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Integrated Watershed Management in Rainfed Agriculture

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Chapter 5

Policies and institutions for increasing benefits of integrated watershed management programs

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5.1 INTRODUCTION

One of the most challenging policy issues for a long time has been conservation and management of land and water resources for sustainable agriculture and poverty reduction, specifically in rainfed areas. Rainfed agriculture contributes 60% of world's staple food and is being practiced on 80% of the world's agricultural area (FAOSTAT 2005). Water is a limiting factor in achieving food production (crop growth) in semi-arid and dry subhumid zones (SEI 2005). Nearly two-thirds of India's agriculture is based on rainfed areas and contributes about 9% of Gross Domestic Product (GDP)[1]. As the source of growth in irrigated areas declines, rainfed agriculture must increase to fill the gap. The recent Comprehensive Assessment of Water for Food and Water for Life showed that challenges of poverty and food security with looming water scarcity cannot be met by irrigated agriculture alone, and major gains have to come through upgrading rainfed agriculture (Molden 2007) and recent forecasts warn of aggravated global water scarcity unless effective water resource management at all levels is done (Seckler *et al.*, 1998; Seckler and Amarsinghe 2000; Shiklomanov 2000; Rosegrant *et al.*, 2002, 2006; Falkenmark and Rockström 2004; SEI 2005). In most rainfed areas, water availability is not a problem but rainfall distribution and poor management creates water scarcity for crops, resulting in low rainwater use efficiency and low crop production (Wani *et al.*, 2003a)[2].

In addition, it is estimated that the ownership of land is highly skewed, nearly 65% of the rural households owning less than one ha (GOI 2007). The landless population

[1] These areas are fraught with soil erosion, land degradation, and loss of productivity. These have serious equity implications as they affect the subsistence of poor marginalized people. In addition, burgeoning population, poverty, lack of awareness of improved farm technologies and lack of knowledge and skills to use them, low income levels, and resource-poor farmers constitute major threat to the sustainable development in these areas. These rainfed areas have scarce water resources and are prone to severe land degradation (Wani *et al.*, 2002, 2003d, 2008a, 2009).

[2] On the other hand, the working group on watershed development, rainfed farming, and natural resource management for the Tenth Five Year Plan constituted by the planning commission had assessed that 88.5 million ha degraded wasteland including rainfed areas would need development. The working group report envisaged to cover the entire area in four successive Five Year Plans, commencing from the Tenth Plan up to Thirteenth Plan at an estimated cost of ₹72,750 crores (1994 prices) (GOI 2001b).

covers 12% of rural households. Fragmentation of farm holdings continues unabated owing to the burgeoning population and land acquisition for industrialization and urbanization. Per capita land availability has also dropped from 0.48 ha in 1951 to 0.16 ha in 1991 and is expected to drop to 0.08 ha in 2035 (GOI 2007). Thus, enhancing and sustaining productivity and income of small farms through crop-livestock integration and multiple opportunities through agro-processing, value addition, and biomass utilization must be a high priority.

In recognition of these challenges, governments, donors, and development partners have devoted substantial resources to develop and promote rainfed areas at a catchment/watershed scale for sustainable intensification of agriculture and rural livelihoods. This approach produces multiple benefits in terms of increasing food production, improving livelihoods, protecting the environment and addressing gender and equity issues along with biodiversity concerns (Wani *et al.*, 2003b, 2003c, 2009; Rockström *et al.*, 2007, 2010). However, the evidence from a large number of studies clearly suggests that the economic benefits are not only limited in terms of coverage of beneficiaries but also heavily influenced by the decision-making processes at various stages of implementation. It is in this context, participatory institutions have special significance. It is therefore, imperative that the design of the watershed treatment should include equity and sustainability aspects while planning for productivity enhancement.

This chapter focuses on policy and institutional aspects of watershed approaches thereby seeking to complement recent studies which have concentrated on the overall impact of watershed projects (Wani *et al.*, 2008a) and those focusing on the institutional aspects of watershed management (Joshi *et al.*, 2004; Raju *et al.*, 2008).

5.2 INTEGRATED WATERSHED MANAGEMENT PROGRAM IN INDIA

In tropical rainfed areas, infrequent distribution of rainfall results in long dry spells as well as severe runoff and soil erosion during the crop growing period. Since soil and water are critical natural resources for production activities, watershed development aims at optimum and prudent use of these resources in a sustainable and cost-effective manner. Augmentation of water resources and minimizing soil degradation are the main activities of watershed development programs (Wani *et al.*, 2010, 2011).

