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World Bank Agriculture Global Practice Discussion Paper

Improving Operational Effectiveness and Impacts of the INTEGRATED WATERSHED MANAGEMENT PROGRAM IN INDIA

JULY 2015

SUMMARY REPORT

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Cover Photo

Cover images courtesy of Grant Milne, World Bank.

Design and Print

Macro Graphics Pvt. Ltd. www.macrographics.com

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ACKNOWLEDGEMENTS

This summary report represents a major step by the World Bank toward improving the understanding of watershed management in India, based on a detailed institutional assessment of the Government of India's Integrated Watershed Management Program, completed in late 2014. The report's findings are contributing to the design of new World Bank supported watershed programs in India as well as government-sponsored schemes. Further, the lessons learned in this report can guide institutional assessment and watershed program development in other regions.

The summary report was prepared by Shruti Gaur[1] and Grant Milne[2] from the Agriculture Global Practice of the World Bank Group. The report draws on a detailed institutional study and voluminous technical background papers[3] prepared by a team of national experts from the Watershed Organization Trust[4] (WOTR), led by Crispino Lobo, Chief Executive. Grant Milne, Task Manager, supervised the development of the study and drafting of the technical background papers. The authors wish to acknowledge excellent peer review comments from Dr. A.J. James[5] and Ms. Priti Kumar[6]. Thanks are also offered to Ms. Vani Kurup[7] for copy editing services.

This work was funded by the Program on Forests (PROFOR), a multi-donor partnership managed by a core team at the World Bank. PROFOR finances forest-related analysis and processes that support the following goals: improving people's livelihoods through better management of forests and trees; enhancing forest governance and law enforcement; financing sustainable forest management; and coordinating forest policy across sectors. In 2013, PROFOR's donors included the European Commission, Finland, Germany, Italy, Japan, the Netherlands, Switzerland, the United Kingdom and the World Bank. Learn more at www.profor.info.

While the team gratefully recognizes the collaboration of the many people who assisted in preparation of this report, the opinions presented here and any errors are the sole responsibility of the authors and should not be attributed to the individuals or institutions acknowledged above.

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ABBREVIATIONS AND ACRONYMS

AAPs	Annual Action Plans
ATMA	Agricultural Technology Management Agency
BRGF	Backward Regions Grant Fund
CBOs	community Based Organizations
CMSA	Community Management of Sustainable Agriculture
CPLRs	Common Property Land Resources
CRP	Community Resource Person
CSWCRTI	Central Soil and Water Conservation Research and Training Institute
DDP	Desert Development Program
DfID	Department for International Development
DoLR	Department of Land Resources
DPAP	Drought Prone Areas Program
DPR	Detailed Project Report
DSS	Decision Support Systems
ForWaRD	Forum for Watershed Research and Policy Dialogue
GDP	Gross Domestic Product
GIS	Geographical Information System
GO–PIA	Government Organization–Project Implementing Agency
GPS	Global Positioning System
GSWMA	Gujarat State Watershed Management Agency
ha	Hectares
ICAR	Indian Council of Agricultural Research
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IGWDP	Indo-German Watershed Development Program
ISRO	Indian Space Research Organization
IWDP	Integrated Wasteland Development Project
IWMP	Integrated Watershed Management Program
IWRM	Integrated Water Resource Management
KVK	Krishi Vigyan Kendra
MEL	Monitoring, Evaluation and Learning

MDT	Multi Disciplinary Team
MNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MGRP	Mahatma Gandhi Recharge Project
MIS	Management Information System
MoA	Ministry of Agriculture
MoRD	Ministry of Rural Development
NABARD	National Bank for Agriculture and Rural Development
NARP	National Agricultural Research Project
NARS	National Agriculture Research System
NGOs	Non-Government Organizations
NIRD	National Institute for Rural Development
NMSA	National Mission for Sustainable Agriculture
NRAA	National Rainfed Area Authority
NRLM	National Rural Livelihood Mission
NRM	Natural Resource Management
PIA	Project Implementation Agency
PMKSY	Pradhan Mantri Krishi Sinchayee Yojana
PNP	Participatory Net Plan
PRA	Participatory Rural Appraisal
RKVY	Rashtriya Krishi Vikas Yojana
SLNA	State Level Nodal Agency
SMS	Surface Water Monitoring System
SPSP	State Perspective and Strategic Plan
SRR	Seed Replacement Rate
UNDP	United Nations Development Program
VSS	Vana Samrakshana Samithi (Local Committee for Forest Conservation)
WOTR	Watershed Organizations Trust
WC	Watershed Committee
WCDC	Watershed Cell cum Data Center
WDF	Watershed Development Fund
WDT	Watershed Development Team

EXECUTIVE SUMMARY

A comprehensive institutional study of the Government of India's Integrated Watershed Management Program (IWMP) was undertaken to better understand its workings and suggest practical mechanisms to improve program delivery and operational effectiveness. This summary report distills the findings of the study, reflected in the background technical papers. The major objective of the study was to assess the effectiveness of IWMP implementation practices at field level and identify practical strategies to improve watershed services for rural communities and farmers. The study was also undertaken to guide the design of the World Bank-supported Neeranchal National Watershed Project, which would help provide technical improvements to IWMP in selected sites in the nine states where rainfed agriculture plays a significant role in agricultural production in India. The main findings of the study are presented below.

Importance of Agriculture and Watershed Development in India

Agriculture currently accounts for just under 14 percent of the Gross Domestic Product (GDP) and yet is the main source of livelihood for the majority of the rural population. India has an estimated 78 million hectares (ha) of rainfed area and about 65 million ha classified as degraded land. Dryland agriculture currently constitutes just over half of the net sown area of the country. Drylands are home to two-thirds of India's livestock and 40 percent of its population. These areas have suffered from underinvestment and policy neglect, but are slowly emerging as the focal points for accelerating agriculture production in the country. Yet in moving forward, a number of major challenges need to be addressed including: a shrinking land base, dwindling water resources and groundwater pollution, declining environmental services, potential adverse impacts of climate change, shortages of farm labor, increasing costs of farm production, and uncertainties associated with volatility in both local and international commodity markets.

Sustainably managed watersheds can become an effective platform for rural development and sustainable use of land and water resources in rainfed areas. Integrated watershed development can serve the multiple objectives of environmental sustainability, productivity enhancement, livelihood promotion and inclusive growth. In India, it forms part of a broader strategy to enhance growth with equity in dryland, rainfed areas.

Evolution of Watershed Policy in India

The national watershed policy has been evolving for a long time in India. A key point in policy development was the systematic review of Ministry of Rural Development (MoRD) schemes in 1993–94 by the Hanumantha Rao Committee and the subsequent drafting of Guidelines for the implementation of the Drought Prone Areas Program (DPAP), Desert Development Program

(DDP), and Integrated Wasteland Development Program (IWDP). The 2006 report of the Parthasarathy Technical Committee, known as 'From Hariyali to Neeranchal' proposed significant changes in the way watershed programs were designed and implemented. This was followed by the formulation of the 'Common Guidelines' in 2008 incorporating the suggestions of the Committee, which would be applicable to all watershed projects in all departments/ministries of the Government. As part of periodic revision of these guidelines, the various watershed development programs were consolidated and renamed as the IWMP in 2009. Implementation was through the Ministry of Rural Development (MoRD). The initial budget allocation for IWMP was US$2.5 billion (at 2006–07 prices). Policy evolution continues, with the latest development being the forthcoming integration of IWMP with a new centrally sponsored micro-irrigation scheme by the Ministry of Agriculture (MoA) – the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY).[8] Policy evolution in India may be viewed as a positive response reflecting the country's commitment to watershed development and its importance for the development of rainfed agriculture and rural livelihoods.

The World Bank and Watershed Development

The World Bank has been a key partner in supporting watershed management programs in India for more than three decades. From 1983 to 2022 (when current projects will close), the Bank's contribution would amount to US$1.6 billion of the approximately US$2.4 billion invested in watershed management programs. Projects have mainly been stand-alone, state-level operations that could be closely monitored. With this design however, projects were not linked to existing, ongoing government watershed management programs. Bank-supported projects in India have generated a substantial number of important lessons and best practices that have been incorporated into national watershed guidelines for ongoing government watershed programs, particularly the IWMP.

In the past two years, a new generation of Bank-supported watershed projects were designed for India that are directly linked to government watershed programs to improve field performance and results through technical inputs and piloting innovative practices. One such project is currently underway in Karnataka. A second, larger operation (Neeranchal National Watershed Project) should start active implementation in 2015, in selected sites across nine pilot states (Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan and Telangana). The Neeranchal project will support watershed inputs in the new PMKSY national scheme. Both the Karnataka and Neeranchal projects will also strengthen convergence between government watershed programs and other national schemes being implemented by the states, such as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS), and sector programs linked to agriculture, forestry.

An extensive a review of three earlier stand-alone Bank-supported projects in Himachal Pradesh, Karnataka and Uttarakhand, to distill best practices and lessons learned, identified five key areas of improvement, with potential lessons for IWMP:

- **Planning scale and hydrology:** The use of a micro-watershed as the basic unit for planning and intervention in the three projects studied was demonstrated to be most appropriate for community participation. However, there is a need to develop a methodology for incorporating more hydrology into watershed management planning at the landscape scale. There is also a need to adopt integrated water resources planning at the micro-watershed level to broaden its focus to include drinking water supply, water quality and overall water availability and allocation issues.
- **Institutions and capacities:** Although the three projects made very strong contributions in the institutional aspects of

8 Or, otherwise known as 'the Prime Minister's agriculture-irrigation program', which seeks to ensure water supply to farmers round the year.

watershed management, from strengthening decentralized local action (planning, investment, management, maintenance and monitoring) and providing incentives to build local capacities to harmonize efforts between the disparate state-level agencies, future work needs to support the policy priorities of water resources planning at basin and/or sub-basin levels and sustainable management of groundwater resources.

- **Equity and livelihoods:** The three projects addressed equity by (1) including, empowering and mainstreaming women, the poor and vulnerable groups into decision making processes; and (2) integrating a livelihood component into the project that targeted these disadvantaged groups.
- **Sustainability:** Due to strong group cohesion and common goals focused around financial growth, more than 80 percent of the 6,000 Self-Help Groups created during the Karnataka project continued to thrive post-project. Maintenance of assets was not a major issue for civil works constructed on private fields (the majority of such works) but the results were not as positive on common lands. Incentives clearly play an important role in institutional sustainability.
- **Monitoring and transparency:** The three projects used wall paintings to promote transparency and public accountability, especially in regards to works and monies. The Karnataka monitoring and evaluation (M&E) system was an award winning, state-of-the-art approach that was used by project management to support ongoing implementation.

Institutional Assessment of IWMP in Neeranchal States

The scale of India's national watershed programs and the breadth of issues to be addressed in rural, rainfed areas requires these programs to be implemented effectively and to generate positive economic returns. The Neeranchal project states represent a wide range of agro-climatic contexts and land-use characteristics ranging from the arid regions of Gujarat and Rajasthan to assured rainfall areas in the eastern part of the country and the rain shadow regions and high rainfall areas of Maharashtra. Land use patterns vary considerably across states, and across regions and districts within these states. The average annual growth rate of agriculture and allied sectors in less developed states as well as the newly emerging states recorded a better performance than the all-India estimated average.

All nine states are part of the IWMP, which has been under implementation since 2009. Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra and Rajasthan have a long history of implementing watershed development projects. The first batch of IWMP projects was sanctioned in 2009–10. The study showed that implementation performance was variable, with low disbursements as a common feature. The study found several reasons for this poor implementation performance as well as broader issues that need to be addressed, including the following:

- Funds allocated by the Department of Land Resources (DoLR) to the states were released by State Level Nodal Agencies (SLNAs) to the district-level Watershed Cell cum Data Centers (WCDCs), as per national guidelines. Thereafter, SLNAs did not have any control over the funds held by districts and could not redistribute resources from poor-performing districts to better-performing districts.
- There was no effective national Management Information System (MIS) and Financial Management System (FMS) to track physical and financial progress across states in real time.
- There were wide disparities in administrative capacities of the Neeranchal project states. Andhra Pradesh, Gujarat and Maharashtra developed reasonable capacities from the SLNA down to field level, but even these did not acquire the full complement of competent personnel, management and operational systems, and the necessary

resources and facilities required to achieve the goals and expectations outlined in the Common Guidelines of the IWMP, and at the scale envisaged.

- More than 80 percent of the IWMP projects were implemented at the field level by government organization–project implementation agencies (GO–PIAs); in Gujarat and Odisha (except for three non-government organizations it was entirely undertaken by GO–PIAs. Most PIAs, however, were understaffed and responsible for many other functions of the parent departments.
- The study found few operational or institutional mechanisms being put in place to ensure better equity. Thus, the representation of marginalized sections (women, landless etc.), was very nominal. Without meaningful involvement from all sections of the local community and strong efforts to build local institutions, the assets created could fail to be sustained, and watersheds could fall back to the pre-intervention situation.
- All states followed fairly comprehensive planning processes based on IWMP guidelines at the micro-watershed or clustered micro-watershed levels. There are many innovative practices undertaken by the states; one example was to use remote sensing images and a Geographical Information System (GIS) to develop thematic overlays for planning. However, a meaningful participatory approach was lacking in many states, which reduced community engagement and buy-in.
- The quality of civil works was mixed - with design issues evident in many interventions including check dams, field bunds and contour lines. In addition, most states did not follow a "ridge-to-valley" approach, which is essential for effective hydrological planning.
- Watershed programs would benefit immensely from systematic hydro-geological studies, however there were many limitations that restricted the application of geo-hydrology, such as the availability and quality of geohydrological data (precipitation, evaporation, transpiration, ground water, stream flow, soil data, geological data, etc.).
- Among the Neeranchal project states, there were ongoing attempts to develop convergence between IWMP and MNREGS, as well as with various MoA schemes, in selected districts. Andhra Pradesh was the front-runner with processes and institutional mechanisms streamlined to facilitate convergence. A key deficiency of national schemes however, was that they largely continued to function within the confines of departmental silos with convergence mainly occurring through personal interactions by officials.

Addressing the Deficits: Where Neeranchal can Make a Difference

Institutional reforms: Institutional arrangements at various levels play a crucial role in IWMP project management and administration. Neeranchal can help address institutional issues in national watershed programs in several ways, including the following:

- *Supporting DoLR in developing and piloting new institutional approaches for national watershed programs,* along with a much stronger project management unit in Delhi, and more autonomous institutions at the state level to provide greater flexibility for implementing the program – and using these lessons to suggest possible institutional structures for the newly announced PMKSY, including a greater role for district administration in coordinating programs across various departments.
- *Piloting the development of farmer–producer organizations*, supported by qualified NGOs who could provide the social mobilization and linkage building/networking support. Neeranchal could also build stronger linkages between Farmer–Producer Organizations

(FPOs) and private sector in providing input and market support.

- *Supporting a full-time project director for the district level Watershed Cell cum Data Center* (WCDC) which is the field-level technical team for IWMP implementation.

Watershed planning: While generally satisfactory, the planning approach in the IWMP could be strengthened through the Neeranchal project using the approaches listed below:

- *An integrated software system* for designing and estimating soil and water conservation measures and preparing the Detailed Project Report (DPR) for their construction. Standardizing data sets and creating integrated databases will ensure that they can be used for Monitoring and Evaluation (M&E), MIS and Decision Support Systems (DSS) at the national, state, district and PIA levels. Such a system would help in aggregation, comparison and analysis across watersheds, clusters and regions.
- *Greater attention to hydrology*. Hydrological assessments of the entire watershed at a landscape scale (at least 20,000 to 50,000 ha) could not only guide lower level micro-watershed planning and help set priorities for the selection of appropriate project sites but could also analyze various scenarios for potential impacts of these interventions and increased climate variability. Such an assessment could also be the basis for an iterative planning process to identify appropriate interventions in a participatory manner with local stakeholders to determine the optimum amount of water harvesting upstream while keeping in mind, the hydrology of the area and downstream water needs.
- *Follow a "ridge-to-valley" approach in the Neeranchal pilot areas* that, instead of excluding forest areas, highlights the need to for treatment in forest areas and explores options with the forest department to include these in the DPRs prepared for the project areas.
- *Participatory Net Planning (PNP)* is an important tool that can improve community participation and dialogue on technology choices. The process can be enhanced through greater use of remote sensing/GIS, Global Positioning Systems (GPS) and other inputs improve the accuracy and quality of the plans. Under Neeranchal, a more robust PNP process can be piloted in selected project sites to demonstrate improvements to both the planning process itself and subsequent post-project benefits.

Capacity building: In the IWMP, the capacity building strategies tend to be menu-and target-driven and not fully calibrated to the specific needs of the target group. Some areas where Neeranchal could help strengthen capacities related to national watershed programs are the following:

- *Supporting the development of a capacity building pedagogy* that is defined by local needs, based on achieving specific outcomes, and linked to progressive phases/stages in the project and release of funds. The focus would be to strengthen the technical, professional and personal capacities of PIA personnel, Watershed Development Teams (WDTs), and technical experts on an ongoing basis, especially in the area of facilitation/communication skills with communities.
- *Further developing the capacities of the WDTs, Technical Experts (TEs), and other stakeholders* for undertaking engineering surveys, preparing watershed plans and estimates, measuring works, etc. Specific training will be necessary to ensure that appropriate and site-specific measures are planned with the consent and ownership of the farmer/land owner and data are organized in a manner that makes IT-assisted planning, monitoring and reporting possible and easy.
- *Hiring support agencies and experts to train the WDTs*. A pool of resource persons and institutions could be accredited to provide technical back stopping.

