihood opportunities (improved technologies and practices for agriculture, horticulture, silvi-pastoral treatments and animal husbandry), increase role of private sector in input supply and support services, farmer choice of technologies, agribusiness, common interest group-based storage, processing and other marketing infrastructure facilities, micro-enterprises and training for vulnerable groups. Institutional strengthening for GPs and other local agencies, communities and institutions in planning, budgeting, financial management, implementation and reporting, and activities to encourage good performance; comprehensive information, education and communication strategy to increase general awareness, communicate terms of participation and promote transparency.

Appendix 4 NOVEL SATELLITE AND GROUND-BASED MEASUREMENT TECHNIQUES FOR WATERSHED PLANNING

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Watershed planning is a challenging problem, particularly in developing countries with limited available data and severe water shortages which may increase with projected climate change. The primary objective of this presentation was to provide an overview of readily available data from satellite and modeling that can be accessed during early phases of watershed planning for reconnaissance analysis and to guide project planning.

GRACE (Gravity Recovery and Climate Experiment) data are available to monitor changes in total water storage at a global scale since March 2002. GRACE consists of two satellites that are ~400 kilometer above the land surface and are separated by ~200 kilometer. By monitoring the distance between the two satellites to within a few meters, global maps of the Earth's gravity field are produced at spatial scales ~200,000 kilometer squared and larger at 10 days to monthly timescales. Gravity variations are interpreted in terms of changes in total water storage. No absolute water storage may be calculated. Several processing centers gather GRACE raw data (including Center for Space Research at the University of Texas at Austin, GFZ, NASA-GSFC, CNES GRGS,[66] and so on) and correct them for atmospheric mass changes, among others, to better extract total water storage from GRACE measurements.

On the continents, total water storage includes vertically integrated storage, including surface water, soil moisture, and groundwater. Changes in total water storage from GRACE may be related to glacier melting (for example, Patagonian Ice Field, Greenland, Antarctica), drought (Australia, La Plata Basin, S. America), irrigation abstractions (NW India), and so on.

66 GFZ: German Research Center for Geosciences; NASA-GSFC: National Aeronautical and Space Agency—Goddard Space Flight Center (USA); CNES GRGS: Center National d'Etudes Spatiales Groupe de Recherche de Géodésie Spatiale (France).

To disaggregate total water storage into individual components requires comparison of GRACE total water storage with modeling results such as the Global Land Data Assimilation System (GLDAS) program which simulates changes in soil moisture and is described below. Correspondence between GRACE and GLDAS time series would suggest that changes in total water storage from GRACE reflect changes in soil moisture storage. In cases where GRACE and GLDAS differ, the differences may reflect changes in groundwater storage that can be calculated by subtracting GLDAS data from GRACE.

Examples are provided of the use of GRACE that show increases in water storage in West Africa (18 millimeters per year) in the region of the Continental Terminal Aquifer that corresponds to ground-based estimates of 23 millimeters per year in the southern part of the region (at the scale of 20,000 km^2). Large decreases in water storage in NW India were attributed to intense pumpage of groundwater for irrigation. We have developed a Google Earth product that provides GRACE data for 215 river basins globally that is corrected for the main processing issues and also provides a comparison of GRACE total water storage changes with output from GLDAS. These data can be used to estimate temporal variations in GRACE total water storage and, by comparison with GLDAS models, can be used to disaggregate total water storage into soil moisture and groundwater storage changes. Although the spatial resolution of GRACE data is coarse, it can provide valuable insights into water storage changes that can be used to close the water budget and comparison with watersheds can be used to assess whether trends in watersheds are regional in extent.

GLDAS is a product from NASA that provides information on state variables (for example, soil moisture) and fluxes (ET, drainage below root zone and runoff) for water resources management based on output from four different land surface models (NOAH, CLM, MOSAIC

and VIC). Land data assimilation is a processing scheme that integrates observations to force/drive land surface models and produce optimal maps of states and fluxes. The grid size of GLDAS range from 0.25 degree (~25 kilometer) for NOAH to 1 degree for all four models (~100 kilometer). Higher resolution (0.125 ~15 kilometer) Land Data Assimilation System (LDAS) is operational in the United States and is currently being developed for the Middle East and North Africa by NASA in a project funded by the U.S. Agency for International Development.