In India, since the beginning, watershed program went through the structure driven approach for soil conservation and rainwater harvesting, aiming at only some productivity enhancements. Soil conservation program became synonymous with contour bunding and water conservation with check-dams. This was a compartmental and top-down contractual approach. The watershed development approach in India has seen many changes since 1980s. The objective of the program has undergone substantial modifications to include and address several components of rural livelihoods aspects. Therefore, the approach shifted from traditional top-down approach to more holistic participatory approach to address sustainability and transparency through community participation (Wani *et al.*, 2006a). However, at the present time, watershed models are being developed giving priority to the empowerment of the community and the stakeholders so that the projects operate not as a supply driven project but as a demand driven project. Multidisciplinary teams are involved to provide all the

technical expertise to solve the problems at the community level. As a result, the level of participation has improved. This approach ensured participation of stakeholders and the watershed is considered as an entry point for improving the livelihoods of the people (Wani *et al.*, 2008a, 2008b; Sreedevi and Wani 2009).

Watershed approach has shown great promise for increasing groundwater recharge and crop yields since the Seventh Five Year Plan (Sharma 2002; Wani *et al.*, 2003b, 2003c; Joshi *et al.*, 2005). The Government of India, therefore, accorded high priority to the holistic and sustainable development of rainfed areas through the integrated watershed development program (Wani *et al.*, 2008a). The range of other government initiatives and incentives also has an influence on watershed development. Some serve a supporting role in improving the benefits to be derived from watershed resources and include sectoral policies on markets and prices, policies and legislation on land, resources and water rights, and the reorientation of extension and research services in the agricultural, livestock, forestry, and wildlife sectors (Turton *et al.*, 1998).

Currently, the emphasis is on the augmentation of water resources by implementing small watershed projects. The majority of watershed development projects in the country are sponsored and implemented by the Government of India with the help of various state departments, non-government organizations (NGOs)[3], self-gelp groups (SHGs), etc. The Drought Prone Area Programme (DPAP), the Desert Development Programme (DDP), the National Watershed Development Project for Rainfed Areas (NWDPRA), Watershed Development in Shifting Cultivation Areas (WDSCA), and the Integrated Wasteland Development Project are a few of the important development programs that plan, fund, and implement watershed development projects. A total sum of US$6 billion has been invested in the country in various watershed development projects from the inception (early 1980s) of the projects until 2006 (Wani *et al.*, 2008a).

Increasing support to watershed development is being extended by a number of international donors. The Department for International Development (DFID), the Deutsche Gesellschaft for Technishe Zusammenarbeit (GTZ), the Swiss Agency for Development and Cooperation (SDC), the World Bank, and the International Fund for Agricultural Development (IFAD) also sponsor and implement watershed development projects, but a significant proportion (about 70%) of the investment in these projects is being made by the Government of India.

5.3 POLICY ENDORSEMENT AT MACRO LEVEL

The watershed program produces multiple tangible and intangible benefits for individuals as well as for the community as a whole. The present watershed development program follows a holistic approach in building resilience of natural resources and human resource to cope with future challenges (Wani *et al.*, 2008c). Therefore, watershed management has been a key component of development planning of rainfed areas

[3] The 1994 guidelines paved the way for participation of public bodies such as NGOs, educational institutions, corporate houses and banks in the form of project implementing agencies (PIAs), leading to a massive growth in the number of NGOs (Turton *et al.*, 1998).

since the early 1980s and got good policy support from the central and state governments in the country. Several programs were launched to target watershed development with a focus to improve food security, alleviate poverty, and sustain the quality of the natural resource base. Several important policies have been launched by the Government of India that affects the success of the watershed development programs. Table 5.1 summarizes the objectives, strategies, and their linkages with watershed development programs in India.

Upgrading the rainfed production system involves integrated approaches to social and ecological management. There is a need for innovations in water management, which requires novel technologies and management practices, e.g., water harvesting and conservation agriculture (Rockström *et al.*, 2007). An integrated approach to rainwater management is necessary where the linkages are addressed between investments and risk reduction, between land, water, and crop, and between rainwater management and multiple livelihood strategies.

For improving rural livelihoods, the watershed approach is a logical unit for efficient management of natural resources, thereby sustaining rural livelihoods. There is a need for environment-friendly resource management practices to alleviate poverty through increased agricultural productivity (Wani *et al.*, 2008c). The current need for resource management in watershed development is use of high science tools and participatory approach. The current model of watershed management, as adopted by ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) watershed consortium team, involves environment-friendly options and the use of new science tools, along with the concept of the consortium approach and emphasis on empowering farmers through capacity building (Wani *et al.*, 2002, 2006a, 2006b; Sreedevi *et al.*, 2004). In the policy front, there is need to strengthen the consortium approach to benefit full potential of participatory resource management. Although there are exceptions, most ongoing watershed development programs have concentrated on physical interventions such as contour bunding and check-dams that are intended to improve groundwater recharging and reduce land and soil degradation. These physical interventions are often not balanced against non-structural measures or measures to improve the production process or open up new livelihood opportunities. These measures include policy changes that bring about cropping pattern shifts and changes in livelihood strategies.