Monitoring and evaluation: Currently, M&E in the IWMP is done at the state level and is focused mainly on input–output monitoring with mixed performance across states. Neeranchal could improve the monitoring and evaluation system in national watershed programs as follows:

- *Designing and implementing a new MIS for the IWMP* at both the state and DoLR levels that can aggregate data from all states. The system could be designed and tested in the Neeranchal project states and then scaled up to all states.
- *Testing and integrating improved performance benchmarks, that were designed* for national watershed programs during the preparation of the Neeranchal project, with the support of the Department for International Development (DfID) Trust Fund in India. The Neeranchal project could learn from piloting these benchmarks, integrated into the M&E/MIS processes, and then scale up the approach to the national level.
- *Financing the development of concurrent process monitoring into the M&E system* to assess the impact of watershed activities on women, gender relations, power and caste equations, etc. This information on processes, could then guide timely and calibrated corrective measures.
- *Supporting periodic thematic and performance-related action research studies* on randomly selected sites over the course of the project/program life cycle/period. Such a mechanism would provide useful inputs for project and program steering and address emergent problems well before they become obstacles.
- *Involving communities in local monitoring*, with the training, equipment and motivation to collect relevant data about local program implementation and send it to a central location through mobile phone or tablet applications. Technology for this approach already exists and there are good examples of projects in other sectors in India (for example the health sector) where community monitoring is a central feature of the M&E system. DoLR has developed a mobile phone application that can be tested in the project and gradually scaled up.

Convergence: There are some positive examples of program convergence at the field-level between IWMP and MNREGS, as well as with various other national schemes being delivered by state agencies. This needs to move beyond the current reliance on motivated and committed senior program officers in each of the respective agencies that can support convergence efforts on a personal basis. Neeranchal could instead support the development of an overall strategy for convergence through: (i) policy and institutional support by necessary government orders and circulars; (ii) inter-departmental coordination at state, district, block and Gram Panchayat levels; (iii) preparing complementary and compatible operational procedures; (iv) identifying functionaries for implementation, monitoring and reporting; and (v) regularly monitoring these at all levels. The strategy could then be piloted in the Neeranchal states in selected sites.

A fundamental starting point for such innovations is to bring all the major stakeholders (government, private sector, NGOs, academics and local communities) on the same page through healthy discussions and action-research pilots to address knowledge gaps, improve implementation practices and try new approaches to different parts of the project management cycle.

Agriculture

Agriculture and Climate Change

Climate change is increasing weather variability, and over time may result in adverse impacts on agricultural livelihoods by affecting soil erosion, soil productivity, the subsequent quality and productivity of crops such as wheat and rice, as well as the productivity and mortality rate of livestock. There is a need to expand the system of meteorological data available to farmers on a near-real time basis to help them make better planting

decisions. Such a system has been developed in Maharashtra by WOTR across their project sites. The system is effective and involves automated data flow from a chain of weather stations at the micro-watershed level to the Meteorological Department which, in turn, processes the data and returns them to farmers at the village level. Neeranchal could replicate this approach in selected PMKSY project areas. The proposed National Mission for Sustainable Agriculture (NMSA), originally conceived as part of the National Action Plan on Climate Change, seeks to make Indian agriculture (crops and animal husbandry) more climate-smart. Neeranchal could support the NMSA by taking up pilots in watersheds across various agro-climatic zones to develop and promote climate-smart, bio-diversity conserving, and low external input requiring, integrated farming systems. These could build on existing knowledge among dry-land farmers, especially around soil fertility management, cropping cycles and integrated farming practices. These experiences should be well documented so that lessons learnt can be disseminated to help shape and inform policies and strategies that would facilitate up-scaling of best practices.

Cropping System Strategy in Rainfed and Uplands Areas

The study determined that in some states, field bunding in the uplands was being supported primarily to increase paddy cultivation cropping systems. Interestingly, these areas earlier supported millet-based multi-cropping systems. Instead of attempting crop substitution or mono-cultivation, it would be preferable to adopt a mixed cropping or inter cropping approach, e.g., paddy with pigeon pea/green gram/black gram. Conversely, mixed cropping, which has been a widespread traditional practice, could also be suitably revived with appropriate technologies and quality inputs, at least in some clusters of watersheds. Where agro-forestry is proposed, the selection of tree species and crops should be such that they encourage and promote adoption of inter-cropping systems. Above all, cropping systems need to be based on better assessments of hydrological potential and water balances.

Seeds and Planting Materials

Studies show that the quality of seeds and planting materials accounts for 20–25 percent of productivity. Hence, the timely availability of quality seeds and planting materials at affordable prices to farmers is necessary for achieving higher agricultural productivity and production. In the case of horticulture crops and other high value crops, this is of crucial importance. Neeranchal can support documenting, improving and promoting local seed collection and storage systems and linking these to the National Agriculture Research System (NARS) for productivity enhancement and protection of crop diversity, especially in rain-fed regions.

Integrated Nutrient Management and Soil Health

Neeranchal could support large-scale soil testing so that appropriate ameliorative and restorative measures that improve the health of soils at farm level can be undertaken. This could be in the form of establishing mobile soil testing facilities that could issue soil health cards to farmers with guidance on measures to be taken. The Karnataka Watershed Development Project-I (2001–09) pioneered micro-nutrient soil testing in partnership with ICRISAT. Neeranchal could also replicate the new Karnataka Watershed project, which is undertaking soil assessment transacts in each micro-watershed to better understand soil types and profiles, to aid farmers in making better decisions about crop selection.

Agriculture Research and Extension

Under IWMP, most states work with state agricultural universities, along with a network of smaller colleges, research stations and extension centers to develop knowledge and innovative practices to support farmers. Generating knowledge is the first step; the second and critical step is to transfer knowledge and practices to farmers on the ground. Neeranchal can improve this situation in the selected states using the following approaches.

- *Supporting SLNAs to create a multi-stakeholder platform* where, in the context of enhancing agricultural production/ productivity and livelihood opportunities, all key actors in the field of research, extension, business and commerce[9]can come together and contribute to improving and increasing agriculture productivity. Farmers must be involved in this exchange as co-evolvers of knowledge, technology, systems and processes for implementation as well as in developing frameworks for monitoring and evaluation of trials and experiments. The SLNA and WCDC could improve this situation by creating a common platform and increasing synergy among the various programs and agencies engaged in providing extension support to farmers.
- *Supporting ICT approaches for providing extension information to farmers*. A farmer's needs for support includes inputs, technology, knowledge and skills, soil health assessment (conducting of soil tests), seeds, etc. An assessment of these needs can be done either as part of the DPR or separately. Then, appropriate and real time information can be transmitted to farmers through modern ICT approaches.
- *Delivering in-person extension support to farmers on the ground*. This could be through two approaches:
    - Community Resource Persons (CRPs), who should be identified and trained to help with technology transfer and diffusion by working with agricultural scientists and extension personnel under the broad ATMA umbrella. Neeranchal could pilot this initially in a few districts having a favorable socio-agronomical milieu in collaboration with competent civil society organizations. This information could be consolidated and fed into the DPR, the block and the "comprehensive district plan". A few pilots to develop and validate the methodology could be taken up through the support of Neeranchal.
    - Farmer producer organizations (FPOs), using the Farmer Field Schools methodology, such as farmers clubs, farmer–producer organizations and farmer-managed agricultural service centers, which could become "one-stop" entities for backward and forward linkages, extension delivery, technology and information dissemination. Neeranchal could provide support in promoting farmer-based organizations at the village, cluster and sub-basin levels and build their managerial and institutional capacities with a focus on both increasing productivity as well as meeting market needs, while taking care of household food security requirements.

Equity and Sustainability: Neeranchal should support piloting of new approaches under the new PMKSY scheme including:

- *Developing an operational strategy for implementing equity concerns* as part of the DPR process at the district level, at landscape scale.
- *Supporting capacity building of key stakeholders on various aspects of equity and working out practical solutions at local level*. This could include: identifying the poor and other disadvantaged groups through effective participatory strategies (such as wealth ranking), and then focusing allocated investments for livelihood support on these groups; giving the poor and other vulnerable groups more space and a voice in decision making structures; organizing exclusive institutions of the poor and marginalized; and organizing the landless and poor women through Self Help Groups (SHGs) and building up their capacities.

Water Productivity: Managing water demand and enhancing water productivity is crucial if agriculture

9 For instance, research institutions/organizations, private entrepreneurs and companies, federations and associations, NGOs and farmers.

is to become an engine for growth in rural India. Going beyond the "optimum output per drop of water" to "optimum profit per drop of water" should be a key focus of sustainable agricultural practices, and of the PMKSY. Neeranchal can help address this situation as follows:

- *Develop water literacy pedagogy/programs* on the science and economics of water resources, their augmentation, management and use. Develop user-friendly and easy-to-adapt tools to mainstream hydrology into watershed planning and development. To generate meaningful databases for hydrological planning, take up monitoring of wells at micro-watershed and cluster levels; collect data on surface runoff, weather and geo-morphology. This step is important to widen the data set and to move on to the next level of water balancing/budgeting.
- *Explore the use of advanced instrumentation* (such as altimeters/total stations, water level recorders for dug/bore-wells) along with simple instruments (such as V-notches, stream gauges, rain gauges and testing kits for water quality) to collect vital data in effective and practical ways. Currently, no such instrumentation is available at the cluster or micro-watershed levels. There is also a great need for training and capacity building to use such instruments.
- *Institutionalize participatory hydro-geological monitoring* as part of the overall monitoring system of watershed development.
- *Institutionalize procedures for landscape-level hydrological assessments*. Using available national, state and local data (e.g., hydro-geology and climatic indicators such as rainfall, groundwater and surface water status, discharge and draw down, stream runoff, water quality and inventories of wells and water harvesting structures), build capacity and procedures to carry out good-quality hydrological assessments, with simple modeling and participatory stakeholder interactions. A number of suitable models are available such as: Surface Water Monitoring System (SMS); Soil and Water Assessment Tool (SWAT); Watershed Modeling System (WMS) for hydrological modeling; and Groundwater Modeling System (such as WaterGEMS), and Visual MODFLOW and Hydro-geosphere for groundwater modeling. These kinds of models would improve our understanding of catchment hydrology and generate scenarios to assess potential future impacts of site interventions and climate variability. This information could then be used to sensitize local communities on crucial issues of water management for sustainability. Aldo, village watershed development plans can then be checked against the model and used in discussions to identify the most effective interventions in the context of the wider catchment and water resources.
- *Focus on improving governance of existing water resources*, rather than simply increasing water availability. This would require developing the necessary policy, and financial, technological and administrative systems to ensure more equitable access to water-related services and increase water-use efficiencies. Neeranchal could consider supporting a study group or action-research to identify "action sets" to be implemented so as to advance developments in this area.

CHAPTER-1

INTRODUCTION

This report presents a summary of a detailed institutional assessment of India's national watershed program – the Integrated Watershed Management Program (IWMP) of the Department of Land Resources (DoLR), Ministry of Rural Development (MoRD), Government of India (GoI) – that was undertaken to improve knowledge of its performance and constraints, suggest practical mechanisms to improve program delivery and operational effectiveness, and identify options for more effective convergence. The World Bank engaged a team of national consultants,[10] with extensive experience in watershed implementation and large-scale project management. The team completed an extensive review of secondary literature and carried out field surveys in selected states linked to a new Bank-supported watershed program (Neeranchal National Watershed Project).[11] The two overarching goals of this major institutional study were to: (i) guide the design of the Neeranchal project (ultimately a US$357 million technical support operation on a 50/50 cost-sharing ratio with the Government of India) to maximize the impact of investments on the performance of IWMP in selected sites across the nine project states; and (ii) influence longer-term policy changes in IWMP to improve performance on the ground across all states, including more effective convergence processes with other national programs addressing rural and natural resource development.

Recent policy changes by the GoI have resulted in IWMP being subsumed into a new national Pradhan Mantri Krshi Sinchayee Yojana Program (PMKSY) that will be led by Ministry of Agriculture (MoA) and merge ongoing national watershed, agriculture and water schemes. The Neeranchal project will now support PMKSY with a focus on the watershed component. The findings of this study will still benefit the watershed component of the PMKSY as well as the broader scheme itself.

This summary report consolidates the voluminous output from the institutional review[12] without compromising on the content and essence of the study findings and original documentation. The major areas of inquiry and approach focused on project management; participation, equity and sustainability; watershed technology; geo-hydrology; sustainable agricultural production; capacity building; and convergence. These aspects were analyzed for their strengths, limitations, opportunities and constraints, including policy aspects where applicable. The study was designed to examine the following:

- Capacities of the various stakeholders including government staff, Non-Government Agencies (NGOs), Project Implementing Agencies (PIAs) and

10 Mr. Crispino Lobo, Team Leader (Chief Executive of Watershed Organization Trust (WOTR), Pune) and his team from WOTR: Mr. Abraham Samuel (Institutional Analyst), Mr. Prakash Keskar (Watershed Development Specialist), Mr. Vishnu Shara (Agricultural Extension Specialist), Mr. Vinit Phadnis (Geo-Hydrology Specialist) and Mr. Thomas Phalgadmal (Mobilization and Capacity Building Specialist).

11 Refer to Annex A for more details on the study methodology.

12 A background paper is available on request.

communities to deliver a more robust IWMP model, and their respective training needs.

- Bottlenecks in IWMP delivery with respect to approvals, clearances, etc.
- Participation of communities in IWMP, major gaps/issues, and approaches for improving social mobilization, group formation, involvement in watershed planning, and general buy-in and sustainability of good watershed practices.
- Convergence of IWMP with other government schemes at field level, and private sector participation and how this could be strengthened.
- How states are handling hydrology in IWMP planning. Are there linkages in place with reputable institutions dealing with water, for example in accessing information on groundwater? Does the watershed agency staff have the necessary capacity to deal with such issues, and get greater community involvement into hydrological planning and management?
- How to link research, extension and farmers into a more effective network, resulting in relevant, timely research and effective and efficient extension, and higher adoption rates among farmers and watershed communities.

Chapter 2 offers an historical perspective on watershed development in India, its links with agricultural production and poverty, and overall potential and opportunities for environmental sustainability, productivity enhancement, livelihood promotion and inclusive growth. A key conclusion is that watershed development is a fundamental strategy in India to enhance growth with equity in dryland agro-climatic conditions. Chapter 2 also examines the policy evolution underpinning watershed development in India, including the findings and recommendations from various committees and how these are reflected in the India's five-year development plans.

Chapter 3 of the report summarizes the historical contribution of the World Bank to watershed development in India and lays out the broad objectives of the study.

Chapter 4 presents a summary of the field assessments undertaken of IWMP in the selected states, together with experiences and key learnings, along with some estimates of impacts. The chapter digs deeper into the context, progress and challenges of IWMP in the states where Neeranchal projects will be implemented. The chapter provides an overview of the institutional arrangement for implementation of IWMP at various levels and analyzes the gaps and issues for consideration under Neeranchal. It then examines IWMP implementation issues around equity and sustainability; watershed planning and implementation processes; hydrology and Geographical Information System (GIS) for planning and monitoring; and convergence between IWMP and other centrally sponsored schemes.

Chapter 5 outlines specific areas where the Neeranchal project could improve the performance of national watershed programs through technical inputs.

Chapter 6 provides a concluding section that summarizes the importance of national watershed programs in India, and how to strengthen coordination among states.

CHAPTER-2

INDIA AND WATERSHED DEVELOPMENT

Importance of Agriculture and Watershed Development

Dryland agriculture currently constitutes 55 percent of the net sown area of the country. Drylands are home to two-thirds of India's livestock and 40 percent of its population. These areas, historically characterized by underinvestment and policy neglect, are slowly emerging as the focal points for accelerating agriculture production in the country. Agriculture now accounts for just under 14 percent of Gross Domestic Product (GDP) yet it is still the main source of livelihood for the majority of the rural population. Recent evidence suggests that while the sector grew at an annual average rate of 3.3 percent during 2005 to 2009, the growth was fairly unstable and subject to high year-to-year fluctuations mostly due to stagnation and poor growth reported in highly irrigated areas.

The net irrigated area of the country is 63.6 million hectares (ha), and gross irrigated area as 89.4 million ha (MoA, 2013). Most of the northwestern states have already reached their potential for irrigated agriculture and exhibit serious ground water exploitation. Thus, a shift in approach is needed not only in these areas but also in the rainfed areas of central and eastern India. Moreover, 83 percent of the individual land holdings are less than 2 ha, constituting around 41 percent of the area under private ownership - and the viability of farming for these marginal and small holders is a crucial issue. The Approach Paper to the 12th Five-Year Plan by the national Planning Commission thus rightly prioritizes resource-use efficiency and technology to ensure sustainability of natural resources, adaptation to climate change and improvements in total factor productivity (Planning Commission, 2011). The stagnation and poor growth in irrigated areas (also called Green Revolution areas) and the deceleration of growth in the rainfed belts during the 9th and 10th Five-Year Plans[13] brings to center stage the technological, institutional, infrastructural, and investment support that is required.

Agriculture in India faces formidable challenges – a shrinking land base, dwindling water resources and groundwater pollution, declining environmental services, potential adverse impacts of climate change, shortages of farm labor, increasing costs of farm production, and uncertainties associated with volatility in both local and international commodity markets. In three of the states visited during the study (fairly representative of the other states in this regard), farmers expressed their concern about these issues. What was also markedly evident was that few institutional arrangements for service delivery and technology transfer exist between the State Level Nodal Agencies (SLNAs) for implementing IWMP and the various research and extension agencies in the states

13 Growth of agricultural GDP decelerated from over 3.5 percent per annum during 1981–82 and 1996–97 to only around 2 percent during 1997–98 and 2004–05. This deceleration, although most marked in rainfed areas, occurred in almost all States and covered almost all major sub-sectors, including those such as horticulture, livestock, and fisheries where growth was expected to be high. Growth plummeted to below 1 percent during its first three years of Tenth Plan that is from 2002–03 to 2004–05. This was followed by an upsurge with an average of just above 4 percent in following plan period (Planning Commission, 2002, p.5 Vol. 3).