The Arab LDAS includes irrigation and agricultural land mapping and assimilates GRACE and other satellite data. These LDAS products provide near real time monitoring of water resources across political boundaries and can provide historical and regional perspectives on local hydrologic variability. The output can be used to assess the severity and extent of droughts and floods and provides a tool for agricultural planning, including irrigation, and a potential to assess hydrologic impacts of climate change. The LDAS will provide a regional perspective for locally observed phenomena, such as declining water tables and reduced river flows. Using forecast data from multiple climate change scenarios, the LDAS will be able to help in planning of agricultural policies and evaluate potential increases/decreases in irrigation water requirements under various climate change scenarios.

Water resources is a demand driven system with irrigation consuming 90 percent of global fresh water resources during the past century. Therefore it is essential to monitor water demands to manage water resources. However, monitoring each diversion from surface water or pumpage from each irrigation well is essentially infeasible. Therefore, an integrated approach to monitoring water demand using satellite-based ET should provide valuable information to water resources managers. Evapotranspiration of cropped systems is essentially synonymous with water consumption. The BEAREX project conducted in Texas was designed to test the use of different satellite data at varying spatial and temporal resolutions (MODIS, 1 kilometer, 1 day and Landsat 30 meter, 16 day) by comparing results with detailed information from airborne surveys (~2 meter resolution) and ground-based monitoring using weighing lysimeters and large aperture scintillometers. A variety of different models are being evaluated for estimating ET from the satellite data, including METRIC, TSM, and SEBS. The objective of this study is to optimize spatial and temporal resolution of ET mapping using satellite data and assess the use of ground referencing approaches. Because the models have been developed for specific regions it is important to test the reliability of model output in other regions using ground based data. The Jackson School of Geosciences at UT has provided large aperture scintillometers to different regions (Niger, W. Africa and North China Plain) to develop a ground based monitoring dataset for comparison with satellite based ET estimates. The satellite approach can be used to estimate crop water consumption coefficients to be used with reference ET models. Satellite based ET modeling allows one to quantify and locate where water is used and in what quantity. The approach can also be used to identify areas where water is being over-applied for water rights management regulation. The efficiency of different irrigation technologies can also be examined using this methodology.

Appendix 5 INSTITUTIONAL ARRANGEMENTS IN THE WORLD BANK WATERSHED PROJECTS

KARNATAKA

Sujala is a multi-actor, multilevel, multisector and multidisciplinary watershed based developmental program that works through public-private-civil society partnerships (figure A5.1). The center of action is the micro-watershed[67] where the agency responsible for overall implementation of the project is the Sujala Watershed Sangha (SWS), a local body registered under the Societies Act. The SWS has a General Body—comprising two members (one man and one woman) from each household in the village—and an Executive Committee (EC). Project beneficiaries are organized into two types of CBO:

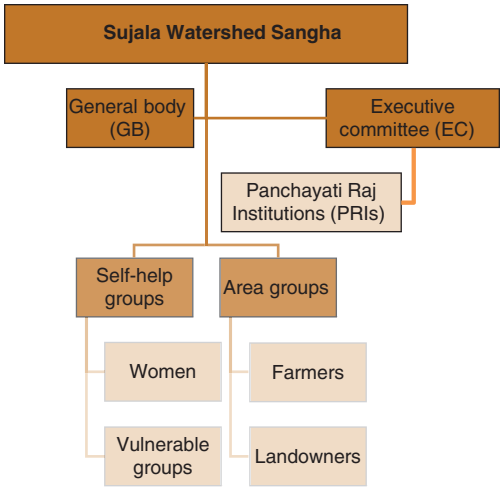
- women and other vulnerable groups are organized into Self Help Groups (SHGs); and
- landowners and farmers are organized into Area Groups (AGs) within their micro-watershed.

Both SHGs and AGs are represented in the SWS (including the EC). Their role in the project is to plan project interventions and implement them, secure contributions from members, manage and account for funds received, manage the maintenance of works and work out management and usufruct sharing arrangements for common property resources (CPRs). The Panchayat Raj Institutions (PRIs) are also involved in the program at the micro-watershed level through representation on the SWS-EC).

At the block (*taluka*) and district levels, PRIs are involved through membership in *Panchayat Samitees* (elected committees), District Councils (*Zilla Panchayats*), and District Level Review Committees.