Equity is seen as a major policy issue, with past watershed programs often failing to reach the poorest households. Equity is also identified as critical for the success of collective action. The new common guidelines have tried to address the equity issue through institutionalizing the livelihoods dimension. However, as most of the proposed livelihood components are linked to irrigation water, the spread of livelihood benefits to marginal farmers will be limited, especially in areas that rely on groundwater. The equity safeguards provided in the guidelines are projected as effective in practice. The continued supply-side focus of the policies in the absence of demand management and clearly defined property rights in common resources are likely to perpetuate the inequities.

Furthermore, watershed development is not influenced by watershed policies alone. A range of other policies influence agriculture, water management, and land management. Power tariff pricing (which influences groundwater exploitation), the guaranteed purchase of rice and wheat, and other protection measures greatly influence

Table 5.1 Macro-level policies and their linkages with watershed management program

Policy	*Objectives*	*Strategies*	*Priorities*	*Linkages with watershed management*
Agricultural development policy	To propel a growth rate of more than 4% per annum – a growth that is efficient, equitable, demand-driven, and sustainable.	• Comprehensive national strategy for attaining lofty goals and targets. • Emphasized strengthening the watershed development program.	• Attempts to intensify integrated and holistic development of rainfed areas by conservation of rainwater. • All spatial components of a watershed will be treated as one geo-hydrological entity.	It reflects the observed commitment of the government to take up watershed development program more aggressively, including provision of the necessary financial and institutional support for its implementation.
Water policy	To address the newly emerging issues of water availability, quality, and inter-sectoral distribution.	Identifies water management as one of the most crucial elements in the development planning.	Rainwater harvesting, preventing soil erosion, providing sustainable irrigation and mitigating the problem of drinking water.	Fails to address watershed management.
Land policy	To protect the interest of the farming community and landless laborers.	Land reforms, land ceilings and restrictions to sell agricultural land.	• Consolidate the fragmented landholdings and distribute the donated and unutilized lands to landless laborers and small and marginal farmers. • Protect the interest of small and marginal farmers and discourage large farmers and thus bring social justice and equity in land distribution.	Supports watershed programs and these watershed programs provide opportunities to small and marginal farmers for collective action that allows a consistent treatment of adjoining pieces of land and reduces costs due to economies of scale.

(*Continued*)

Table 5.1 Continued

Policy	*Objectives*	*Strategies*	*Priorities*	*Linkages with watershed management*
Forest policy	• To maintain environment stability through preservation and, where necessary, restore ecological balance that has been adversely disturbed by serious depletion of the forests. • To prevent soil erosion and denudation in the catchment areas of rivers, lakes, and reservoirs in the interest of soil and water conservation for mitigating floods and drought and for reducing siltation of reservoirs. • To control further problem of sand dunes in the desert areas of Rajasthan, India and along the coastal tracts. • To expand the forest/tree cover in India through massive afforestation and social forestry programs. • To meet the growing demand of fuel-wood, fodder, minor forest produce, and small timber of the rural population. • To make the afforestation program a people's movement with the involvement of women.	• Focus on fuel-wood and fodder development on all degraded lands. • Community and village lands are given priority for afforestation and fodder development programs. • Control soil erosion and runoff, prevent desertification and improve micro-ecosystem.	• Encourage the participation of village community through panchayats and revenues were shared with communities to provide incentive to protect the forest resources. • Adequate grazing fees to discourage maintaining large herds of non-essential livestock.	• Forest policy objective and strategies are by and large consistent with those of the watershed development programs. • Rehabilitate, conserve, and manage degraded lands, and augment production of fuel and fodder through community participation.

the structure of incentives for watershed management in rainfed areas. While some policies (like water pricing) strive to improve the economic efficiency of water, agricultural price policies indirectly promote inefficient use of water. For example, subsidized power tariffs for agriculture are leading to widespread depletion and inequitable distribution of the groundwater resources (Shiferaw and Bantilan 2004; Reddy 2005).

5.4 WATERSHED DEVELOPMENT GUIDELINES

Several government departments and state governments undertook watershed development programs. Until 1997, watershed development projects have been carried out under different programs launched by the Government of India. Notably, the DPAP and DDP adopted the watershed approach in 1987. The Integrated Wasteland Development Project initiated by the National Wasteland Development Board in 1989 also aimed at developing wastelands based on the concept of watershed development. Since their inception, these programs were undertaken by the Ministry of Rural Development.

The other major program based on the watershed concept is NWDPRA under the Ministry of Agriculture. All these programs had their own guidelines, norms, funding patterns, and technical components based on their respective and specific aims (GOI 1994). In 1994, the Ministry of Rural Development issued a new comprehensive guideline for all its projects. It was realized that while the focus of these programs may have differed, the common objective of these programs has been land and water resource management for sustainable production. Therefore, common guidelines for all the programs under the Ministry of Rural Development were developed in 1994 and have been implemented since 1995. These guidelines were used by the central-sponsored schemes for the watershed development under the Ministry of Rural Development and the Ministry of Agriculture. Based on the common principles the Ministry of Agriculture developed a new guideline in 1997 for implementation of NWDPRA.