(including agriculture universities, Krishi Vigyan Kendras (KVKs), Agricultural Technology Management Agencies (ATMAs), state agriculture departments and other service providers). As a result, despite the existing institutional and multi-agency set-up, numerous demands of farmers still remain relatively unaddressed.[14]

With an estimated 78 million ha of rainfed area (MoA, 2013) and about 65 million ha classified as degraded land[15] the importance of watershed development for resource conservation and livelihood promotion cannot be underscored enough. Accelerated growth in rainfed agriculture is crucial from the point of inclusiveness of the large majority, mostly poor, who still depend on it for their livelihood. Giving priority and focus to these areas through policy and program support is a major strategy of the GoI to achieve the objective of inclusive growth. Despite relatively better performance of India's agriculture sector during the Eleventh Five-Year Plan period (2007-12), the sector has yet to attain stable and sustainable growth. While there was no conclusive evidence of the impact of watershed development projects in this acceleration on a national, aggregate scale, lessons learned from earlier Bank-supported watershed development projects in India strongly suggest that agricultural intensification and productivity can be significantly increased through watershed management programs such as the IWMP.

Sustainably managed watersheds can become an effective means and platform for rural development and sustainable use of land and water resources. Hence, integrated watershed development is crucial for the country as it has the potential to serve the objective of environmental sustainability, productivity enhancement, livelihood promotion and inclusive growth. It is one of the key strategies to enhance growth with equity in dryland agro-climatic conditions. In that sense, the watershed development initiative is an important move in the direction of promoting equity across regions, farming situations and different agro-climatic conditions in the country. Besides crop lands, the watershed approach, if strategized properly, can also ensure development of common pool resources, such as tank foreshores, pastures and forests, all which may contribute significantly to the livelihoods of the rural poor in dryland regions of the country.

Policy Evolution

National watershed policy has had a long evolution since 1956 with the establishment of the Central Soil and Water Conservation Research and Training Institute (CSWCRTI) followed by watershed management activities in 42 locations. The major breakthrough in policy development came with the systematic review of Ministry of Rural Development (MoRD) schemes in 1993–94 by the Hanumantha Rao Committee and the subsequent promulgation of the Guidelines for the implementation of the Drought Prone Areas Program (DPAP), Desert Development Program (DDP), and Integrated Wasteland Development Program (IWDP). This was the turning point in India's journey of watershed development where, for the first time, scientific criteria were introduced in the selection of DPAP and DDP areas.[16] The poor performance of agriculture in the 1990s once again brought attention towards mechanisms for infusing growth in the sector, especially in the rainfed areas.

The Eleventh Five-Year Plan (2007-2012) saw major policy changes in watershed development programs in the country. The Inter-Ministry Task

14 For example, 'certified seed' of paddy is not available to many farmers and they continue to use 'uncertified seed' resulting in low production.

15 Estimates of the extent of degraded land vary from 55 million ha to 175 million ha depending upon the definition of wasteland and also the source of information. The latest attempt to harmonize the above data (NRAA, 2008) has brought out that the degraded land which has the potential for development under watershed development projects amounts to a total of 64 million ha consisting of 50 million ha of water eroded, 5 million ha of wind eroded, and 9 million ha in notified forest (Planning Commission, 2008, Vol. 3 p.28). There was also an attempt to estimate and prioritize the rainfed areas in the country using the Natural Resource Index and Livelihood Index by NRAA (NRAA, 2012).

16 The committee developed the criteria to identify districts to be covered under DPAP and DDP. This was mainly based on climatic zones and percent net irrigated area. The Moisture Index was used to assess the climatic zones. The Moisture Index was worked out using the formula [(P-PE)/PE]*100, where P=Precipitation and PE=Potential Evapo-transpiration.

Force on integration of various programs led to the setting up of the Technical Committee to review and suggest strategies to strengthen watershed programs in India (known informally as the 'Parthasarathy Committee'). The report of the Technical Committee, known as 'From Hariyali to Neeranchal' proposed some significant changes in the way watershed programs were designed and implemented (DoLR, 2006). This was followed by the formulation of the 'Common Guidelines' in 2008 incorporating the suggestions of the Committee, which are applicable for all watershed projects of the DoLR. These guidelines were also amended a couple of times and the various watershed development programs were consolidated and renamed as the IWMP. Implementation of this consolidated program began in 2009. Some crucial changes suggested in the Guidelines included limiting the project duration to five years, introducing professional human resources in project management, focusing more on capacity and institution building to ensure better sustainability, adopting a "ridge-to-valley" approach and smoother fund release procedures. These changes were expected to happen from April 2013 (Planning Commission, 2013, vol.1, p.159) but as this current study report will elaborate, many of these changes have yet to be fully realized.

Policy evolution continues in India. The most recent development (from mid-2015) is the integration of IWMP with a new centrally sponsored micro-irrigation scheme by the MoA called the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY).[17] While implementation and institutional arrangements are still being developed by the GoI, it is understood that IWMP will form the watershed component of the new PMKSY program and continue to be administered by DoLR through the current national watershed policy guidelines. This ongoing policy evolution in India may be viewed as a positive process, reflecting the country's commitment to watershed development and its recognized role in the development of rainfed agriculture and rural livelihoods.

17 Or, otherwise called the 'the Prime Minister's agriculture-irrigation program', which seeks to ensure water supply to farmers round the year.

National policies on watershed development are impacted by global program experiences (World Bank, 2008). However, citing examples from some countries, the World Bank 2008 report suggests that if field results are not sufficiently convincing there is often reluctance to change national policies or adopt new ones. This is also reflected in India's experience - the watershed development program developed in an iterative fashion with new learnings and experiences emerging from implementation brought about incremental changes in policies and strategies. This process has been underpinned by Bank supported watershed projects that have allowed more experimentation and innovation to generate knowledge and lessons learned.

Key Learnings and Some Estimates of Impacts from Past Programs

India has invested heavily in watershed management programs. By the end of the Tenth Plan, a total of US$3.2 billion had been spent on developing around 51 million ha of rainfed lands in the country (Table 1).

The experience of government watershed projects since the mid-1990 suggests that there has been some success in enhancing crop productivity, whereas the impacts on stability (including drought resistance) and diversification of farm-activities have been rather limited. Many studies have highlighted the impacts of watershed development on biophysical and socio-economic indicators.[18] One of these, a meta-analysis by the International Crops Research Institute for the Semi-Arid-Tropics (ICRISAT) covering a large number of impact studies completed in India, showed the following results (Table 2).[19]

The Eleventh Five-Year Plan document (2007-2012) highlighted some of the achievements of watershed

18 There are large numbers of studies on impacts of watershed development projects in the country. They vary according to the research objectives, indicators assessed, sample size of the study, timing of the study, the agency that undertook the evaluation/ study etc. The focus here is on studies that covered a large sample size cutting across states and agro-climatic regions so that it is representative of the country.

19 See Joshi et al., 2008a; Joshi et al., 2005 and Joshi et al., 2008b.

TABLE 1: INDIAN WATERSHED PROGRAMS: AREA COVERED AND EXPENDITURE INCURRED

Ministry	Program	Year since implementation	Area covered (100,000 ha)	Expenditure (since inception to Tenth Plan (US$ million)
A. Rural development	Drought-Prone Areas Program	1973-74	137.27	793.77
	Desert Development Program	1977-78	78.73	319.00
	Integrated Wastelands Development Program	1988-89	95.56	399.00
	Externally aided projects		5.00	47.87
	Total (A)		**320.56**	**1,561.15**
B. Agriculture and co-operation	National Watershed Development Project for Rainfed Areas	1990-91	93.09	495.00
	River Valley Projects & Flood Prone Rivers	1962 & 1981	64.86	367.87
	Watershed Development Project in Shifting Cultivation Areas	1974-75	3.93	48.36
	Reclamation of Alkaline Soils	1985-86	7.11	19.84
	Watershed Development Fund	1999-2000	0.59	4.27
	Externally aided projects		18.15	650.39
	Total (B)		**187.73**	**1,586.89**
C. Environment and Forests	National Afforestation and Eco-Development Project	1989-90	0.70	7.79
Total (A+B+C)			**508.99**	**3155.90**

Source: Planning Commission (2008), vol. 3, p. 42.

TABLE 2: IMPACTS OF WATERSHED DEVELOPMENT IN INDIA

Indicators	Unit	Number of studies	Mean value from various studies	Minimum reported	Maximum reported
Employment	Person days ha/year	99	154.50	5.00	900.00
Increase in irrigated area	Percent	93	51.50	1.23	204.00
Increase in cropping intensity	Percent	339	35.50	3.00	283.00
Runoff reduced	Percent	83	45.30	0.34	96.00
Soil saved	Tons/ha/Year	72	1.10	0.10	2.00
Benefit–cost ratio	Ratio	311	2.00	0.80	7.30
Internal rate of return	Percent	162	27.40	2.00	102.70

Source: Joshi et al. (2008).

development, drawing extensively from various studies and evaluations (Planning Commission 2008, p. 25). Some key findings are as follows:

- Soil loss and surface runoff reduced by 52 percent and 58 percent, respectively, in completed watersheds.

- Area under irrigation increased from 34 percent to 100 percent in different watersheds including the area where sowing increased.
- The cropping intensity increased.
- Productivity/yields of crops increased and the net returns also increased (up to 63 percent).
- The benefit–cost ratio of watershed development programs ranged from 1.10 to 15.72, depending on the above factors.
- The availability of drinking water and groundwater situation improved in all project villages.
- Other benefits, such as fodder availability, employment opportunities (and also equal wages in limited number of cases), and income generation opportunities improved significantly in all villages where watershed projects were implemented.

There are other large scale studies - such as the one by Kerr et al. (1998); the 'Rapid assessment of watersheds in Maharashtra, Karnataka and Madhya Pradesh' covering 1020 watersheds by Forum for Watershed Research and Policy Dialogue (Samuel et al., 2009); and two large scale studies (837 micro-watersheds implemented during 1997–2002 and 947 watersheds implemented during 2002–05) undertaken by National Institute for Rural Development (NIRD) in collaboration with other national agencies (NIRD, 2011 and 2012) - that showed that watersheds bring direct tangible benefits with regard to ecosystem resources, productivity potential, livelihoods and the general rural economy, besides several indirectly attributable benefits, such as education, credit uptake and food security.

While the Hanumantha Rao Committee gives a detailed analysis of the lessons learnt and the need for changing the various components of implementation with reference to technology, processes, institutional and project management mechanism (DoLR, 1995), the Eleventh Plan also highlighted key weaknesses of government watershed programs:

Planning and Implementation

- *Deficiencies and gaps in project conceptualization, planning, implementation and project management:* this results from lack of appropriate systems, tools and pedagogies; and problems in designing and operationalizing project components that have local specificity and relevance, and the inadequate use of planning and implementation-enhancing tools such as GIS and GPS.

Institutions and Capacities

- *Insufficient use of participatory mechanisms for building stakes and ownership of the developmental intervention:* this results from a top-down approach, inadequate creative dialogue between the agencies and people, mechanical implementation of some strategies to enhance participation, and general lack of transparency and trust at the local level.
- *Gaps in institutional mechanisms to address concerns of equity:* this results from unequal resource access to resources due to social factors such as caste and gender and also from economic stratification and location-specific (and pre-existing) inequalities. The problem of equity in watershed interventions is further compounded by weak attention to strategies or institutional arrangements for project-specific equity concerns, such as effective representation, timely and due wage receipts for project work and effective mechanisms for ensuring assured and preferential access to minor products from common pool resources in favor of the poor. In the absence of these considerations, watershed development tends to strengthen existing inequalities towards landed farmers.

Monitoring and evaluation

- *Ineffective feedback mechanisms for ongoing, mid-term and in-course corrections.* This results from inadequate M&E systems and weak processes for

information generation and feedback to project stakeholders. Revisiting original local watershed plans and implementation strategies is not usually a part of large-scale government programs.

Sustainability

- *Discontinuity of institutions and maintenance of assets and resources post-project completion.* These result from weak strategies and resources for continuity of institutions beyond the project period, and participatory governance not taking root in the implementation phase.
- *Discontinuity of benefits.* Studies show that while the impacts on environmental resources such as soil, water and productivity are 'good' in the initial stages, they often fail to sustain in the medium to long term. This results from the unsustainable use of regenerated resources, lack of maintenance, lack of additional investments and incentives for sustainable practices.
- *Lack of convergence with other programs.* Watershed projects are implemented in departmental silos and generally fail to complement other programs. This results in duplication of effort, waste of human resources, etc.

Application of R&D

- Poor application of scientific and technological inputs such as geo-hydrology, ground water issues, local agro-climatic factors, soil conditions.

Emergence of the Integrated Watershed Management Program

The Eleventh Five-Year Plan (2007–2012) was ambitious with respect to watershed development. It proposed to develop 36.6 million ha through an integrated watershed approach, which would combine soil and water conservation investments with support for rural livelihoods, through a participatory planning framework. The investment requirement for the treatment of 36.6 million ha was estimated at approximately US$5.9 billion. The Eleventh Five Year Plan period also saw the emergence of the new Common Guidelines for Watershed Development (DoLR, 2008), a policy initiative that drew heavily on lessons learned in smaller Bank-supported and bi-lateral supported watershed programs in India. The introduction of IWMP with increased unit cost allowances, changes in institutional arrangements, and supportive strategies to operationalize the guiding principles of equity, inclusive growth, sustainability and participation, truly began from 2009-10. The actual outlay for IWMP over the five year Plan period was US$2.5 billion (at 2006–07 prices).

In 2012–13, the first year of the Twelfth Five-Year Plan, an additional 5 million ha was targeted by the DoLR with the financial target of US$500 million (MoRD, 2012).[20] However, only US$3.6 million ha of this target had been sanctioned till the end of 2012 which was a sharp decrease from the previous two years. Based on data from DoLR, the amount released as the central government share during 2012–13 to the states was US$250 million and the total amount released as of August 2013 for IWMP was US$885 million. Estimates showed that only 50 percent of the amount was utilized as planned. The Twelfth Five-Year Plan document notes, "However, despite considerable emphasis on this in the Eleventh Plan and design and development of common guidelines, actual performance in regard to watershed development was poor during the Eleventh Plan." This prompted the need for a committee under the chairmanship of the national Planning Commission to revisit the Common Guidelines for watershed development projects, in order to provide greater flexibility for implementation and to facilitate greater momentum to the IWMP.

20 The expected outlay during the Twelfth Five-Year Plan (2007-2012) for DoLR was approximately US$5.0 billion, of which the maximum share was for watershed development (Planning Commission, 2008).

CHAPTER-3

THE WORLD BANK AND WATERSHED MANAGEMENT IN INDIA

The World Bank and Watershed Management Programs in India

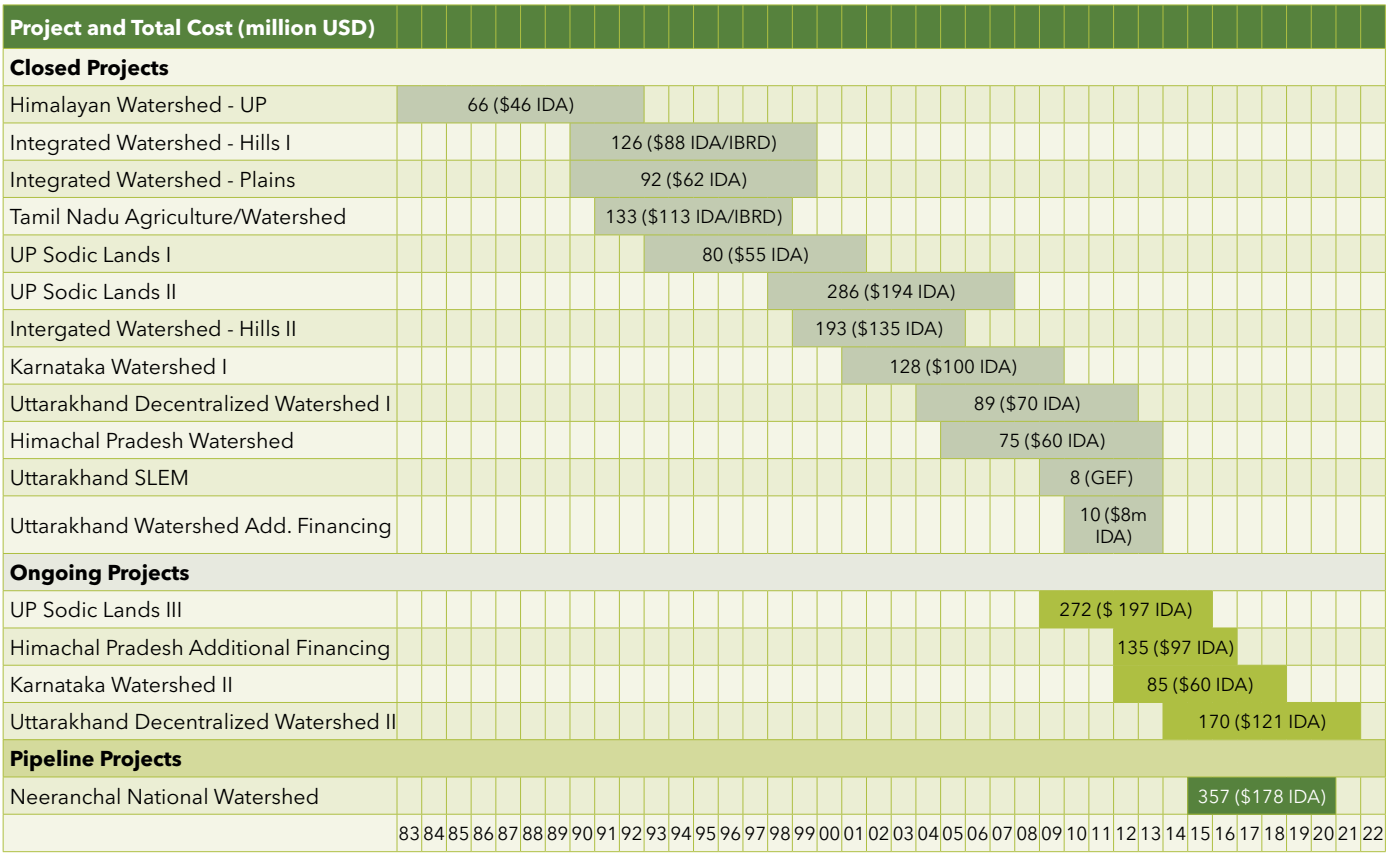
The World Bank has been a long standing and trusted partner in supporting watershed management programs in India for more than three decades (Figure 1). From 1983 to 2022 (when current projects will close), total investments in watershed management programs would have reached approximately US$2.4 billion, with the Bank contributing US$1.6 billion. Past Bank-supported projects have mainly been targeted at specific states through stand-alone operations where the projects were not linked to existing, ongoing government watershed management programs. Instead, these projects operated independently of government programs with the Bank co-financing all investment activities including participatory planning, capacity building, research and development, farming system intensification, soil and water conservation, and monitoring and evaluation. This approach allowed Bank-supported projects to be more focused on piloting new approaches and innovations that would not be possible in government programs. The Bank-supported projects in India have generated a substantial number of important lessons and best practices that have been incorporated into the national watershed guidelines for current government watershed programs, particularly the IWMP, which was developed in 2009 as a consolidation of three earlier Government of India national watershed development schemes.