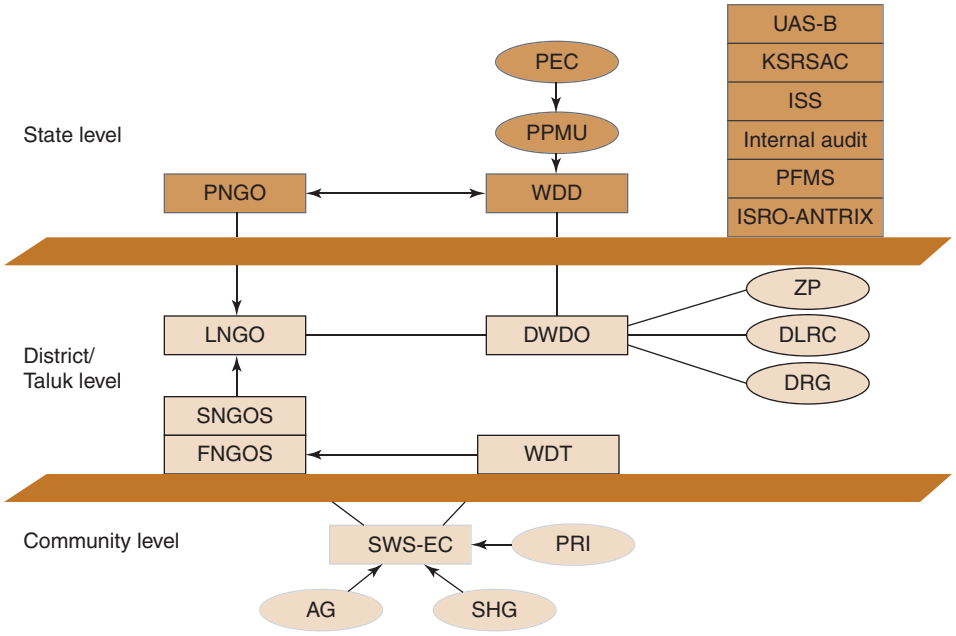
Sujala works through a network of NGOs—a model emphasized by national program guidelines when the project was being developed—to implement the program (figure A5.2). At the grassroots level, Field NGOs (FNGOs) mobilize and coordinate the grassroots institutions at the sub-watershed level through awareness raising; capacity building for planning, implementation, management, and maintenance; and providing technical assistance to CBOs during implementation of the Sujala Watershed Action Plan. Lead NGOs support FNGOs by creating effective and functional linkages between project partners at the district level, building FNGO capacity to train CBOs, direct technical assistance, and monitoring social mobilization activities. Specialized NGOs (SNGOs) at the sub-watershed level support SHGs with entrepreneurship awareness programs, skills development training, and by helping SHG members start income generating activities while establishing the forward and backward linkages required for sustainability. Sujala appointed a Partner NGO (PNGO) for a period of five years to work at the state level to provide advice and support to the Watershed Development Department (WDD) in all matters related to the program; to train lead NGOs in discharging their roles; to develop strategy papers on subjects relevant to the project; to produce,

FIGURE A5.1: Grassroots Institutions in Sujala



67 Generally each micro-watershed is about 500 ha; 10 such micro-watersheds comprise a sub-watershed.

FIGURE A5.2: Overall Institutional Arrangements for Sujala



AG	Area Group	PNGO	Partner NGO
DLRC	District Level Review Committee	PPMU	Project Planning & Monitoring Unit
DRG	District Resource Group	PRI	Panchayat Raj Institution
DWDO	District Watershed Development Office	SHG	Self Help Group
FNGO	Field NGO	UAS-B	Univ. of Agriculture Sciences–Bangalore
KSRSAC	Karnataka State Remote Sensing Application Center	WDD	Watershed Development Department
LNGO	Lead NGO	WDT	Watershed Development Team
PEC	Project Empowered Committee	ZP	Zilla Panchayat

share, and provide support in training material development; and to provide systems support to the project.

The WDD manages and coordinates the entire program at the state level, reporting to and supervised by a Project Empowered Committee chaired by the Principal Secretary for Agriculture and Horticulture, with Secretaries of other departments (such as Forest, Finance, Animal Husbandry, Minor Irrigation, Rural Development and Panchayat Raj) as its members. The Watershed Department Director serves as Member Secretary. The WDD functions through District Watershed Development Offices at the district level, which is supported by a District Resource Group (DRG) and a District Level Review Committee. Watershed Development Teams (WDTs) exist at the sub-watershed/taluka level. The DRGs and WDTs are multidisciplinary teams of government functionaries seconded from various line departments. This arrangement has proved quite successful.