The 1994 guidelines of the Ministry of Rural Development were in operation for five years. This period has seen many successes as well as some failures in watershed development. Hence, greater flexibility of the guidelines was essential to enhance the robustness of the response to the regionally differentiated demands that characterize rural India. Since different ministries were involved in watershed development, it was decided to develop common guidelines. The 1994 guidelines were instrumental for developing the common guidelines. The Ministries of Agriculture and Rural Development jointly developed the 'Common Approach/Principles for Watershed Development' in 2000 (GOI 2000a). The two ministries and Ministry of Environment and Forest then adopted these guidelines as common principles for implementation of watershed development projects.

The Ministry of Agriculture brought out the new guidelines based on the 'Common Approach' in 2000 as 'WARSA – *Jan Sahbhagita*' (people participation), Guidelines for NWDPRA (GOI 2000b). A similar document of revised guidelines (Guidelines for Watershed Development) based on the common principles was also issued by the Ministry of Rural Development (GOI 2001a).

The new guidelines give more flexibility that was needed at village/watershed level. These guidelines, inter alia, envisage the convergence of different programs of the Ministry of Rural Development, Ministry of Agriculture, and other ministries and

departments. Following the 73rd and 74th Amendments to the Constitution of India in early 1990s, the Panchayat Raj Institutions (PRIs) are mandated with an enlarged role in the implementation of developmental programs at the grassroot level, and accordingly their role has been more clearly brought out. The new guidelines also emphasize specific and focused project with destination, roadmap, and milestones. The 1994 guidelines were made more flexible, and workable with more participation of the community. The new guidelines provide more emphasis on local capacity building through various training activities and empowering community organizations.

5.4.1 The new common guidelines

Since 1994, several guidelines have been released focusing on different aspects of watershed development and implemented accordingly. As a result, the watershed development programs have had impacts such as increased water availability, reduced soil erosion, increased cropping intensity, more rural employment and increased crop productivity and incomes. However, these benefits have been largely confined to a few successful watershed programs. In fact, almost two-thirds of the watershed programs performed below average, as indicated by a meta analysis jointly undertaken by ICRISAT and Indian Council of Agricultural Research (ICAR). Therefore, at the Ministry level, there was apprehension about further investment to be made on watershed development programs in the country. Thus, ICRISAT in partnership with ICAR institutions, state agriculture universities, a number of state government departments, and NGOs, undertook the comprehensive assessment during 2006–08 and concluded that community watershed programs could serve as growth engines for the development of rainfed areas with prospects of doubling productivity[4]. The Comprehensive Assessment also highlighted the need for reform in institutional and policy front to ensure equity in benefit sharing among all sections of the community. It is in this context, that in coordination with the Planning Commission, an initiative has been taken to formulate Common Guidelines for watershed development projects in order to have unified perspective by all ministries. These guidelines are therefore applicable to all watershed projects in all departments/ministries concerned with watershed development projects.

The new common guidelines set the selection criteria and prioritization of watersheds based on a broad framework and states may incorporate any other relevant criteria within the prescribed framework:

- Extent of rainfed area
- Scarcity of drinking water
- Low productivity of crops
- Poverty index [people in the categories of below poverty line (BPL), scheduled castes (SC) or scheduled tribes (ST), etc.]
- Area owned by small and marginal farmers, SC/ST, BPL
- Contiguity to already treated/ongoing watersheds
- Extent of treatable common property resources
- Willingness of the villagers to participate, contribute, and support the program.

[4] The Ministry of Agriculture and Cooperation and the Ministry of Rural Development, jointly sponsored the Comprehensive Assessment.

The framework addresses most relevant issues and identifies broad indicators that must be followed by an implementing agency when selecting the project area. This framework can be complemented through participatory rural appraisal (PRA) exercise and demand-driven approaches. Another most important feature of the common guidelines is the development criteria for success of the watershed. Among others, the exit protocol for the PIAs is developed.

The larger question of livelihood security through natural resource management lies in the effective implementation of watershed programs. The appropriate information at all levels for suitable planning and execution is essential[5]. Therefore, the common guidelines reinstate the centrality of participatory process and community-based institutions for planning, implementation, and future management of the assets created by watershed projects (GOI 2008). It further extends the project duration from four years to seven years with a hike in the cost of ₹12,000 per ha in plain areas and ₹16000 per ha for hilly areas as per the Eleventh Five Year Plan. Emphasis has been laid on cluster approach of micro-watersheds with an average area of 1000–5000 ha as unit of implementation; multi-tier strategy based on ridge to valley approach[6] with the Forest Department and Joint Forest Management Committee playing an important role in the upper reaches mainly in hilly and forest areas.