The new generation of Bank-supported watershed projects in India is directly linked to national watershed programs and will improve program performance through the addition of technical inputs and innovative practices. One project is now underway in Karnataka. A second, larger, operation (Neeranchal National Watershed Project) has already been prepared and will become active in late 2015, in selected sites across several pilot states. With the emerging transition of IWMP into a component of the new PMKSY scheme, these two Bank projects will migrate to this new scheme. Both the Karnataka and Neeranchal projects have also been designed to strengthen convergence between watershed programs and other national schemes being implemented by the states, where positive synergy is possible, for example with a national employment scheme (MNREGS), and sector programs linked to agriculture and forestry. In particular, the MNREGS is investing close to US$2.0 billion per annum on manual labor works for soil and water conservation in rural areas, but without formally being linked to IWMP and science-based watershed management planning.

Laying the Groundwork for New Bank-Supported Projects in India

To aid the development of the new generation of Bank-supported watershed projects in India, the Bank supported a review of three earlier stand-alone Bank projects in Himachal Pradesh, Karnataka and Uttarakhand, to distill best practices and lessons learned. An extensive report was prepared

FIGURE 1: SUMMARY OF WORLD BANK WATERSHED PROJECTS, INDIA, 1983 TO 2022



and disseminated in Washington and Delhi (Smyle, et al., 2014).

Drawing directly from this review report, some of the main lessons learned from the three Bank-supported projects, and guidance for future projects, are as follows:

Planning Scale and Hydrology

- The use of the micro-watershed as the basic unit for planning and intervention in the three projects studied was demonstrated to be very appropriate. But, because the micro-watershed approach was carried out in the absence of a landscape level hydrological assessment, the larger scale goals of protecting and conserving hydrologic services and/or managing negative downstream and groundwater impacts were not addressed. Knowledge of landscape level hydro-geology and water balances is critical to guide specific interventions at the micro-watershed-level and to assess the aggregate impacts of individual micro-watershed developments

Google Earth map showing distribution of existing and proposed water harvesting structures in rainfed areas of Patel Faliya, Gujarat, following landscape level assessment.

in a specific region. The Himachal Pradesh project is looking into this aspect, utilizing a simple methodology to account for increased water use.[21] The new Karnataka Watershed project is developing simple water budgeting tools. As part of the Neeranchal project preparation, the Bank supported a study in Gujarat to develop a methodology for landscape level hydrological assessment that could be piloted during project implementation.

- All three projects focused primarily on the productive aspects of water management for agriculture, and not on broader drinking water supply, water quality, or overall water availability and allocation Watershed programs need to adopt integrated water resources planning at the micro-watershed level, guided by a larger scale hydrological assessment. In Uttarakhand, project staff has noted that domestic water supply is a priority of villagers. Some limited work on water quality is being done in 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. This aspect will be considered in the new PMKSY scheme, with technical support from the Neeranchal project.

Institutions and Capacities

- The three projects made very strong contributions in the institutional aspects of watershed management. 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[22] the projects also sought to contribute to harmonizing efforts between the disparate state-level agencies with mandates over water resources and watershed management. 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.
- In the case of the earlier Karnataka and Uttarakhand projects, both used NGOs to mobilize and build the capacities of the villagers. With Karnataka, performance-based payments systems were used with field NGOs where payments were made based on demonstrated outputs, rather than inputs. For example, with livelihood support, payments were made based on Self-Help Group members achieving an agreed monthly income target after training, business development and handholding, rather than payments being made simply for running training courses.

Equity and Livelihoods

- All three projects addressed equity issues. Watershed management projects in India, by nature of the soil and water conservation interventions, tend to favor landed farmers. Equity was addressed in two ways. First, the planning and implementation process featured inclusion, empowerment and mainstreaming of women, the poor and vulnerable groups into the decision making processes. 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. Second, integrating a livelihood component into the project that targeted these disadvantaged groups

21 According to personal communications with project staff: (i) an estimate (assumption) is made on what increase in base flow 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.

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

Livelihood products by women's groups

Wall paintings, Karnataka

demonstrated that, 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.[23]

Sustainability

- A post-project impact study of the Karnataka project indicated that of the more than 6,000 Self-Help Groups created during the project, more than 80 percent continued to thrive post-project because of strong group cohesion and common goals focused around financial growth. Other institutions set up during the project such as farmer groups and higher-level village committees had mixed results. Institutions that continued to function effectively post-project were those that consistently applied principles of transparency and accountability in the functioning of their group. This extended to all group members, not just the leaders. Maintenance of assets was not a major issue, since the majority of civil works were constructed on private fields where farmers not only had made a financial contribution during construction, but also had the financial incentive of higher crop yields to ensure assets were looked after. On common areas, the results were not as positive.

Monitoring and transparency

- Transparency and public accountability, especially in regards to works and monies, is the key to smooth implementation and harmonious social relations. Projects used wall paintings to indicate beneficiaries, fund flow and labor rates to promote full transparency. The Karnataka M&E system was an award winning,[24] state-of-the-art approach but also, and perhaps more importantly, because of the manner in which the system was put to use by project management to monitor ongoing implementation and guide subsequent changes in approach.

23 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 benefitted, and that too fairly, from their participation in the project.

24 The project (via the Watershed Development Department) was the recipient of five prestigious national awards in the latter years of implementation: National Productivity Awards in 2007 and 2009; the National Water Award in 2007; Earth Care Award in 2008; and the National E-Governance Award in 2009. The project also won three international awards through the M&E agency for innovative IT work done in the project by Antrix Corporation - part of the Indian Space Research Organization: the prestigious Globe Sustainability Research Award in 2010, presented in Stockholm; the Geospatial Excellence Award 2010, presented at the 9th Annual Asian Conference on Geospatial Information, Technology and Applications in Malaysia; and the Intel Environment Award as part of the Tech Awards Laureates 2013. The project also won a World Bank Internal Evaluation Group (IEG) award for Excellence in M&E in 2011.

Based on the experience of these three World Bank-supported projects, and drawing on success stories from government and bi-lateral watershed programs, it is very clear at this point that watershed development provides a credible approach to a range of development and natural resource management challenges facing rainfed areas in rural India. The measurable benefits from Bank projects were significant. From the Karnataka project for example, a post-project review indicated:

- The increase in yields per hectare with rainfed production was 27 percent for cereals, 37 percent for pulses, 41 percent for oilseeds and around 48 percent for other crops.
- Average milk yields increased from 1.70 liters to 2.80 liters/day in the case of local breeds and between 6-7 liters in respect of cross-breeds.
- Overall, incremental household income from project activities increased by an average of 71 percent.

As a tool, watershed management is most useful in helping to: (i) increase agricultural productivity under difficult rainfed conditions; (ii) arrest and reverse land degradation; and (iii) reduce water stress on the lands of project participants and also in micro-watersheds, by capturing and utilizing rainfall and stream flow for productive purposes.

CHAPTER-4

INSTITUTIONAL ASSESSMENT OF IWMP

The Neeranchal Project Focal States: An Overview

As indicated earlier in the report, the World Bank has worked with the Department of Land Resources to design a new US$ 357 million National Watershed Development "Neeranchal" Project to provide technical support to IWMP. As IWMP is folded into the new PMKSY scheme, Neeranchal will broaden its focus somewhat. Originally, Neeranchal was targeted at nine states (Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha,[25] Rajasthan and Telangana[26]). As the PMKSY scheme evolves and most likely becomes operational in late 2015, Neeranchal may support additional states. For the purpose of the institutional assessment, these nine states were the focal regions. Lessons learned would have useful applications in all states where PMKSY and its watershed component operate.

These nine focal states represent a wide range of agro-climatic contexts and land-use characteristics.[27] They vary from the arid regions of Gujarat and Rajasthan to assured rainfall areas of the eastern India and the rain shadow regions and high rainfall areas of Maharashtra. As per the Indian Council of Agricultural Research (ICAR) classification, under the National Agricultural Research Project (NARP), each state is classified into various agro-ecological zones based on major influencing factors such as soils, climate, topography, crops and vegetation. The socio-cultural context, land tenure systems and community context also varies across these regions.

Land use patterns vary considerably across states and across regions and districts within states. Eastern states have considerable forest cover while the area under cultivation is very limited. This would suggest that many watersheds are forest watersheds having a different dynamic of conservation strategies and resultant benefits. The policies of access to forest produce would be very crucial in these watersheds. The land use time series data show reduction in cultivable land and increase in land not available for cultivation and uncultivated land specifically for Andhra Pradesh, Gujarat and Jharkhand. This indicates that land has been diverted to non-agricultural uses and also that land degradation has increased. The average annual growth rate of agriculture and allied sectors in less-developed states as well as in the newly-emerging states recorded a better performance than the all-India estimated average. The better-developed states also report a better growth of five percent and above, on average, in comparison to the national scenario.

Some of these states such as Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra and Rajasthan have a fairly long history of implementing watershed development projects (Table 3). In recent years, Odisha also made serious attempts in this direction. Except for the more recently-

25 Formerly known as Orissa.

26 Telangana was recently added through a political bifurcation of Andhra Pradesh. As such it was not specifically included in the institutional study.

27 See Annex B for more details.

TABLE 3: STATUS OF WATERSHEDS DURING PRE-IWMP PERIOD

States	Total Micro-Watersheds (MWs) (Number)	Area (100,000 ha)	Untreatable MWs	MWs Taken Up Prior to IWMP	Area (100,000 ha)	Balance of MWs (No.)	Area (100,000 ha)	Ratio of area treated to treatable area (%)
Andhra Pradesh	46,035	275.04	18,454	9,518	47.91	27,581	134.86	26.00
Chhattisgarh	17,623	135.10	None	4,746	16.60	12,877	118.49	12.29
Jharkhand	10,798	79.70	2,519	1,026	7.84	7,253	57.46	12.01
Gujarat	13,587	196.02	1,005	4,540	37.68	8,042	131.10	23.32
Maharashtra	60,251	307.68	16,066	13,676	74.08	30,509	165.25	30.95
Madhya Pradesh	37,243	308.25	13,875	8,949	50.81	14,710	131.32	27.90
Odisha	20,079	155.71	3,206	4,836	27.99	12,037	106.58	20.71
Rajasthan	45,026	247.36	744	11,096	66.81	33,186	178.69	27.23

Source: SPSP of all states; in the case of Andhra Pradesh, also from data presented by SLNA during the Mission visit.

formed states of Chhattisgarh and Jharkhand, other states have also experimented with, and adopted, different institutional arrangements for implementing watershed projects.

Status of IWMP Implementation in the Focal States

State Perspective and Strategic Plans

As part of the initial IWMP planning process, each state developed a detailed State Perspective and Strategic Plan (SPSP). It consisted of details about the state's resources, such as water, land use pattern, the socio-economic parameters, details of agriculture and related activities, watershed demarcation, prioritization and road map for implementation and proposed institutional arrangements for the same.

Physical and Financial Progress

IWMP has been under implementation since 2009 and the first batches of projects were sanctioned in 2009–10. Data showed that by the end of that financial year, projects got the "go ahead" from the DoLR in all the states and the work started by the end of the financial year. Based on allocations given by the DoLR (area allocated based on weightage for each state) and on reports submitted by each SLNA, projects have been sanctioned for various areas to be treated along with an allocated budget (Table 4). Implementation performance of the IMWP was quite varied. A key point is that even one of the best performing states (Madhya Pradesh) had a disbursement rate of under 65 percent for funds allocated from IWMP. Also, progress was inversely proportional to the quantum of the projects: Larger states with a greater number of projects tended to show lower levels of expenditure. Further, an average delay of a year was observed in initiating each batch of projects *after* funds were allocated. In most of the states, the first batch of projects only utilized the funds from the Preparatory Phase even though the projects had been under implementation for the past three and half years.

What are some of the reasons for this poor implementation performance? The current study found that funds allocated by DoLR to states are released by State Level Nodal Agencies (SLNA) to the District level Watershed Cell cum Data Centre units (WCDC)[28] within fifteen days of receipt from the Department of Land Resources (DoLR) in Delhi, as per national guidelines. From then on however, the funds are held at the district level.

28 The WCDC is a project support and management unit chaired by the District Collector.

TABLE 4: FINANCIAL PROGRESS OF PROJECTS[29]

States (2009– 13)	Projects	Area treatable (100,000 ha)	Sanctioned Amount (US$ billion)	Received amount (US$ billion)	Expenditure (US$ billion)	Expenditure Rate to Allocation Received (%)
Andhra Pradesh	556	23.85	48.0	62.0	6.90	11.1
Chhattisgarh	208	9.17	18.0	15.0	1.70	11.3
Gujarat	489	24.49	52.0	78.0	3.88	5.0
Jharkhand	117	6.21	15.0	1.7	0.67	39.4
Maharashtra	933	40.02	83.0	21.0	8.44	40.2
Madhya Pradesh	357	20.12	40.0	8.0	4.30	62.5
Odisha	234	1.278	26.0	4.0	2.54	63.5
Rajasthan	749	4.229	96.0	19.0	5.59	29.4
Total	**3,643**	**17.893**	**378.0**	**208.7**	**34.02**	**16.3**

Note: Expenditure and release as on April 2013 for all states except Andhra Pradesh and Chhatisgarh (as on July 2013).

The SLNA does not have any control on funds held by districts and they are unable to redistribute resources from poorly-performing to better-performing districts. The better performing districts often struggled to fulfill their targets for lack of funds, as the study observed in Chhattisgarh and Odisha, thus creating a kind of undesirable "performance disincentive." Even though inter-batch and inter-project transfer of funds was proposed in the new financial release guidelines (letter dated 13 June 2012 by DoLR) it did not affect funds already released and held by the districts. While inter-project transfers would have helped districts to re-allocate funds *within the district* from poor-performing to better-performing watersheds, funds could not be reallocated across districts. The outcome was that poor-performing districts in smaller states (Chhattisgarh, Jharkhand and Odisha) had considerable unspent balances. This problem was compounded by the fact that the SLNA cannot call for additional funds from DoLR until 60 percent of overall funds released to the state have been spent. Thus, slow-performing districts sitting on huge unspent balances are holding back implementation progress in other parts of the state.

There is lack of an effective national MIS and Financial Management System (FMS) to track the progress, both physical and financial, at different levels of fund movement online, in real time. Andhra Pradesh is an exception with a fairly effective MIS and FMS that allowed both the SNLA and DoLR to monitor implementation performance.

The administrative capacity of the states to absorb and initiate a large number of IWMP projects is another factor. There are wide disparities amongst the focal states: Andhra Pradesh, Gujarat and Maharashtra had developed reasonable capacities from the SLNA down to field-level, yet none have acquired the full complement of competent personnel, management and operational systems, and the necessary resources and facilities required to achieve the goals and expectations outlined in the common guidelines of the IWMP, and at the scale envisaged. This can be confirmed from Table 4, which shows that Andhra Pradesh and Gujarat have very low disbursement levels. It was also observed that contracted Watershed Development Teams (WDTs) that support district level implementation did not always have a strong sense of ownership of the projects. This is compounded by weak decision-making powers or delegation, poor levels of overall planning and guidance, inadequate human resource policy and staff moving to other government programs, such as MNREGS and the National Rural Livelihood Mission (NRLM), where salaries and working conditions are perceived to be superior to those offered by the IWMP.

29 The table is indicative. Errors existed in the data provided by SLNAs and, consequently, the aggregated data available from the current DoLR MIS was not reliable.