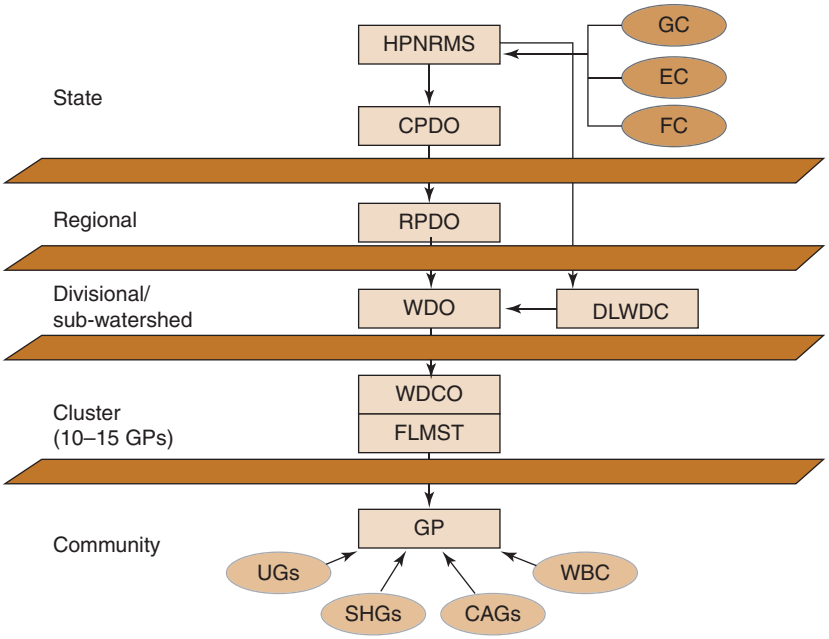
An independent external agency, Antrix, managed the MEL for the entire program. Antrix established district level teams to work in close partnership with the WDD. Experts from the public and private sectors provided technical, managerial, financial and capacity building support on an ongoing basis through detailed service provision contracts.

HIMACHAL PRADESH

The HP project focuses its activities on the Gram Panchayat (GP) and the wards they comprise (figure A5.3). At the ward level, UGs, SHGs, CAGs and their federations propose and implement project activities. The Works and Budget Committees of the GPs propose GP-level plans, which the Gram Sabha considers and approves the aggregated ward-level plans as well as GP-level plans, forwards the same to the project authorities and also monitors the implementation of the plans. Supporting this effort are women Motivators[68] belonging to the GP, who are appointed and paid by the GP and who liaison with project functionaries. These Motivators provide a vital link between the villagers and the project.

68 The minimum qualification to become a Motivator is matriculation.

FIGURE A5.3: Institutional Arrangements for the HP Program



CAGs	Common Activity Groups
CPDO	Chief Project Director's Office
DLWDC	District Level Watershed Development Committee
EC	Executive Committee
FC	Finance Committee
GC	Governing Council
GP	Gram Panchayat
HPNRMS	H. P. Natural Resource Management Society
FLMST	Front Line Multi-sectoral Team
RPDO	Regional Project Director's Office
SHGs	Self Help Group
UGs	User's Groups
WBC	Works and Budget Committees of GP
WDCO	Watershed Development Coordinator's Office
WDO	Watershed Development Office

At the Cluster level (10-15 GPs), a Watershed Development Coordination Office headed by a Watershed Development Coordinator (WDC) supports the GPs in implementing the project as well as is responsible for inter-GP spaces.[69] The WDC is assisted by a multidisciplinary team[70] (Forestry, Agriculture, Horticulture and Animal Husbandry) called the Front Line Multi-sectoral Team which provides technical support to the GPs to implement project activities. A key member of this team is the Facilitator,[71] essentially a graduate woman with good communication skills, whose task is to mobilize the community. Generally each Facilitator is responsible for six to seven GPs and each WDC team would have at least two Facilitators. Supporting the Facilitators at the GP level are the local Motivators.