The Common Guidelines emphasize creation of database both at national and state levels for scientific planning and monitoring which is essential to inform policy makers as well as planners about the current issues and debates of watershed programs. The common guidelines focus on livelihood security while ensuring resource conservation and regeneration and dedicated institutions at central, state, and district levels with professional experts and devolution of finances. The special feature of the common guidelines 2008 is the convergence with other schemes such as National Rural Employment Guarantee Scheme (NREGS), Bharat Nirman, and Backward Region Grant Fund (BRGF). Table 5.2 summarizes different guidelines.

5.5 INSTITUTIONAL ARRANGEMENTS FOR WATERSHED DEVELOPMENT

The institutional arrangements required for sustainable watershed management are equally varied and diverse. Watershed programs faced paradigm shift towards involving local village communities or institutions for implementing the projects. But village level institutions, in most cases, do not have relevant capacities to deal with complexities involved in natural resources management, which need necessary guidance initially to handle the responsibilities. Suitable institutional mechanisms should be placed to

[5] Inadequate access to the evaluation studies for the government supported watershed projects emerged as one of the important constraints while carrying out the comprehensive assessment of watershed projects, coordinated by ICRISAT.

[6] The approach is to identify an area, and first look at the forest and the hilly regions, in the upper water catchments wherever possible. The purpose of this approach is that all activities required to restore the health of the catchment area by reducing the volume and velocity of surface runoff, including regeneration of vegetative cover in forest and common land, afforestation, staggered trenching, contour and graded bunding, bench terracing, etc. (GOI 2008).

Table 5.2 Summary of watershed guidelines issued during 1994–2008 by the Ministry of Rural Development (MoRD), Government of India[a]

Item	*MoRD guidelines (1994)*	*Hariyali guidelines (2004)*	*Neeranchal guidelines (2006)*	*The new common guidelines (2008)*
Objectives	Economic development through regeneration of natural resources in drought-prone areas. Integrated treatment of both non-arable and arable lands on watershed basis.	Stressing the physical nature of watershed development and the central role of the *Gram Panchayats* in overall economic development.	Providing sustainable rural livelihoods through overall development centered around watershed development (harnessing, conserving, and developing natural resources, i.e., land, water, and biomass).	Sustainable rural livelihoods through natural resource managements.
Selection of watersheds	Where people's participation and voluntary contributions are forthcoming. The area should have an acute shortage of drinking water, preponderance of SC/ST population and wastelands. Only micro-watersheds of 500 ha each are selected. In case of more than one micro-watershed in a block, these need not be contiguous.	Same as 1994 Guidelines. Contiguity with existing watersheds is favored (and is one of the criteria used for watershed selection).	Same as 1994 guidelines. Positive history of women's agency and community action. Micro-watershed will be a part of the milli watershed (4–10 thousand ha) identified by the district watershed management team.	Same as 1994 Guidelines. Area of the project should not be covered under assured irrigation and productivity potential of the land need to be considered.
Institutional arrangement (a) National	MoRD	Same as 1994 Guidelines.	NASDORA (supported by apex stakeholders council/governing board).	NRAA
(b) State	Review committee under the chairmanship of the chief secretary.	Same as 1994 Guidelines.	State level governing board.	State Level Nodal Agency (SLNA)
(c) District	DRDA (District Rural Development Agency)/DPAP (Drought Prone Area Programme). A district watershed advisory committee which offers guidance on issues of implementation, including PIA selection.	Zilla Panchayat (ZP) or DRDA/DPAP	District watershed development agency; supported by district panchayat (i.e., ZP).	District Watershed Development Unit (DWDU)

(d) Watershed	Government or non-government organizations can be selected as PIAs at the watershed level. A multidisciplinary watershed development team to assist the PIA. Watershed association, which shall be a registered body, will be supported by a watershed committee (elected body) with representatives from SHGs, UGs, women, *Gram Panchayat*, and WDT	*Gram Panchayat* and NGO in the case of requirement. *Gram Sabha* will act as watershed association. Watershed committee is discontinued. A multidisciplinary watershed development team to assist the PIA directly.	The village watershed committee (VWC) (elected body) will implement the watershed, supported by milli watershed council, WDT, *Gram Sabha* and women's watershed councils. VWC would have maximum 20 members – 50% women and 33% SC/ST; and representation from SHGs, UGs, *Gram Panchayat*, and WDT. The VWC would function as a subcommittee of the *Gram Panchayat*.	Line departments, autonomous organizations under state/ central government, institutes/ research bodies, Intermediate Panchayats, and voluntary organizations (VOs) can be selected as PIAs. WDT, SHGs, UGs, and watershed committees to implement the project.
Funding pattern	₹4,000–4,500 per hectare at DRDA level Watershed works: 80% Social and human development: 10% Administrative overheads: 10%	₹6,000 per hectare (from 2001 onwards) at DRDA/ZP level Watershed works: 85% Social and human development: 5% Administrative overheads: 10%	₹12,000 per hectare at DRDA/ZP level Watershed works: 80% Social and human development: 8% Impact assessment: 2% Administrative overheads: 10%	₹12,000 per hectare Watershed works: 78% Social and human development: 10% Impact assessment: 2% Administrative overheads: 10%
Flow of funds	GoI, MoRD to DRDA-PIA	Same as 1994 Guidelines.	NASDORA – State Boards – DWDA – VWC	CLNA – SLNA – DWDU
Cost sharing	Compulsory, 5% for common property resources and 10% for private lands of general category, and 5% for SC/ST.	Same as 1994 Guidelines.	Same as 1994 Guidelines.	Same as 1994 Guidelines.
Time period	Four years	Five years (increased in 2001)	Eight years (2 + 4 + 2)	5–7 years (2 + 3 + 2)