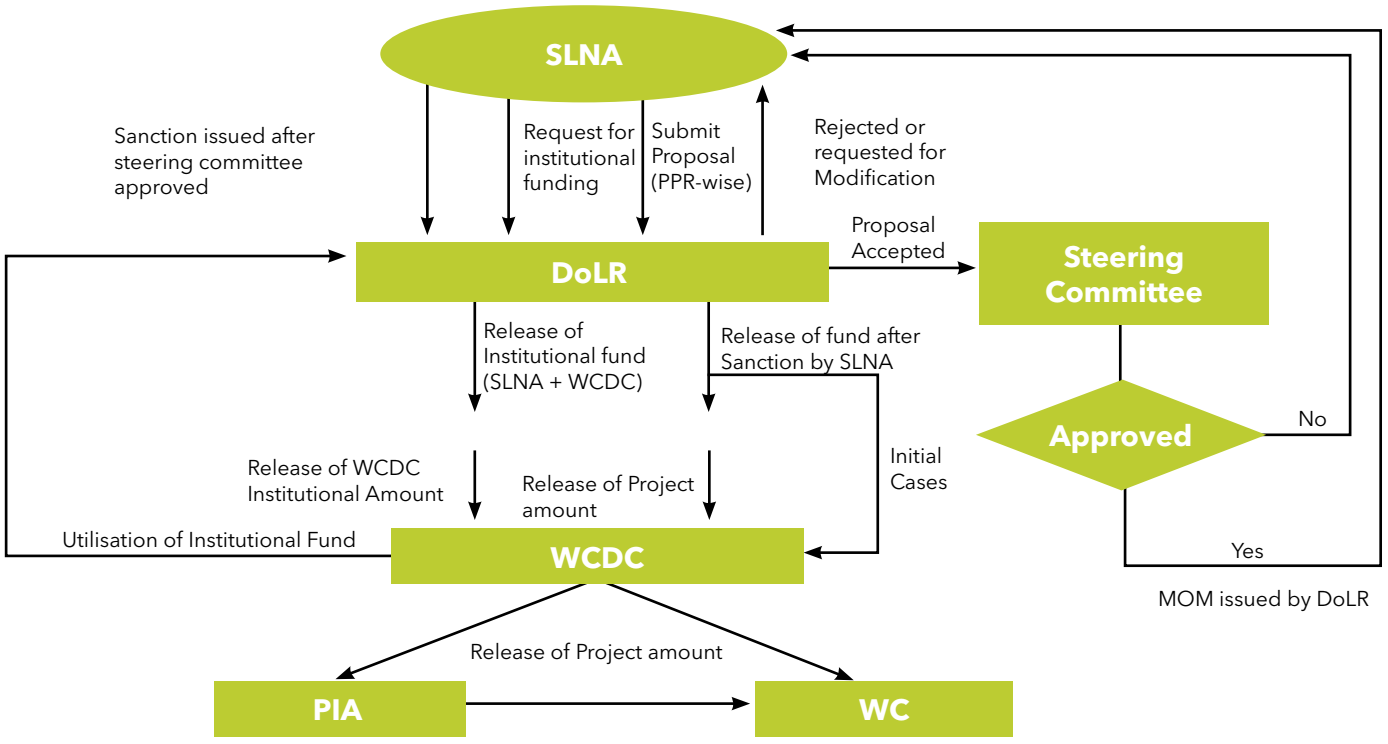
IWMP Institutional Arrangements

A major departure and innovation from previous watershed programs is the new institutional arrangements in IWMP, especially the provision of dedicated organizational mechanisms for project management and support at the state and district -levels. The option of using additional resource providers such as NGOs has also provided. Other project-level institutional arrangements (e.g., the nature of Project Implementation Agencies – PIAs; Watershed Development Teams WDTs and Community Based Organizations – CBOs) are the same as before; nevertheless, there is a positive intent on strengthening CBOs and participatory mechanisms (Figure 2).

A crucial issue emerging from this study pertains to the institutional arrangements at the state and district-levels in most of the states. For example,: the district should ideally have a Watershed Advisory and Coordination Committee (WCDC), chaired by the District Collector as the senior civil servant in the district, to provide administrative and political back up with the WCDC to support the management and implementation of watershed programs. The study shows that the WCDCs are often poorly staffed and ill-equipped to function as a district level support unit. Some attempts to address this situation have been attempted in Gujarat and Odisha to strengthen the WCDCs with additional staff.

Direct field implementation is either through government agencies or contracted agencies, such as NGOs. More than 80 percent of the IWMP projects are implemented at the field level by government organization–project implementation agencies (GO–PIAs): in states like Gujarat and Odisha (except for three NGOs) it is entirely undertaken by GO–PIAs. While this is understandable, to an extent, given the scale of the program and in some cases insufficient numbers of qualified NGOs, the issue of a "conflict of interest" arises. The governance and implementation functions at the WCDC need to be separated. Where the WCDC acts as implemented, it cannot then be also responsible for financial sanctions, monitoring and oversight to ensure accountability. Moreover, most GO–PIAs do not have the full

FIGURE 2: INSTITUTIONAL ARRANGEMENTS FOR THE IWMP



BOX 1: THE COMMON GUIDELINES, EQUITY AND SUSTAINABILITY

The most recent national watershed guidelines indicate that Project Implementing Agencies (PIAs) must facilitate equity processes such as: (a) enhanced livelihood opportunities for the poor through investment in their assets and improvements in productivity and income; (b) improving access of the poor, especially women, to the benefits; (c) enhancing the role of women in decision making processes and their representation in the institutional arrangements; and (d) ensuring access to usufruct rights from the common property resources for the resource poor.

The Watershed Committee (WC) with the help of the PIA and district technical teams shall facilitate resource-use agreements among the user groups based on the principles of equity and sustainability. It should work out detailed resource-use agreements (for surface water, groundwater and common/forest land usufructs) among user group members in a participatory manner based on principles of equity and sustainability. The Detailed Project Report (DPR) needs to elaborate the institutional mechanisms and agreements for implementing the plan, ensuring emphasis on participatory decision-making, equity and sustainability of benefits, and post-project sustainability.

Source: DoLR (2011), pp. 9, 29, 35 and 37.

range of expertise related to the participatory planning process including social mobilization, group formation, and institutional support. Most of the PIAs reviewed are understaffed and responsible for many other functions of the parent departments. The WDTs are relatively new and inexperienced with hardly any opportunities for career mobility and job security; hence they are viewed largely as stop-gap arrangements. In the absence of systems and procedures, PIAs in most of the states are working based on their experience, intuition and ingenuity. As a result, IWMP operations have often reverted back to a top-down process led by the WCDC, with minimal attention given to meaningful and sustained community involvement. While the national watershed guidelines suggest that NGOs be used to support implementation, building on positive lessons learned from several Bank-supported and other donor-assisted watershed projects, this is not a legal requirement under the IWMP.

Equity and Sustainability in IWMP

The IWMP has adopted an integrated approach through the national watershed guidelines of adding a livelihood component to promote equity and build on lessons learned from Bank-supported projects (see Box 1). In practice however, the study found there were few operational or institutional mechanisms being put in place to ensure better equity.

IWMP Watershed Planning and Implementation

The Detailed Project Report (DPR) is expected to be developed by WDTs and PIAs with the support of the WCDC, ratified by the Gram Sabha,[30] approved by the district agency and sanctioned by the SLNA (Box 2).

The unit of planning is at the micro-watershed level based on a cluster of several micro-watersheds comprising between 3,000 and 5,000 ha. Each cluster is referred to as a "project" in IWMP. In all the states except Maharashtra, separate DPRs are prepared for each of the micro-watersheds; whereas in Maharashtra, a single DPR is prepared collating and depicting each of the micro-watersheds in the cluster. The institutional and financial arrangements for projects thus are also at micro-watershed/village levels in all the states. The ridge-to-valley principle of conservation is expected to be followed in the plans.

Gujarat prepared a 'model' DPR where the steps followed included preliminary village meetings, baseline survey, Participatory Rural Appraisal (PRA), problem analysis, Project Net Planning (PNP) and

30 The Gram Sabha is the foundation of local government in India. A village with not less than 1,500 people forms a Gram Sabha represented by every adult of the village. Members of the Gram Sabha elect members of the Gram Panchayat for three years. The Gram Panchayat is the organization of elected officers (generally five).

BOX 2: PLANNING PROCESS AND PREPARATION OF DPR

- Sound PRA exercises and beneficiary level database linked to cadastral and spatial data.
- Biophysical, socio-economic and institutional database.
- Problem analysis and proposed strategy to address these problems.
- Proposed interventions with physical and financial phasing as well as detailed design and drawings.
- Institutional mechanism for implementing the plan, ensuring equity and sustainability.
- Mapping exercise.
- Convergence plan and integration with district perspective plan.
- The DPR will be a part of the MIS from which details will be arranged into various layers on a GIS platform as a monitoring, management, accounting and analytical tool besides serving as a source of information and a link to the state-level data cell in the SLNA and National Data Center. The DPR may be summed up using a standard planning tool such as Logical Framework Analysis that includes goals, purpose, outputs, activities, inputs, challenges and measurable indicators of progress.

conversion of the same into an Action Plan.[31] While the PNP is designed for a dialogue with each land holding family to work out a possible land use plan and expected treatments, the planning system adopted is limited to a focused discussion on problems and solutions and location for structures in the village meetings (along the lines of a PRA) - instead of visiting the plots of land to understand the problems and work out solutions with the land owning families or user groups, in the case of water harvesting structures.

Odisha adopted a system called 'patch planning' for an area of 20–30 ha. The method was adopted due to extremely small land holdings in the state. A patch is selected based on land capability factors, texture, soil depth, soil erosion and soil slope and, since the planning is done for a micro-watershed, 15-20 patches are identified for the planning unit. There is no specific survey number-wise plan or data base in this case. It is basically a gross estimation of the treatment requirement in the patch and the expected cost of the same.

In Maharashtra, PIAs worked with consultants to undertake the net plan survey, socio-economic survey and preparation of the DPR. In almost all watersheds they have adopted the PNP process of planning, taking into consideration the land capability characteristics based on soil depth, erosion status, soil texture and land slope. However the exercise has very little involvement of the beneficiary farmers.

In Chhattisgarh, for the first phase DPRs, the baseline data and the DPRs were not well linked. The planning exercise was mainly top-down and determined by the type of PIA involved in the process. Even where the Water Resource Department was involved as a PIA, the approved design details for structures were not closely followed and instead basic thumb rules were followed.

In Andhra Pradesh, the first batch of DPRs did not closely follow the methodology of the PNP, which should actively involve farmers on-site to assess the land capability of their farms and to plan conservation and production measures. Rather, a "patch planning" approach was adopted and extrapolated across large contiguous areas, resulting in aggregate estimates of types and works to be done. Farmer involvement was minimal. Moreover, in this early batch, DPR preparation was contracted out to some NGOs who were not necessarily PIAs in those projects. This resulted in low ownership of the proposed measures on the part of the farmer as well as the PIA. However, subsequent batches of DPRs have progressively demonstrated marked improvement in quality.

Even though PRA exercises were conducted in all the states, a participatory planning process and approach was lacking. In a few states like Gujarat,

31 Referred as such by the DoLR website as it appears to be the first DPR prepared in the country (for Eval village in Patan district of Gujarat).

Jharkhand, Madhya Pradesh and Odisha, PRA was used for identifying locations of various treatments; in states like Andhra Pradesh, Chhattisgarh and Maharashtra PRA was basically done as an exercise to understand the social and resource aspects besides creating awareness about the project.

Though ideally DPRs should be used to prepare Annual Action Plans (AAPs), due to inaccuracies in the DPRs prepared (in terms of design, outlay and phasing of activities), the AAPs were prepared as a separate activity in most of the states. The gross cost estimation for each structure given in the DPR was later converted into technical designs and financial estimates at the time of implementation, and necessary sanctions (technical and administrative) were sought by the WDT. For costing purposes, the standard estimated schedules of the respective departments or the nodal agencies were used. The data collected were analyzed using a Microsoft Excel spreadsheet, except in Andhra Pradesh (which had prepared specific software for this purpose) and Maharashtra (which used the net plan software).[32] In other states, the data for Natural Resource Management (NRM) work was entered into an Excel spreadsheet.

Even though the guidelines stipulate that the DPR should be discussed and approved in the Gram Sabah, the study found that in general, awareness levels were rather low – most of the villagers interviewed were hardly aware about the planning process and the DPR. There is a need for a comprehensive planning system that uses participatory methods and modern technology while being flexible to adapt to local requirements. The DPR should not only give the physical and financial details of interventions, but should also become the basis for a systematic monitoring system, as envisioned in the guidelines.

The Natural Resource Management Component of IWMP

The IWMP national guidelines stipulate that 7.5 percent of the 20 percent allocation for the Preparatory Phase is for planning around NRM. During the Works Phase, 56 percent of the allocated project funds are meant for the NRM component of watershed development. The projects from the first two phases (2009–11) should ideally have reached the Work Phase by now; but data showed that only first-phase projects in a few states had reached this work stage by 2015.

In most of the focal states, the major physical interventions include water-harvesting structures while area treatment and biomass development is very insignificant – although there is extensive soil moisture conservation through field and contour bunding activities in projects in Andhra Pradesh, Gujarat and Maharashtra and decentralized water harvesting in Odisha. In most of the states, the predominant expenditure was on water harvesting structures, but, there are exceptions. While there is high demand for water harvesting structures from the community, the WDTs and PIAs also lean towards these as preferred them because they show immediate impacts, are visible, and allow for relatively large expenditures. While the emphasis on types of treatments undertaken follows the general agro-climatic situation, there is a distinct emphasis on area treatment in both Gujarat and Maharashtra, two drought prone states. Rajasthan had very few technological options, according to SLNA and WCDC officials, because most of the watersheds were located in 'desert' conditions.

The quality of work reviewed in the field was mixed. Most of the works are executed through machines; hence the usual process of having a specific cross-section is not followed for land treatment works. In most cases, no provision is made for the field bund outlets; hence breaches by water flows during the rainy season are common. Staggered, continuous trenches constructed in Jharkhand, Maharashtra, and Madhya Pradesh do not always follow contour lines, nor are contour-based layouts marked before work begins. Earthen structure spill ways require a lot of attention, which is not always the case. For example, in Eval (the model project in Patan, Gujarat), the spillway for a large earthen structure was not planned as part of the intervention but done later as an afterthought. In Rajasthan many check dams fail to retain water

32 This software has been developed by the Watershed Organization Trust (WOTR) for use in the IGWDP.

due to faulty construction and poor quality control measures.

The implementation process does not always adhere to a ridge-to-valley approach. In watersheds where the predominant conservation measure is terminal water harvesting structures in various drainage channels, the upper catchment is seldom treated.

Hydrology and Geographical Information Systems

As indicated earlier in the report, watershed programs would benefit immensely from systematic landscape level hydro-geological studies. Groundwater resources play an important role in watershed hydrology and agriculture economy and provide a fundamental model for formulating strategies for local groundwater use, keeping in mind the "typologies" of groundwater resources at different scales, especially at the micro and macro-scales Kulkarni (1998). As the study found, there are many limitations that restrict the application of geo-hydrology such as the availability and quality of geo-hydrological data (precipitation, evaporation, transpiration, ground water, stream flow, soil data, geological data, etc.). Chhattisgarh, Gujarat and Odisha, through their State Water Resources Department and Data Storage Centers, are collecting hydrological, meteorological, topographical, geo-morphological, demographical and ecological data. To facilitate planning and development of water resources, a modern hydrological information system is in the process of development, which would include collection, processing, archiving and dissemination of water-related data. The data so far available are on a river basin scale. With the large-scale proposed aquifer mapping in the Twelfth Five-Year Plan document, there may be another window for integrating hydrological data with watershed planning, but only at a basin or sub-basin scale. For sub-watershed and micro-watershed levels, the hydrological data required are not readily available. However, these data may be useful in larger-scale (catchment-level) hydrological assessments. Thus, there should be a strong focus on hydrological modeling and simulations, to predict possible impacts (positive and negative) and to subsequently use these in an iterative planning process to identify appropriate interventions in a participatory manner with local stakeholders.

GIS for Planning and Monitoring

Currently, detailed data are available on topography, land-use, slope, geology, hydrology, geo-hydrology and drainage at the state and district-levels in some states. All this information is digitally enabled through a Geographical Information System (GIS). All the focal states have remote-sensing/GIS cells supported by various other agencies. In Andhra Pradesh, Gujarat and Maharashtra there was an attempt to use GIS data in planning and monitoring. In other focal states, the use of GIS is presently limited to elementary aspects of planning such as locating structures and to identify contours. In Odisha and Chhattisgarh, the GIS unit is supported by the National Institute of Rural Development and Panchayati Department; in Rajasthan a separate cell is being established with the help of WAPCOS and PDCOR.[33] Currently the GIS cells at all focal state SLNAs operate on a single-license system with only one expert to take care of all the updating of databases for the IWMP as a whole. There is a need for a server-based, multiple-license system with more experts to handle the tasks involved. Also, the current capacity of the GIS cells can be further increased with support from an external technical agency having remote sensing and GIS competencies. Further, moving to an online GIS platform would greatly facilitate management and analysis of data and information in a geo-spatial mode.

33 WAPCOS Limited is a public sector enterprise under the Ministry of Water Resources that provides consultancy services 'in all facets of Water and Power and Infrastructure sectors' (http://www.wapcos.gov.in/Home/Aboutus.aspx). The Project Development Company of Rajasthan (PDCOR) is a company jointly promoted by the Government of Rajasthan and Infrastructure Leasing & Financial Services Limited (IL&FS) 'to facilitate private sector investment in the infrastructure sector in the State of Rajasthan' (http://www.pdcor.com).