At the divisional or sub-watershed level, there is a Watershed Development Office headed by a Watershed Development Officer. The Watershed Development Office is responsible for all activities in the division. It sanctions the Gram Sabha approved plans, enters into Overall Financing Agreements with GPs, releases the funds, facilitates technical support and participatory monitoring of the progress and supervises the work of the WDCs. A District Level Watershed Development Committee[72] headed by the Deputy Commissioner, guides and reviews the project as well as monitors the convergence of various watershed and livelihood schemes. The Committee includes representatives from line departments, lead banks and non-official members.

Two regional offices (one at Dharamsala and the other at Bilaspur) headed by Regional Project Directors (RPDs) are responsible for planning, supporting and coordinating the implementation of projects in their respective regions. The project is led by the Chief Project

69 The project has 46 such WDCs and WDC Offices.

70 These are government officers on secondment or hired from the market.

71 Formally known as Watershed Development Plan Facilitators.

72 This Committee is part of the HP Natural Resource Management Society. The Divisional Watershed Development Officer is the Member Secretary of the Committee.

Director assisted by a team of Deputy Directors.[73] This team provides technical support to RPDs, District Watershed Development Offices and WDCs.

Overseeing the entire project at the state level is the HP Natural Resource Management Society. The Chief Minister is the Chairperson and the Forest Minister is the Vice-Chairperson. The Society functions through the Governing Council[74] and the Executive and Finance Committees, respectively. The Forest Department is the nodal department through which the Society operates.

UTTARAKHAND

As in HP, the center of action is the GP, and more specifically, the Revenue Village (not the ward as in HP). The villagers elect a Revenue Village Committee (RVC)—comprising at least 50 percent women—to represent them. Within the Revenue Village, UGs, SHGs, farmer interest groups and their federations where they exist, and van Panchayats (forest councils) propose and implement project activities. These plans are forwarded by the RVC to the Water and WC of the GP which consolidates the plans with proposals from the GP and those pertaining to inter-GP areas where applicable. The Gram Sabha considers, approves, and monitors the implementation of plans. The GP then ratifies and forwards the same to the project authorities. Supporting this effort at the village level are female Motivators[75] who liaise with project functionaries and are appointed by and accountable to the RVC. These Motivators provide a vital link between the villagers and the project. Supporting the GP are Account Assistants who are appointed by the GP and are accountable to them.

Supporting the GPs and the various CBOs are two Facilitating NGOs (FNGOs) and two Partner NGOs (PNGOs). The FNGOs are responsible for project implementation in eight divisions (four each in each region) and the PNGOs are responsible for two divisions (one each in each region) in the two project regions of Garhwal and Kumaon. The two PNGOs not only undertake operational responsibilities, but have also been given project related administrative responsibilities and authority. This approach of devolving complete project and field responsibilities to selected NGOs is a marked departure from similar Government-funded projects and reflects a flexibility, openness and willingness to experiment[76] on the part of project authorities in the quest for new and effective ways of achieving project objectives. It also differs from the Sujala project which deployed a large number of NGOs but maintained project-related responsibilities and authority within the government structure. This institutional arrangement of Gramya is promising and should be carefully assessed in terms of learning gained and comparative advantages secured, if any, with a view to informing similar government funded projects. In this regard, the Gramya approach is a unique innovation, at least within the Indian watershed context.

At the Divisional level, a Divisional Project Office headed by a Divisional Project Director (DPD) supports the GPs and the FNGOs in implementing the project as well as is responsible for inter-GP spaces.[77] The DPD is assisted by a number of Multi-Disciplinary Teams[78] which provides technical support to the GPs as well as to the FNGOs to implement project activities.[79] The DPD sanctions the Gram Sabha approved plans, enters into Overall Financing Agreements with GPs, releases the funds to both the GPs and the FNGOs, facilitates technical support and participatory monitoring of the projects and supervises the work of the FNGOs as well as the GPs.

The PNGOs have their own technical teams. The FNGOs and the PNGOs respectively have appointed facilitators, essentially, graduate women with good communication skills, whose task is to mobilize the community. The facilitators together with the village level motivators are the project's direct communication channel to the beneficiaries.

73 HRD & Administration, Livelihood & Institutional Development, Planning Monitoring & Information Management, Rural Infrastructure and Public Relations.

74 Other members of the Governing Council are the Chief Secretary, Principle Secretaries, and Heads of line departments (Forests, Agriculture, Horticulture, Animal Husbandry and RD & Panchayat Raj), Pr. Adviser (Planning), Vice Chancellors of HP KVV Palampur and UHF Nauni, Project Directors of NRM projects (Forest Department), Chief Project Director and RPD Dharamsala and Bilaspur. Pr. Secretary (Forests) is the Member secretary of the Council.