(*Continued*)

Table 5.2 Continued

Item	*MoRD guidelines (1994)*	*Hariyali guidelines (2004)*	*Neeranchal guidelines (2006)*	*The new common guidelines (2008)*
Role of NGOs	Can be one of the implementing agencies for a group of 10 or 12 micro-watersheds.	Limited to group formation and social mobilization. PIA where *Gram Panchayat* and/or ZP capacity is not adequate.	Importance of NGOs is recognized and restored to pre-Hariyali level.	Can be one of the implementing agencies. However, not more than 25% of projects should be given to NGOs.
Watershed development fund (WDF)	Concerned WDT to take care with the help of the watershed committee. To support this activity, WDF is to be created and cost contributions will go to this fund. No operational rules were prepared.	Same as 1994 Guidelines.	Operation rules of the fund should be prepared by VWC and ratified by the *Gram Sabha;* 50% of the fund should go towards maintenance of common assets. Remaining should be used as revolving fund for giving loans to the villages who have contributed.	Same as 1994 Guidelines.
Gender	This item is addressed in the guidelines but the strategy has not been spelt out clearly.	Same as 1994 Guidelines.	Gender quota of 50% in VWC is introduced. Separate women watershed committee is introduced to support VWC.	Representation of 50% from women and vulnerable groups in watershed committee.
Equity	This item has been addressed by giving user rights for poor and SC/ST in common property resources. But no strategy is defined or suggested.	Same as 1994 Guidelines.	Livelihood component is added for the benefit of poor. But no specific strategy is defined for sharing the common resources like water.	Livelihood component was the thrust for the benefit of poor. Allotting usufruct rights.

Source: Modified from Reddy (2006).

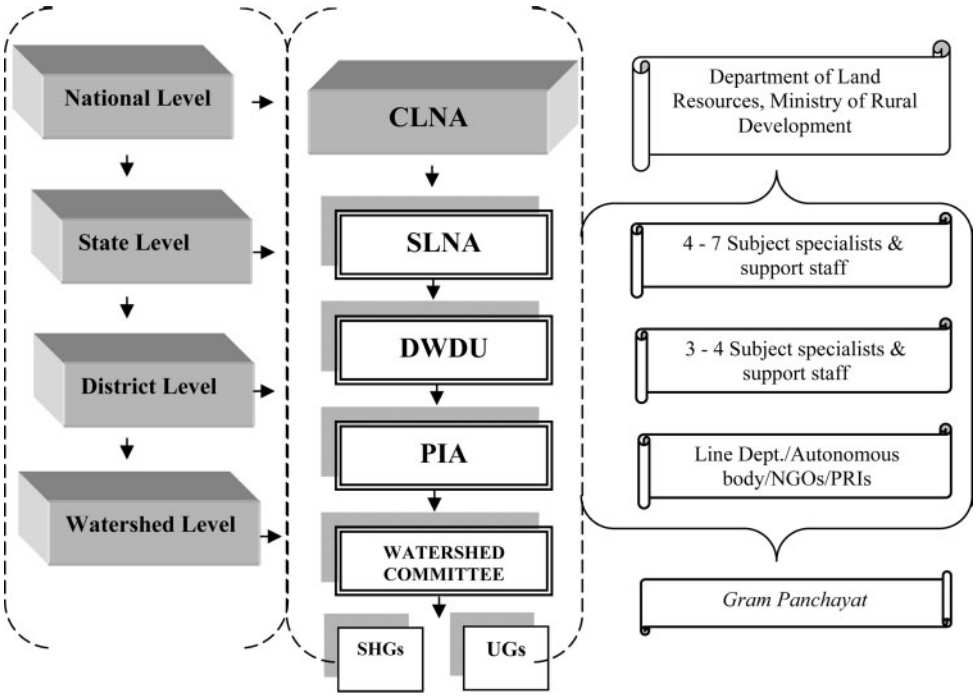

Figure 5.1 Institutional arrangements for integrated watershed management program (Note: CLNA = Central Level Nodal Agency; SLNA = State Level Nodal Agency; DWDU = District Watershed Development Unit; PIA = Project Implementing Agency; SHGs = Self-help groups; UGs = User groups; NGOs = Non-government organizations; PRIs = Panchayat Raj Institutions)

manage the dilemmas while implementing the project, which ultimately play an important role in determining efficiency and sustainability of the watershed development programs.