Convergence in the IWMP: Experiences and Issues

Convergence of major rural development programs, especially in the areas of natural resource development, enhancing agricultural productivity and rural livelihoods, have been a concern for watershed development interventions since many years. Institutionalized convergence of watershed development with other interventions - such as Mahatma Gandhi National Rural Employment Guarantee Schemes (MGNREGS), Rashtriya Krishi Vikas Yojana (RKVY), Backward Regions Grant Fund (BRGF), National Rural Livelihood Mission (NRLM) and the National Horticulture Mission) - have the potential to enhance the intensity and impacts of the interventions during the project period and also ensure continuity in investments.

A key deficiency of many of these national schemes is that they continue to function within the confines of departmental silos and without requisite convergence; this can lead to a high degree of duplication of effort (Planning Commission, 2013, vol. 1 p. 290). Even though the guidelines of all major and relevant national schemes stipulate inter-program coordination and convergence, inter-departmental consultation is a rare phenomenon. There is reluctance among the sectoral departments to commit funds for projects emanating from other departments mainly due to the fear of losing control over internal resources. Even national schemes emanating from the same Ministry[34] tend to operate independently, without the necessary coordination and consultation. The Twelfth Five Year Plan (2012-2017) visualizes a convergence of implementation across programs to pool financial and physical resources across sectors to attain synergy to benefit the target group. The emergence of the PMKSY scheme, which combines ongoing watershed, agriculture and water programs across three Ministries, is an attempt to address this problem.

A study recent undertaken by the National Institute of Rural Development (NIRD) regarding convergence issues in major flagship programs identified some key critical issues. Besides the problem of departmental silos and fear of losing control, the lack of institutional mechanisms in operationalizing convergence at both the policy and field levels is considered as a major bottleneck. In the absence of an institutional platform for convergence, departmental functionaries raise questions on how to monitor and who to hold accountable, given that "convergence" resources are under the authority of another agency, over which they may have no administrative control. There are differences in norms of subsidy/target groups and accounting procedures which bring in conflicts and complexities in the process of planning for convergence.

The MoRD has made an independent effort in this direction with the Department of Rural Development and if this has been spelled out earlier, then we can just use DoLR here by issuing Joint Convergence Guidelines in 2009 covering watershed and rural livelihood programs. Similarly the Twelfth Plan also proposes creating common sanctioning authorities within districts for the IWMP and RKVY programs so that the IWMP has a livelihoods focus and the RKVY is implemented based on landscape/watershed principles (p. 291). More recent guidelines developed by MoRD relate to convergence between IWMP and MNREGS, which are both hosted in the Ministry (highlights are shown in Box 3).

Among the focal states, there are ongoing attempts to develop convergence between IWMP and MNREGS, as well as with various MoA schemes, in selected districts (Box 4). The DPR can provide details of potential convergence activities to be undertaken, but during the study, it was found that outcomes are not uniform. Further, success with convergence at field level often depends upon the commitment and interest of officials responsible for implementation of specific programs or schemes. Institutional arrangements in IWMP should facilitate effective convergence; but except for Andhra Pradesh and a few instances from other states, it has not fully developed. In six out of eight states, the nodal agency for IWMP and MNREGS was the same, and in all the states, the Chairperson

34 A good example is the convergence between MNREGS and IWMP, both implemented by MoRD.

BOX 3: ELEMENTS OF CONVERGENCE GUIDELINES OF IWMP AND MNREGS

- A detailed operational strategy for convergence in terms of planning, management and institutional arrangements at different levels, implementation strategy and monitoring systems.
- Three areas crucial for convergence are planning, management and works.
- An attempt to complement the strengths of both programs is in the guidelines, whether it is the planning and costing of IWMP or the emphasis on labor generation and role of Panchayati Raj institutions in MNREGS.
- To ensure commitment on coordination of departments, a District Resource Group (DRG) has been provided, with representatives from Watershed Cell and the Departments of Water Resources, Agriculture, Rural Development and Panchayati Raj.
- The DRG is expected to assist in knowledge sharing, planning, communication, training, technical support, resource pooling, informational functions and monitoring. However, despite good intentions not much has happened in this direction.

BOX 4: NEERANCHAL STATES AND CONVERGENCE

- In Andhra Pradesh, equity concerns were addressed through the convergence program. All NRM works on scheduled caste/scheduled tribe/small and marginal farmer's lands were taken up with MNREGS staff using program funds in IWMP villages.
- In Rajasthan where the nodal agencies (Directorate of Watershed and Soil Conservation) of IWMP and MNREGS from district to watershed levels were the same, there were attempts to bring in convergence in the IWMP projects.
- In Odisha and Maharashtra where the agriculture/soil conservation departments function as the nodal agency for IWMP, coordination with projects like RKVY and NHM was quite good with also an assured component of MNREGS funds.
- In Gujarat, the Gujarat State Watershed Management Agency (GSWMA) was the State-Level Nodal Agency (SLNA) to implement MNREGS and IWMP (Circular dated 20th January 2012, Commissionerate of Rural Development, Government of Gujarat). This, in essence brought both the programs under one single institutional arrangement and facilitated better flow of information and synergy.
- In Jharkhand, convergence activities were undertaken with MNREGS, NRLM and forestry programs.
- In Madhya Pradesh, labor-intensive works (such as gully plugs, contour trenching, farm bunding) were planned under MNREGS for implementation with manual labor, while IWMP focused on water harvesting structures to be developed with machinery.

of WCDC was the District Collector who was also the authority providing administrative sanction for various projects. The District Planning Committee (DPC) was expected to oversee and integrate all the plans of various departments in the district so that convergence and synergy take place.

Among the focal states, Andhra Pradesh is leading with processes and institutional mechanisms that have been streamlined to facilitate convergence. A composite plan with the objective of saturating coverage of treatments within selected micro-watersheds, following the ridge-to-valley principle, is first developed. The plan identifies works to be undertaken under IWMP, MNREGS, Mahatma Gandhi Recharge Project (MGRP), and Community Management of Sustainable Agriculture (CMSA); these were then included in the DPR. There is a clear segregation of soil and water conservation works under these various schemes. Till the end of 2013, an estimated US$ 187 million worth of work was undertaken by MNREGS in the IWMP project areas. In terms of the overall IWMP and MNREGS allocations in the state, this amount was fairly small, but the model being used had good potential for scaling up in other states as experience was gained and lessons were learned.

Preparation of the micro-plan/DPR by estimating the total requirement of the watershed and bifurcating activities under IWMP and various programs for NRM and livelihoods available through various departments/agencies would enhance convergence at the program and project levels. The planning process involving AAPs and Perspective Plans of the MNREGS should facilitate advance planning and include a year-wise shelf of works to be undertaken with the help of PIA/WDT. Involvement of stakeholders, such as the District Collector and bankers, etc. in planning as well at the monitoring stage along with the SLNA should lead to be better convergence at the policy level.

The overall strategy for convergence requires policy and institutional support through necessary government orders and circulars; inter-departmental coordination at state, district, block and Gram Panchayat levels; preparation of complementary and compatible operational procedures; identification of functionaries for implementation, monitoring and reporting; and regular monitoring of the same at all levels.

CHAPTER-5

ADDRESSING THE DEFICITS: WHERE NEERANCHAL CAN MAKE A DIFFERENCE

Specific Reforms for Watershed Implementation and Management

Under the forthcoming PMKSY scheme where IMWP will form the watershed component, the Neeranchal project is in a position to support a number of innovations and pilot work that could improve watershed program performance. The following represent potential key reforms:

Institutional reforms

The experience emerging from the study is that better results are generated where watershed programs clearly define the functions and role of the policy and governance entities as well as that of management and operational units, and give the latter considerable autonomy while effectively holding these units accountable for performance. Separation of functions and responsible agencies, in terms of roles, functions and authority levels, with appropriate mechanisms for linkages and coordination helps speed up decision making, increases overall accountability and improves performance. Neeranchal can help address institutional issues in watershed programs including:

- *Support DoLR in developing and piloting new institutional approaches for IWMP,* along with a much stronger project management unit in Delhi. This could include using more autonomous institutions at the state level, such as a registered society, to provide greater flexibility for implementing the program, using NGO more intensively for field implementation with communities, and promoting a greater role for district administration in coordinating programs across various departments. Lessons learned could then suggest possible institutional reform for the new PMKSY and the watershed component.
- *Support a full-time Project Director for the WCDC*. The WCDC could also enlist support from other service providers in capacity building, livelihood promotion, marketing, forward-backward linkage building, etc.; and–backward linkage building, etc.
- *Pilot the development of farmer producer organizations* (FPOs), supported by qualified NGOs who could provide the necessary social mobilization and linkage building/ networking support, while agencies such as ATMA, KVKs, state research stations, etc., could strengthen technology dissemination. Neeranchal could also develop better links between the FPOs and service area banks and credit cooperatives to bring in institutional credit for farmers and communities. Neeranchal would also need to build stronger linkages between the FPOs and private sector in providing input and market support. Lessons can be learned from good examples in Kerala (known as Kudumbashree - a joint effort of State Government and NABARD), the UNDP-GoI project operating in Andhra Pradesh (Mahila

Samakhya or APMSS), and one of the most successful and oldest cooperative institutions in Gujarat, called the "Ghambhira."

Watershed Planning

While generally satisfactory, the planning approach in ongoing government watershed programs can be strengthened through the Neeranchal project as follows:

- *An integrated software system for design and estimates of soil and water conservation measures and preparation of DPR*. Through this software, it would be easy to prepare individual designs and estimates for all structures. In addition to this, software on preparation of the DPR can be developed to help prepare DPRs including data analysis and cost calculations for the various components and activities.[35] This would be useful for desk appraisal of DPRs and would also help in integrating the plan document into the MIS. Standardization of data sets and integration of the same into integrated databases is required for the data to be used for M&E, MIS, and DSS at the national, state, district and PIA levels. Such a system would help in aggregation, comparison and analysis across watersheds, clusters and regions.
- *Greater attention to hydrology*. Hydrological assessments of the entire watershed at a landscape scale (at least 20,000 to 50,000 ha) could not only guide lower level micro-watershed planning and help set priorities for the selection of appropriate project sites but could also analyze various scenarios for potential impacts of these interventions and how best to mitigate against increased climate variability. Such an assessment could also be the basis for an iterative planning process to identify appropriate interventions in a participatory manner with local stakeholders to determine the optimum amount of water harvesting upstream while keeping in mind, the hydrology of the area and downstream water needs.
- *Follow a "ridge-to-valley" approach in planning*. Rather than excluding forest areas in upper catchment areas of Neeranchal sites, the DPR could highlight the requirement of treatment in forest areas and explore options with the forest department.[36] This is very important in eastern states where watersheds often have 50 percent forest cover.
- *Participatory Net Planning* (PNP) is an important tool that can improve community participation and dialogue on technology choices. The PNP process can be strengthened through greater use of remote sensing/GIS, Global Positioning Systems (GPS) and other technical inputs to enhance the accuracy and quality of the plans. Neeranchal can support piloting these approaches in selected project sites to demonstrate improvements to both the planning process itself and subsequent post-project benefits.

Capacity Building

Currently in IWMP, capacity building strategies are menu and target-driven and not fully calibrated to the specific needs of the target group. Technical, managerial and communication skills at the district and field levels, especially, are a major impediment to quality implementation. More specific areas where Neeranchal can strengthen capacities related to future watershed management include:

- *Supporting the development of a capacity building pedagogy* that is defined by local needs, based on achieving specific outcomes, and linked to progressive phases/stages in the project and release of funds. Capacity

35 The WOTR (www.wotr.org) has developed and validated for over a decade and a half such an integrated system for large-scale watershed projects together with Expert Systems and a DSS. The Antrix Corporation (part of ISRO) developed an excellent computer-based planning tool for the Karnataka Watershed Development Project (2001-2009).

36 There was a precedent in this regard. The Indo-German Watershed Development Program (IGWDP) in Maharashtra not only secured the cooperation of the Forest Department, but also got formal clarification that treatment of degraded forest lands coming in the IGWDP watersheds did not attract the provisions of the Forest Conservation Act. This allowed the VSS's facilitated by NGOs to enter forest areas and undertake treatments of the same. Further information in this regard can be got from the WOTR.

building should strengthen the technical, professional and personal capacities of PIA personnel on an on-going basis, especially in the area of facilitation/communication skills with communities.

- *Further developing the capacities of the WDTs, Technical Experts (TEs), and other stakeholders* for undertaking engineering surveys, preparing watershed plans and estimates, measuring works, etc. Presently, the availability of sufficient numbers of technically-qualified persons is a constraint in IWMP projects. Specific training on how to undertake PNP should be expanded to ensure that appropriate and site-specific measures are planned with the consent and ownership of the farmer/land owner and data are organized in a manner that makes IT-assisted planning, monitoring and reporting possible and easy.[37]
- *Hiring support agencies and experts to train the WDTs*. A pool of resource persons and institutions could be accredited to provide technical back stopping. It is also important to have a proper system for selecting, accrediting and attracting the best players (such as NGOs) in this field should be developed. Performance-based contracts should be used to pay NGOs or other agencies based on delivered results against benchmarks, rather than for providing specifics of training programs, workshops, etc. The approach of performance-based contracts was used in the Bank-supported Karnataka Watershed Development Project with good success.

Monitoring and Evaluation

Currently, M&E under the IWMP at state level is focused mainly on input–output monitoring with mixed performance across states. While input–output monitoring is needed, a more comprehensive M&E approach is required that incorporates concurrent input–output and process monitoring, and periodic impact assessment. Neeranchal could improve the M&E system in watershed programs as follows:

- *Support the development of a more effective Management Information System (MIS) for* watershed programs at both state and central levels that can also aggregate data from all states for improved national reporting. The initial support could cover: finalization and standardization of data and reporting requirements together with integration and harmonization of data formats; developing software programs that integrate the various formats so that data can be managed seamlessly and efficiently; and incorporating IT-enabled systems for public accessibility for transparency and accountability. The experience of Andhra Pradesh and Karnataka in this regard should be studied to facilitate adoption in other states.
- *Test the improved watershed management performance benchmarks* developed during the preparation of the Neeranchal project with the support of the DfID Trust Fund in India. These benchmarks can be tested at a moderate scale, integrated into the M&E/MIS processes and the approach expanded to the national level after incorporating the lessons learned from the experiences.
- *Finance development of concurrent process monitoring into the M&E system* to assess the impact of watershed activities on women, gender relations, power and caste equations, etc. This information on processes, could then guide timely and calibrated corrective measures.
- *Support periodic thematic and performance-related action research studies* on randomly selected sites over the course of the project/program life cycle/period. Such a mechanism would provide useful inputs for project and program steering and address emergent problems well before they become obstacles. A third party with no direct stakes in the program should preferably handle this task. This was the

37 The PNP was originated and developed by WOTR and they conducted regular trainings in this regard.

approach in the World Bank-aided Sujala project in Karnataka,[38] which appointed the Antrix Corporation in Bangalore to undertake this task. This was an important factor that contributed significantly to the success of the Karnataka program this task. This was one of the important factors that contributed significantly to the success of the Karnataka program.

- *Involve communities in local monitoring* by supporting training, equipment such as GPS enabled phones or tablets, and motivation to collect relevant field data and send it to a central point for collation and analysis. Technology for this approach already exists and there are good examples of projects in other sectors in India (for example the health sector) where community monitoring is a central feature of the M&E system. DoLR has also developed a mobile phone application for data gathering that can be tested in the project and gradually scaled up.

Convergence

As indicated earlier in this report, there are some positive examples of program convergence at field level between IWMP and MNREGS, as well as with various other national schemes being delivered by state agencies. These good examples tend to be based on motivated and committed senior program officers in each of the respective agencies who support convergence efforts on a personal basis. The Neeranchal project could help update the current convergence guidelines in DoLR by supporting development of an overall strategy for convergence that is borader than just watershed and MNREGS. It could be based on policy and institutional support that touches on: (i) drafting relevant government orders and circulars; (ii) defining methods for inter-departmental coordination at the state, district, block and Gram Panchayat levels; (iii) preparing complementary and compatible operational procedures; (iv) identifying functionaries for implementation, monitoring and reporting; and (v) regular monitoring of convergence against clear indicators. The strategy could be piloted in selected sites in the Neeranchal states.

Convergence is a major challenge faced by both the IWMP and possibly the PMKSY and therefore, innovative thinking is critical. But a fundamental starting point for such innovations is to bring all the major stakeholders – from within various arms of government, private sector, NGOs, academics and local communities – on the same page. Healthy discussions could then pave the way for action-research pilots to address knowledge gaps, improve implementation practices and try new approaches to different parts of the project management cycle. Of particular interest would be how to involve the district administration in the coordination and convergence of various programs, especially given the inter-Ministerial and inter-departmental approach suggested by the new PMKSY.[39]

Specific Reforms for Agricultural Improvement in Watershed Programs

Agriculture

Agriculture and climate change

Climate change is increasing weather variability, resulting in adverse impacts on agricultural livelihoods by affecting soil erosion, soil productivity, the subsequent quality and productivity of crops such as wheat and rice, as well as the productivity and mortality rate of livestock. There is a need to expand the system of meteorological data available to farmers on a near-real time basis to help them make better planting decisions. Such a system has been developed in Maharashtra by WOTR across their project sites. The system is effective and involves automated data flow from a chain of weather stations at the micro-watershed level to the

38 Sujala is the local name for the Karnataka Watershed Development Project (2001-2009).

39 It is also time to move beyond the usual practice in most 'convergence' efforts that seem to stop at involving the District Collector or by forming Committees with representatives from different departments (e.g., the District-level Coordination Committee or the District Planning Committee).