75 The minimum qualification to become a Motivator is matriculation.

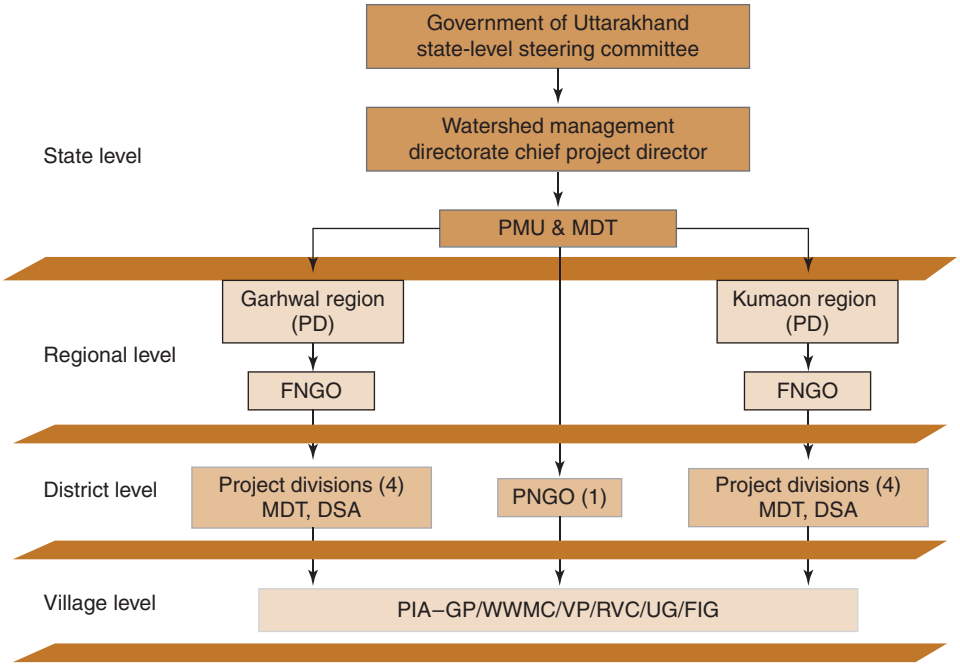
76 And take the corresponding calculated, but necessary risks.

77 The project has eight such DPOs; the other two divisions are looked after by the PNGOs.

78 These are government officers on secondment.

79 They consist of personnel having competence in Forestry, Agriculture, Horticulture and Animal Husbandry.

FIGURE A5.4: Institutional Arrangements for Gramya



DSA	District Support Agency
FIG	Farmers Interest Group
FNGO	Facilitating Non-government Organization
GP	Gram Panchayat
MDT	Multi-disciplinary team
PD	Project Director
PMU	Project Management Unit
PNGO	Partner Non-government Organization
RVC	Revenue Village Committee
UG	User Group
VP	Van Panchayat
WWMC	Water and Watershed Management Committee

In addition, six development support agencies have been hired under the project to provide support for value addition and marketing of agricultural produce as well as to develop forward and backward linkages (agri-business). These development support agencies provide support services only to the farmer interest groups of the FNGO facilitated GPs; the PNGOs are resourced to provide likewise for the villages they facilitate.

Two Regional offices headed by two RPDs are responsible for planning, supporting and coordinating the implementation of projects in their respective regions. The DPD and the PNGOs report to the RPDs. At the district level, a Zilla (District) WC chaired by the Chairman of the Zilla Panchayat and with representatives from line departments and the block level administration facilitates coordination between the project, GPs and government departments.

The project is managed by the Watershed Management Directorate led by the Chief Project Director assisted by an Additional Director and a team of officials. This team provides technical, administrative and capacity building support to RPDs, DPDs, PNGOs and Facilitating NGOs.[80]

A state Steering Committee under the Chairmanship of the Additional Chief Secretary/Forest and Rural Development Commissioner and including other Secretary level officials provide overall guidance, policy support and to facilitate inter-departmental coordination. The Chief Project Director is the Member Secretary of the Committee. Figure A5.4 outlines the institutional set up for Gramya.

80 The competencies represented are: administration, forestry, agriculture, horticulture, animal husbandry, planning, GIS/MIS and monitoring.

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