Strong local level institutions can increase the viability and sustainability of watershed management programs by empowering the community to manage and maintain the assets created under the project (Joshi *et al.*, 2004). However, strengthening and empowering local institutions needs to be done through continuous process of capacity building which includes technical training and human resource development for upgrading communication skills, building confidence and leadership, decision-making, and conflict resolution. A number of institutions therefore are conceived and established at different levels (Figure 5.1). These institutions are created based on the provisions of the common approach and principles for watershed management are conceived and developed by the Ministries of Agriculture and Rural Development.

5.5.1 National Rainfed Area Authority

The National Rainfed Area Authority (NRAA) is a central level agency which supports preparing strategic plans for watershed based development projects at state and district

level keeping in view specific agroclimatic and socioeconomic conditions. The NRAA is mandated to facilitate convergence of different schemes and projects of Government of India which are having similar objectives. The NRAA acts as an effective coordinating mechanism between all bodies/organizations/agencies/departments/ministries who are involved in watershed programs.

5.5.2 Central Level Nodal Agency

The Central Level Nodal Agency (CLNA) set up at the department or ministry level facilitates allocation of the budgetary outlay for the projects among the states keeping the specified criteria in the guidelines. The CLNA comprises professional multidisciplinary experts experienced in the fields of agriculture, water management, institution and capacity building along with representatives of different ministries. The CLNA should interact with state and district level agencies, facilitate, and ensure smooth flow of funds to the District Watershed Development Unit (DWDU) as per the fund flow norms as well as recommendations from the State Level Nodal Agency (SLNA).

5.5.3 State Level Nodal Agency

The state government is responsible to constitute the SLNA. The SLNA will sanction watershed projects for the state on the basis of approved state perspective and strategic plan as per procedure in vogue and oversee all watershed projects in the state within the parameters set out in the Common Guidelines. SLNA has a wide range of functions in the state.

5.5.4 District Watershed Development Unit

In districts, where the area under the watershed development projects is about 25,000 ha, the DWDU, a separate dedicated unit, is established at the district level, which will oversee the implementation of watershed program in each district and will have separate independent accounts for this purpose. The DWDU will identify potential PIAs in consultation with SLNA as per the empanelment process as decided by the respective state governments. The DWDU would facilitate coordination with relevant programs of agriculture, horticulture, rural development, animal husbandry, etc. with watershed development projects for enhancement of productivity and livelihoods.

5.5.5 Project implementing agency

The SLNA would evolve appropriate mechanisms for selecting and approving the PIAs, who would be responsible for implementation of watershed projects in different districts. These PIAs may include relevant line departments, autonomous organizations under State/Central Governments, government institutes/research bodies, intermediate panchayats, and voluntary organizations (VOs). However, the following criteria may be observed in the selection of these PIAs:

- They should preferably have prior experience in watershed-related aspects or management of watershed development projects.

- They should be prepared to constitute dedicated Watershed Development Teams (WDTs).

5.5.6 Watershed Committee

The Watershed Committee usually consists of 10–12 members; half of the members are representatives of SHGs and user groups (UGs), SC/ST community, women and landless persons in the village. The committee manages the project funds, and is responsible for coordination and liaising with the *Gram Panchayat*, PIA, WDT, and other agencies.

5.5.7 Self-help groups

Self-help groups are usually homogeneous groups consisting largely of landless individuals with common or similar sources of income such as animal husbandry, goat rearing, poultry, and agriculture labor. These are more often women's group having 15–20 members in each group. The primary activity of these groups is thrift and credit. Under the watershed guidelines, a revolving fund of an amount to be decided by the Nodal Ministry is allocated to each watershed project for supporting the SHG members to scale-up their activities or to invest in productive assets for increasing income.

5.5.8 User groups

User groups largely consist of those who are likely to derive direct benefits from a particular watershed work or activity such as different types of bunds, farm ponds, farm bunds, etc. The UGs usually formed around specific interventions. The UGs will be responsible for the operation and maintenance of all the assets created under the project in close collaboration with the *Gram Panchayat* and the *Gram Sabha*.