Meteorological Department who, in turn, process the data and return it to farmers at the village level. Neeranchal could replicate this approach in selected PMKSY project areas and strengthen it where possible.

More broadly, the proposed National Mission for Sustainable Agriculture (NMSA) originally conceived as part of the National Action Plan on Climate Change, seeks to make Indian agriculture (crops and animal husbandry) more climate-resilient. The NMSA will primarily focus on synergizing resource conservation, improving farm practices (which include weather-responsive integrated nutrient, irrigation, pest and disease management), and integrated farming systems for enhancing agricultural productivity especially in rain-fed areas.[40] Neeranchal could support the NMSA by taking up pilots in watersheds across various agro-climatic zones that will develop and promote climate-smart, bio-diversity conserving, and low external input, integrated farming systems. These could build on existing knowledge among dry-land farmers, especially around soil fertility management, cropping cycles and integrated farming practices. All these experiences should be well documented so that lessons learnt can be disseminated to help shape and inform policies and strategies that will facilitate up-scaling of best practices.

Seeds and planting materials

Studies show that the quality of seeds and planting materials accounts for 20–25 percent of productivity. Hence, the timely availability of quality seeds and planting materials at affordable prices to farmers is necessary for achieving higher agricultural productivity and production. In the case of horticulture crops and other high value crops, this is of crucial importance. Neeranchal can support documenting, improving and promoting local seed collection and storage systems and linking these to the National Agriculture Research System (NARS) for productivity enhancement and protection of crop diversity, especially in rain-fed regions.

Integrated nutrient management and soil health

Neeranchal could support large-scale soil testing so that appropriate ameliorative and restorative measures to improve the health of soils at farm level can be undertaken. This could be in the form of establishing mobile soil testing facilities that could issue soil health cards to farmers with guidance on measures to be taken. The Karnataka Watershed Development Project-I (2001–09) pioneered micro-nutrient soil testing in partnership with ICRISAT.[41] Neeranchal could also replicate the new Karnataka Watershed project, which is undertaking soil assessment transacts with deep soil pits in each micro-watershed to better understand soil types and profiles, to aid farmers in making better decisions about crop selection.

Agriculture research and extension

Under the IWMP, most states work with State Agricultural Universities (SAUs), along with a network of smaller colleges, research stations and extension centers to develop knowledge and innovative practices to support farmers. Generating knowledge is the first step; the second and more critical steps are transferring knowledge and practices to farmers on the ground. For better adoption and improving the effectiveness of IWMP, two dimensions of extension need to be considered:

i) *Advisory activities:* These encompass information on weather and crops, seed related issues and matters, integrated disease and pest management, storage, marketing, etc.

ii) *Supply of necessary inputs:* These are provided to the farmers in order to improve their production systems and sub-systems and include seeds, saplings, fertilizers and material for treatment of soil.

40 The key deliverables under this Mission would be developing rainfed agriculture, natural resource management, enhancing water and nutrient use efficiency, improving soil health and promoting conservation agriculture (Planning Commission, 2013, vol. 2, p. 45).

41 This activity was subsequently scaled up by the state into the Boochetana Mission covering all districts.

Neeranchal can improve this situation as follows:

- *Supporting SLNAs in creating a forum where all key actors in the field of research, extension, business and commerce*[42] *can come together* and contribute to improving and increasing agriculture productivity. Farmers must be involved in this exchange as co-evolvers of knowledge, technology, systems and processes for implementation as well as in developing frameworks for monitoring and evaluation of trials and experiments. The SLNA and WCDC could lead this work, executed by SAUs towards creating a common platform and synergy among the various programs and agencies engaged in providing extension support to farmers.
- *Supporting ICT approaches for providing extension information to farmers*. Either as part of the DPR or separately, once the project is underway a farmer's needs identification has to be made in terms of support required, such as inputs, technology, knowledge and skills, soil health assessment (conducting of soil tests), seeds, etc. At that point, appropriate and real time information can be transmitted to farmers through modern ICT strategies as well as IT-enabled systems and processes that can be developed by Neeranchal.
- *Supporting extension service delivery to farmers on the ground, in person*. Two approaches can be provided through the Neeranchal project.
    - *Community Resource Persons* (CRPs), who should be identified and trained to help with technology transfer and diffusion by working with agricultural scientists and extension personnel under the broad ATMA umbrella. Neeranchal could pilot this initially in a few districts having a favorable socio-agronomical milieu in collaboration with competent civil society organizations. This information could be consolidated and fed into the DPR, the block and the "comprehensive district plan." And as the Plan. A few pilots to develop and validate the methodology could be taken up through the support of Neeranchal.
    - *Farmer Producer Organizations* (FPOs), using the Farmer Field Schools methodology, such as farmers clubs, farmer–producer organizations and farmer-managed agricultural service centers, which could become "one-stop" entities for backward and forward linkages, extension delivery, technology and information dissemination. Neeranchal could provide support in promoting farmer-based organizations at the village, cluster and sub-basin levels and build their managerial and institutional capacities with a focus on both increasing productivity as well as meeting market needs, while taking care of household food security requirements.

These are not mutually-exclusive and could be piloted together under Neeranchal to see their relative efficacy, to yield useful insights for the new PMKSY.

Equity and Sustainability

To address the issue of equity, Neeranchal should support a restructuring of the present approach in IWMP and piloting of new approaches under the new PMKSY scheme including:

- *Developing an operational strategy for implementing equity concerns* as part of the DPR process at the district level, based on a landscape approach.
- *Supporting capacity building of key stakeholders on various aspects of equity and working out practical solutions at local level*; identifying the poor and other disadvantaged groups through effective participatory strategies (such as wealth ranking), and then

42 For example, research institutions/organizations, private entrepreneurs and companies, federations and associations, and NGOs, farmers, etc.

focusing allocated investments for livelihood support on these groups; giving the poor and other vulnerable groups more space and a voice in decision making structures and also organizing exclusive institutions of the poor and marginalized; and organizing the landless and poor women through Self Help Groups (SHGs) and building up their capacities.

Specific Reforms for Strengthening Hydrology in Watershed Programs

Water Productivity

Managing water demand and enhancing water productivity is crucial if agriculture is to become an engine for growth in rural India. Going beyond the "optimum output per drop of water" to "optimum profit per drop of water" should be a key focus of sustainable agricultural practices, and of the PMKSY. Neeranchal can address this situation as follows:

- *Develop water literacy pedagogy/programs about the science and economics of water resources, its augmentation, management and use*. It is also important to develop user-friendly and easy-to-adapt tools to mainstream hydrology in watershed planning and development. To generate meaningful databases for hydrological planning, Neeranchal can support inventories of water harvesting structures and monitoring of wells at micro-watershed and cluster levels. It can also consolidate (and where necessary, collect) data on surface runoff, weather data as well as geo-morphological data.
- *Explore the use of advanced instrumentation* (such as altimeters/total stations, water level recorders for dug/bore-wells) *along with simple instruments* (such as V-notches, stream gauges, rain gauges and testing kits for water quality) to collect vital data in effective and practical ways. Currently, no such instrumentation is available at the cluster or micro-watershed levels. There is also a great need for training and capacity building to use such instruments.
- *Institutionalize participatory hydro-geological monitoring* as part of the overall monitoring system of watershed development. This would be a massive task for the entire watershed program, but Neeranchal could pilot work in selected sites and link it to new participatory monitoring systems.
- *Institutionalize procedures for landscape-level hydrological assessments*. Using available national, state and local data (e.g., hydro-geology and climatic indicators such as rainfall, groundwater and surface water status, discharge and draw down, stream runoff, water quality and inventories of wells and water harvesting structures), build capacity and procedures to carry out good-quality hydrological assessments, with sophisticated modeling and participatory stakeholder interactions. These models would not only aim to accurately capture catchment hydrology but also to generate scenarios to assess potential future impacts (of interventions and climate variability). These could then be used to trigger and sensitize local communities on crucial issues of water management for sustainability and village watershed development plans can then be checked against the model and used in discussions to understand optimal interventions keeping in mind the potential downstream impacts.
- *Focus on improving governance of existing water resources*, rather than simply increasing water availability. This would require developing an approach that puts in place the necessary policy, and financial, technological and administrative systems to ensure more equitable and sustainable access to water-related services and increase in water-use efficiencies. Neeranchal could consider supporting a study group or action-research to identify "action sets" to be implemented so as to advance developments in this area.

CHAPTER-6

CONCLUSIONS

The IWMP is a major national watershed program, which has significant implications for India's agrarian economy and the economy as a whole. If implemented well, watershed programs like IMWP can result in long term productivity, income, social and environmental gains that will have important and far-reaching impacts, well beyond the immediate stakeholders. A detailed institutional assessment of IWMP in focal states, linked to the new Bank-supported Neeranchal National Watershed Project identified a number of issues that, if addressed, could lead to better performance of watershed programs. As IMWP is integrated into the new national PMKSY program, watershed management will become one component of a more integrated approach with agriculture and water programs. As lessons are learned through the Neeranchal project on a limited number of sites, they can be scaled up across all states and contribute to improved operations of PMKSY.

Key areas where support could improve watershed program performance include: strengthening coordination amongst the key stake holders; introducing more holistic watershed planning at a larger scale for better application of hydrological assessment and monitoring; strengthening the quality of oversight arrangements to improve sustainability of physical investments; building human resource and institutional capacities at both MoRD and DoLR in the Government of India, within state watershed agencies, NGOs and in communities and local authorities; supporting more targeted research and development to provide new tools, systems and a stronger scientific basis for watershed management; strengthening extension services for technology transfer to farmers; promoting climate change resiliency; and improving M&E systems and filling in institutional, capacity and technology "deficits." In the process, Neeranchal can help establish a replicable paradigm that can improve the effectiveness of large-scale public investments.

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ANNEX A: DETAILED STUDY METHODOLOGY

Methodology and Assessment Methods

The study used a combination of methods that included detailed analysis of existing literature, policy documents and data available in the public domain, and field visits to the proposed states to get a first-hand view of the interventions and the perceptions of various stakeholders involved in the program.

Conceptual and Analytical Framework

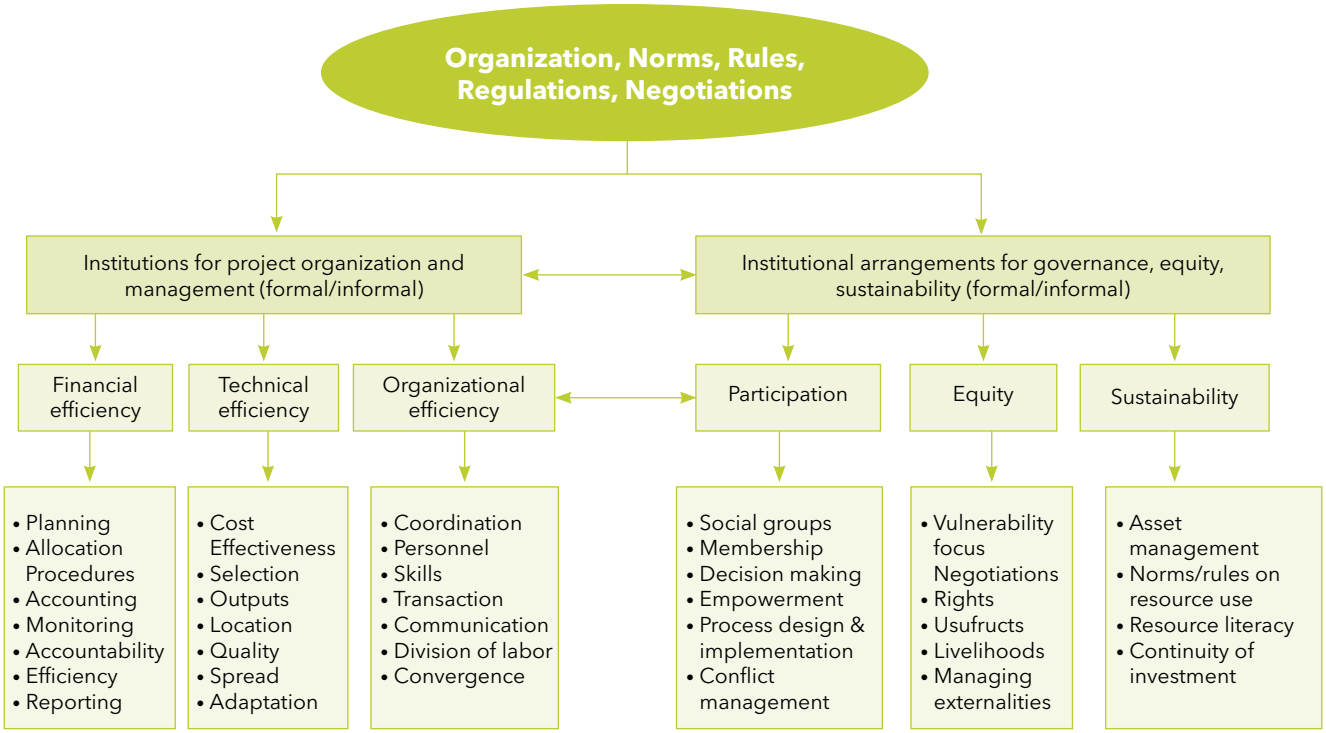
Complex sets of institutions are involved in watershed development projects, ranging from formal government agencies, NGOs and CBOs, to more informal community groups. Due to the complexity of agents and arrangements linked to watershed development in India, the term 'institutional ecosystem' has emerged (Cannon, 2000). Institutions are designed to regulate or constrain conduct. They could be formal and based on codified laws, constitutions and property rights, or alternatively as informal socially agreed rules (such as customs, traditions and community code of conduct). If institutions are the rules of the game, organizations are the players. They are groups of individuals engaged in purposive activity (North, 1990). The constraints imposed by the existing institutional framework help define the opportunity set and therefore the kind of organizations that will come into existence. Institutions are designed to reduce the transaction cost through increased cooperation among various actors.

Watershed development projects are influenced by a web of institutional arrangements even though, most often, guidelines and policy documents consider only institutional arrangements related to project management; community participation is accepted as an instrumental necessity to enhance project delivery. There is very little stress on institutional mechanisms for environmental (sustainability) and political (fairness/equity) rationality. For instance, property rights related to surface water or common pool resources, which are impacted by soil and water conservation interventions, are not usually addressed, even though they are central to realizing these outcomes.[43]

Thus the institutional analysis was approached from two different, but mutually linked and reinforcing aspects: The first being the institutional arrangements for project organization and management that are concerned primarily concerned with the implementation of the project design through collaboration of various organizations; and the second being the institutional arrangements that ensure governance, participation and distribution. While the former is more oriented towards the technical, financial,

43 Institutional arrangements in watershed development were often viewed within the 'design' of the project. A closer analysis of the Guidelines showed that it was given primacy reflected as three sections within the Guidelines (DoLR, 2008, pp. 12-32). Institutional arrangements envisaged under these Guidelines were mainly from the objectives of project organization and management. Institutional mechanisms for resource management, equity and sustainability were only secondary and incidental. There was an attempt to address these concerns in the recently issued Guidelines (revised in 2012), which would be applicable for projects sanctioned from April 2013.

FIGURE 3A: KEY INSTITUTIONAL MECHANISMS IN WATERSHED DEVELOPMENT



organizational and governmental rationality, the latter falls into the realm of political, environmental and social rationality (Figure 3A).[44]

The methodology of the evaluation was based on the above conceptual framework through which various aspects of IWMP implementation were analyzed. This includes the organizational set up for project implementation (organizational arrangements at various levels), implementation processes (participation), systems and procedures for planning, execution, monitoring and accountability (DPR, work flow, sanctions, transparency, etc.), technological choices for resource management (for example geo-hydrology), conservation (watershed technology and production agriculture), distribution of resources and benefits (equity), and systems for assets and resource management (sustainability issues).

Capacity of the agencies both in terms of human resources and skills was a cross-cutting theme as this impacts the functioning of the institutions and also the project outcomes. There is an inherent incentive for institutions to invest in knowledge and skills as that enhances productivity and hence the existence of the institution.

Studies have often shown that institutional arrangement are one of the weakest links in watershed development, resulting in below par performance in a majority of projects. Where successes or relatively better performances were achieved, the following institutional drivers played important roles:

- Dedicated government or NGOs for project management.
- The philosophy and approach of the implementing agency.
- Bottom up approach to planning and implementation.
- Demand-driven interventions by communities.
- Decentralized and democratic decision making by communities and implementing agency.
- Prior resolution of conflicts around natural resources.

44 The issue of environmental and financial rationality in analyzing institutional design in watersheds is drawn from Gandhi (2010).

- Commitment to allocate common areas and minor products to the resource poor.
- Strengthening existing and building new social capital.
- Ensuring transparency and accountability.
- Managerial and institutional capacity building in communities and implementing agency.

Besides these drivers, larger public institutions of government also played a crucial role, as noted by a World Bank (Darghouth et al., 2008) report: "Government commitment to the project was an important ingredient for project success. Government commitment, often led by "champions," was a basic feature of successful projects reviewed."

Objectives of the Study

The broad objective of this institutional study was to assess/audit the prevailing watershed development practices existing in the proposed Neeranchal states and benchmark it through examining experiences emerging from other contexts, such as accumulated knowledge/ practices and relevant literature. The specific study objectives were to:

- Assess the field level operational effectiveness of IWMP in sample areas in selected project states and identify approaches for improvement that can be supported through the Neeranchal project.
- Provide practical inputs that can contribute to the designing of the Neeranchal project, as well as the Project Implementation Plan (PIP), which is a detailed guide for implementing each component, sub-component and related activity.

The study was also designed to outline IWMP effectiveness from the perspective of the watershed communities and farmers, and identify where bottlenecks are occurring as well as lessons learned from good practices. It complements a separate study of institutional convergence being undertaken for Neeranchal.

Scope of the Study

The study was designed to assess the current operational effectiveness of the IWMP in the field in selected states so as to understand why IWMP implementation is working well in some areas with good impacts, and not so well in other areas where achievements are limited. Overall, the study focused on providing inputs to the Neeranchal project with a view to improving IWMP operational performance and results in regard to the following areas:

- Capacities of the various stakeholders (including government staff, NGOs, PIAs and communities) to deliver a more robust IWMP model, and their respective training needs. How can relevant stakeholders including government, NGOs, support institutions and communities at local levels, provide better services for improved watershed management mainly through more effectively and efficiently delivered IWMP?
- Bottlenecks in IWMP delivery with respect to approvals, clearances, etc.
- Participation of communities in IWMP, major gaps/issues, and approaches for improving social mobilization, group formation, involvement in watershed planning, and general buy-in and sustainability of good watershed practices.
- Convergence of IWMP with other schemes at field level, including MNREGS, other government sectoral programs, and private sector participation and how this could be strengthened.
- Handling of hydrology issues in IWMP planning by the states. For example, do they plan to incorporate water budgeting in micro-watershed plans, or will they have a hydrology plan? Are there linkages in place with reputable institutions dealing with water, for example in accessing information

on groundwater? Does the watershed agency have the necessary capacity to deal with such issues, and get greater community involvement into hydrological planning and management?

- Linking of research, extension and farmers into a more effective network, resulting in relevant, timely research and effective and efficient extension, and higher adoption rates among farmers and watershed communities.

Major Areas of Inquiry and Approach

The major objective of the study was to assess the effectiveness of IWMP implementation practices through field analysis so that strategies could be built in to improve its implementation for enhanced watershed services for rural communities and farmers. For this the study reviewed various aspects related to project design and the process of project operationalization and implementation. As IWMP is of relatively recent origin, the study also perused other experiences from the field and historically derived learnings. The following questions provided the broad framework to conduct the study.

1. To what extent is program design at state level compliant with the larger project objectives? Is the design efficient in implementation and tracking of results? What are the institutional mechanisms that are triggering implementation and outcomes? And what changes are the required?
2. Is the project operationalized in conjunction with the design, guiding principles and larger objectives? What are the institutional and technical processes? What are the enabling and limiting operational issues?
3. What are the factors/conditions affecting the realization of program objectives: resources, expertise, linkages, institutional bottlenecks, policy framework, framework actors, locale specificities, externalities, etc.?
4. Is the technical design and implementation contributing to the program objective? Is it relevant to the context and effective? What are the possible alternatives?
5. Is the watershed geo-hydrology taken into consideration in planning and implementation? Is there a technical system/model for water resources planning, development and sustainable use, in place?
6. What are the strategies for agricultural production enhancement? Is sustainable and climate adaptive agriculture a focus area and how it could be built in the design?
7. What are the systems, strategies and pedagogic details of the capacity building strategy? Is it sound enough to address the requirements of implementation, ensure participation and manage impacts and sustainability? What are the institutional drivers in realizing the objectives of capacity building?
8. What mechanisms have been put in place to support learning-based monitoring and timely course correction?
9. What knowledge management strategies are in place to capture best practices, learnings-from-experience and dissemination for up-scaling and program-wide replication of innovative and successful technologies and practices?
10. What are the regulatory and policy mechanisms in place in relation to resource use and management? What changes, if any, are required? What new institutional and policy arrangements should be made to enable better implementation of the program and its projects?

Field Visits, Consultations and Data Collection

The study was carried out through desk review of literature, interviews with key informants and institutions and field work in sample sites in the three focal states of Chhattisgarh, Gujarat and Odisha as well as in the remaining five states proposed to

be covered under Neeranchal (Andhra Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, and Rajasthan), albeit, rapidly. The preparation process for Neeranchal was fast-tracked, necessitating rapid completion of this study in order to provide useful inputs to overall project design.

The visits to the proposed project states included initial familiarization about the project with the SLNA, detailed discussions on policy and practice with the SLNA and related major stakeholders, visits to WCDC, PIAs, watershed villages and communities as well as local public and private service providers. A detailed checklist, developed for the purpose on various thematic areas and formats for collecting project progress information was used. All available secondary data shared by the states, i.e. SPSPs, DPRs, MPRs, evaluation reports of the Preparatory Phase and other documents and reports were referred to during the visit and later. These included the following steps.

- Stakeholder consultations at state, district, PIA and watershed levels besides consultation with various other service providers.
- Analysis of project documents and systems (plans, administrative and process, guidelines, management information systems, etc.).
- Transects and technological reconnaissance of watersheds.
- Accessing and analyzing various documents, data from institutions and organizations that would help in triangulating and contextualizing the learning.
- Institutional analysis and auditing.
- Documenting innovations, success stories, if any.
- Identifying the drivers of success.

Each state visit was structured such that the first day was spent in understanding the major processes, achievements, constraints, strategies and changes introduced in speeding up IWMP implementation. Secondary information showed that most, if not all of the states were behind target and implementation was slower than expected. There was an attempt to understand the reasons and thus the state specific circumstances and issues. Subsequently, districts were selected in consultation with the SLNA. The study team expressed the need to: (i) visit old projects (2009-10) as sufficient time had passed and some main phase work would have been undertaken, and (ii) check if projects selected were representative for the state in terms of agro-climatic and biophysical characteristics; the spread of the project, agencies involved, etc. This was followed by field level interactions with WCDC and PIAs and watershed CBOs, visit to work sites and various other activities. In all core states, focused group discussions were conducted involving WCDC, PIAs and WDT from some projects being implemented in the districts. On the final day, a debriefing and clarification meeting was conducted with the SLNA in all the states except for Gujarat. The field visits took place from mid-June to late July.

Data Analysis and Report Structure

Data collection, analysis and documentation were done based on the broad thematic areas identified. For the eight states involved in the study (three core and five non-core) individual recordings of each state were documented and a base report prepared. Thus all thematic areas were analyzed in core states while crucial areas of institutions, technology and project strategies were analyzed in the non-core states. Each thematic area was also analyzed and documented by the respective consultants.

A detailed background paper was drafted for the state analyses (all eight states) and thematic studies. Each core section was taken up in the report that included institutional arrangements at various levels, watershed technology, hydrology and GIS/IT, agriculture extension systems, equity, sustainability, convergence and best practices. For each thematic area the analysis was divided into three components: (i) the current status in the Neeranchal state, followed by (ii) an assessment of the thematic area (comments/observations), and (iii) critical recommendations for improving

the situation. Recommendations were included in a separate sub-section for ease of reference. In addition, based on the analysis of the institutional arrangements, an institutional framework integrating the IWMP and Neeranchal at all levels was proposed. To analyze the current status, various data sources made available by SLNA, WCDC and those available in the public domain were used. Detailed state-wise comparative matrices covering institutional arrangements, geo-hydrology, watershed technology and agriculture together with a proposed equity-oriented approach to the post-project consolidation phase were included as Annexures to the detailed background paper.

ANNEX B: AGRO-CLIMATIC, LAND-USE AND AGRICULTURAL CHARACTERISTICS OF PROJECT STATES

Agro-climatic Situations of the States

The eight states reviewed in this study represent a wide range of agro-climatic contexts. They varied from the arid regions of Gujarat and Rajasthan to assured rainfall areas of the eastern parts of the country, and the rain shadow regions and high rainfall areas of Maharashtra. As per the ICAR classification, under the National Agricultural Research Project (NARP), each state is classified into various agro-ecological zones based on ecological land classification that recognizes various components (such as soils, climate, topography, crops, vegetation, etc.) as major influencing factors (Table 5B). The zones

TABLE 5B: AGRO-CLIMATIC ZONES OF THE NEERANCHAL STATES (BASED ON THE ICAR-NARP)

State	Number of zones	Agro-climatic zones	Rainfall range (in mm)
Andhra Pradesh	9	North coastal, Godavari, Krishna, Southern, Northern Telangana, Central Telangana, Southern Telangana, scarce rainfall, high altitude and tribal areas	407–1238
Chhattisgarh	3	Chhattisgarh plains, Bastar Plateau, Northern hills	720–1710
Gujarat	8	Southern Hill, Southern Gujarat, Middle Gujarat, North Gujarat, North West arid, North Saurashtra, South Saurashtra	250–1840
Jharkhand (as part of Bihar)	3	Central and north eastern (Zone IV), Western (Zone V) and South eastern (Zone VI) plateau	720–1350
Madhya Pradesh	11	Jhabua hills, Malwa Plateau, Nimar plains, Vindhya Plateau, Central Narmada Valley, Satpura Plateau, Grid Region, Keymore Plateau, Bundelkhand Region, Northern Region of Chhattisgarh, Chattisgarh plains	749–1623
Maharashtra	9	Southern Konkan Coastal Zone, Northern Konkan Coastal Zone, Western Ghat Zone (2), Western Maharashtra Plain Zone, Scarcity Zone, Central Maharashtra Plateau Zone, Central Vidarbha Zone, Eastern Vidarbha Zone	450–3750
Odisha	10	North western plateau, North central plateau, North eastern coastal plain, East and south eastern coastal plain, North eastern Ghat, Eastern Ghat highland, South eastern Ghat, Western undulating zone, Western central table land, Mid central table land	1352–1710
Rajasthan	10	Arid western plain, irrigated north western plain, hyper arid partial irrigated zone, internal drainage dry zone, transitional plain of Luni basin, semi arid eastern plains, flood prone eastern plain, sub-humid southern plains, humid southern plains, humid south eastern plains	100–1100

Source: SPSPs of each state.

were selected as contiguous areas within the state boundary and to the possible extent had homogeneous physical characteristics (such as topography, rainfall, soils, cropping patterns and irrigation availability). The rainfall in the proposed states ranged from 25 mm in Kutch and parts of Rajasthan to 3,750 mm in the Western Ghats of Maharashtra. The biophysical characteristics of the watersheds were seen to change accordingly demanding diverse and varied conservation strategies and production system. While some of these project areas were located in the upper reaches of the basin, others were in the plains and discharge zones. The socio-cultural context, land tenure systems and community context also varied across these regions.

Land Use Patterns

Land use patterns varied considerably across states, regions and districts and within states (Table 6B). Eastern states had considerable forest cover while the area under cultivation was very limited. This suggests that many watersheds were forest watersheds having a different dynamic of conservation strategies and resultant benefits. The policies of access to forest produce would be very crucial in these watersheds.

The land use time series data showed reduction in cultivable land and increase in land not available for cultivation and uncultivated land specifically for Andhra Pradesh, Gujarat and Jharkhand. This implies that land was diverted to non-agricultural use and there was increase in degradation.

In this study land use data were used to emphasize the considerable significance these had on watershed planning, technology choice and institutional arrangements. However, even though land use data were collected as part of planning, these were seldom used for designing the conservation strategies and institutional arrangements.

Agricultural Growth

The eight states selected for the Neeranchal project are fairly representative of the country. They are from the rainfed regions covering the eastern, central and western part of the country where the maximum number of IWMP projects is being implemented. Overall, during the Eleventh Plan, there was an improvement in the agricultural growth rate as well as a recovery in agricultural production (Table 7B).

It was interesting to note that low productivity/ low growth rate and less developed states as well

TABLE 6B: LAND USE PATTERNS IN NEERANCHAL STATES

Million ha

Land use	Andhra Pradesh	Chhattisgarh	Gujarat	Jharkhand	Madhya Pradesh	Maharashtra	Odisha	Rajasthan	India
Forest	22.65	45.95	9.62	28.09	28.28	16.96	37.58	8.00	22.89
Not available for cultivation	17.81	7.39	19.52	16.71	11.13	10.34	14.73	12.45	14.24
Total uncultivated	5.35	8.78	14.76	6.76	7.95	7.84	8.10	17.36	8.55
Total fallow	16.10	3.83	2.07	34.81	3.48	8.27	9.33	8.64	8.04
Net sown area	37.85	34.06	54.03	13.61	49.16	56.59	30.26	53.54	46.28
Total cropped land	46.38	41.12	58.13	15.67	78.25	78.25	35.09	75.88	65.04
Cultivated more than once	8.53	7.07	4.11	2.06	22.52	21.66	4.83	22.33	18.76
Land available for cultivation	48.78	35.89	56.01	35.31	50.80	61.03	35.93	57.15	50.95

Source: Agricultural Statistics 2011.

TABLE 7B: AVERAGE ANNUAL GROWTH RATE OF AGRICULTURE AND ALLIED SECTORS, 1981-2012

States	1981–82 to 1993–94	1994–95 to 1999–00	2000–01 to 2004–05	2005–06 to 2011–12	Percent of rainfed area
Andhra Pradesh	3.9	2.8	4.7	5.0	59
Chhattisgarh	4.9	–2.1	4.6	7.3	71
Gujarat	8.8	5.2	9.1	5.5	64
Jharkhand	1.1	4.3	5.0	8.0	85
Madhya Pradesh	4.9	1.6	2.2	4.4	74
Maharashtra	5.7	3.1	1.6	5.3	83
Odisha	2.6	0.0	3.5	3.1	73
Rajasthan	5.9	5.5	10.9	5.5	70
India (average of 27 states)	3.4	3.3	1.7	3.7	60

Source: Planning Commission (2013), vol. 2, p. 4. Rainfed area data are from various sources including the state SPSP.

as the newly emerging states recorded a better performance than the all-India estimated average. The better-developed states also reported a better growth of five percent and above, on average, in comparison to the national scenario.

The Twelfth Five-Year Plan document (Planning Commission, 2013) noted that the better performance of relatively less-developed states was because the Eleventh Plan strategy gave much greater flexibility to states and focused on yield gaps within existing technology, rather than emphasizing and supporting new technologies. Growth acceleration since 2005 was therefore stronger in states with lower productivity and less irrigation. This suggests that the strategy was perhaps correcting the relative neglect of the past, which caused rain-fed farming (covering over 60 percent of arable land) to perform well below potential. However, Gujarat (a high performing state), showed a decline mainly attributable to the stagnation in Bt cotton productivity with yields reaching a plateau. Clearly, growth is more difficult to accelerate at higher productivity levels without new technology, particularly if past patterns of growth have taken a toll on natural resources (Planning Commission, 2013, vol. 2, p. 5).

Most of the better performing states from the eastern and central parts of India have high potential for sustainable production enhancement strategies. This is because they could further develop their water resources and adopt sustainable production practices, as they are traditionally more attuned to low input agriculture. This implies greater scope to enhance the outreach of watershed activities and to introduce sustainable farming system approaches in these areas, in order to realize the untapped potential and, thus, to and unleash dynamic processes that could overcome the past developmental deficits and lead to rural transformation.

ANNEX C: STATUS OF PROJECTS UNDER THE INTEGRATED WATERSHED MANAGEMENT PROGRAM (IWMP)

State	Year	Number of Projects	Area ('000 ha)	Funds Released (USD million)
Andhra Pradesh	2009-10	110	4.73	5.03
	2010-11	110	7.41	19.64
	2011-12	110	7.47	26.38
	2012-13	110	4.25	20.51
	2013-14	110	4.07	30.04
	Total	**550**	**27.93**	**101.60**
Chhattisgarh	2009-10	41	2.09	2.24
	2010-11	71	2.84	8.26
	2011-12	69	2.99	10.22
	2012-13	27	1.24	0
	2013-14	29	1.55	4.26
	Total	**237**	**10.71**	**24.98**
Gujarat	2009-10	151	7.08	8.23
	2010-11	141	7.14	26.51
	2011-12	138	7.12	26.35
	2012-13	59	3.17	53.97
	2013-14	60	3.18	9.84
	Total	**549**	**27.69**	**124.90**
Jharkhand	2009-10	20	1.19	1.25
	2010-11	22	0.97	3.95
	2011-12	45	2.42	2.57
	2012-13	30	1.63	7.90
	2013-14	27	1.47	4.82
	Total	**144**	**7.67**	**20.49**
Madhya Pradesh	2009-10	116	0.67	7.13
	2010-11	99	0.55	18.57
	2011-12	111	0.62	17.8
	2012-13	37	0.21	21.03
	2013-14	73	0.43	22.23
	Total	**436**	**2.47**	**86.76**

State	Year	Number of Projects	Area ('000 ha)	Funds Released (USD million)
Maharashtra	2009-10	243	9.96	11.11
	2010-11	370	16.15	34.12
	2011-12	215	9.31	62.08
	2012-13	120	5.27	82.23
	2013-14	116	5.19	29.57
	Total	**1064**	**45.88**	**219.11**
Odisha	2009-10	65	3.36	3.57
	2010-11	62	3.50	12.04
	2011-12	68	3.80	12.71
	2012-13	39	2.12	14.70
	2013-14	38	2.12	22.44
	Total	**272**	**14.90**	**65.46**
Rajasthan	2009-10	162	9.26	11.46
	2010-11	213	12.57	42.21
	2011-12	229	13.01	52.19
	2012-13	145	7.88	69.60
	2013-14	135	7.44	
	Total	**884**	**50.16**	**175.46**

Note: There are a few discrepancies in the data provided by SLNA. Moreover, the aggregated data available on the current DoLR MIS is also not 100 percent reliable.

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