Institutional mechanisms installed in Sujala program seems to be effective in many activities due to the functional linkages between the elements involved in the project addressing post-project sustainability (Wani *et al.*, 2008a). This showed the importance of *Gram Panchayat* linkage and role in the watershed program for the success of the project. Among the watershed community-based organizations (CBOs), SHGs showed the potential to be sustainable in all the programs. The watershed implementing agency is more sustainable in Andhra Pradesh Rural Livelihoods Programme (APRLP) and Hariyali programs. Regarding participation of different sections of watershed community, Sujala program gets higher ranking as different sections of watershed community is involved in program management from the inception of the program. The Hariyali watersheds are ranked least while APRLP and IGWDP (Indo-German Watershed Development Project) watersheds fall between these two extremes with the latter ranked higher than the former (Wani *et al.*, 2008a). Hence, suitable institutional arrangements and linkages within the institutions are necessary to put in place, when the responsibility of managing natural resources is given to local communities to promote inclusiveness among the communities.

5.6 PROMOTING CLOSER INSTITUTIONAL LINKS

There have been significant changes in the options for local institutional development over the last decade. Although earlier guidelines highlighted the importance of PRIs,

recent guidelines emphasized the role of local institutions including PRIs to enhance the benefits. The current policy environment is therefore more favorable to the development of local UGs with rights to plan, manage, and retain certain benefits. The new common guidelines for watershed development clearly illustrate this trend particularly well (GOI 2008). The common guidelines emphasize decentralization of powers to state, district, village, and community level. This is supported by financial allocations from Central Government to state /district level and then to village and community level organizations. Apart from institutional alignment for better outcomes in a watershed project, there is a need to account for principal types of macro-economic interventions influencing the farmers' decisions.

Over the years, watershed development has been threatened by the adoption of unsuitable technologies encouraged by subsidies (Kerr *et al.*, 1996). High subsidies for rural electricity encourage the use of electric pumps, leading to overexploitation of newly created groundwater resources in rehabilitated watersheds (Shiferaw and Bantilan 2004; Reddy 2005). In addition, irrigation subsidies cause farmers to shift cropping patterns to water-intensive crops, which results in further water scarcity; thus these crops should not be promoted in unfavorable regions. While subsidies could be justified under some conditions where market or institutional failures prevent socially desirable conservation, there is a need for careful appraisal of the equity and sustainability implications of policies that affect smallholder resource use and management decisions.

Subsidies are one form of incentive operating at the community level. They are intended to simultaneously support improved land management and generate employment opportunities and commonly take the form of contribution to the labor cost of constructing soil water conservation structures. Past experiences have indicated that it is difficult to operate without subsidies because communities act as though they are entitled to handouts, but not responsible for solving their own problems (Kerr *et al.*, 1996). Therefore, relevant questions in relation to the use of subsidies arise: What for? How much? How long? These questions need to be addressed keeping in mind that resource sustainability is at the center stage. One way of improving watershed benefits is through mobilizing social capitals at the community level. Since watershed development is a complex process involving a range of interest groups and distinct operations, promoting UGs and CBOs is the focus of the resource management debate.

Pricing policies for agricultural produce are a key factor influencing farmers' decisions. The most important fact of these policies is that the support prices for cereals such as wheat and rice encourage farmers to switch production away from traditional drought tolerant crops such as millet and sorghum to less water efficient crops such as rice. In many watersheds, gains arising from more efficient conservation of runoff are often offset by greater demands for irrigation water for water intensive crops (Sreedevi *et al.*, 2008). However, for sustainable water resource management, the strategy should include no incentives for growing water intensive crops in *rabi* (postrainy) and summer seasons.

One of the major constraints to the success of agricultural development and more specifically watershed development is high interest rate and lack of credit facilities for farmers. In general, small farmers turn to the informal lending market where interest rates of up to 60% are charged (Reddy *et al.*, 2008). Watershed projects make possible

the introduction of new technologies; the use of which often requires a large initial investment but the lack of credit facilities and the high interest rates of the informal sector act as a disincentive to medium- and long-term investment. But there is concern that subsidizing credit schemes for particular projects may adversely affect their sustainability through directly altering economic viability (Turton *et al.*, 1998).

Another set of literature deals with issues of property rights in managing common pool resources. From an economic perspective, a rational farmer can only be expected to undertake resource-improving investments when the on-site discounted benefits that directly accrue to him/her from such investments are higher than discounted costs (Joshi *et al.*, 2004). When private resource-improving and conservation investments generate additional benefits off-site, to the community at large, the level of investment undertaken by the private farmer would be less than what would be socially desirable. This problem arises because of lack of excludability of undesirable effects which means that part of their decisions on resource use and production choices fall under the control of other farmers. Capturing such spillover social benefits requires special policies such as cost sharing, subsidies, and benefit transfer (Shah 2005). To address these problems, there is a need to strengthen institutional links at the grassroots level. As market prices and effective government regulation is missing to ensure sustainable management of these resources, households, and communities have to coordinate the supply and demand to avoid overexploitation.

5.7 DEALING WITH POLICY AND INSTITUTIONAL CONSTRAINTS

The Comprehensive Assessment on watershed programs indicated positive and significant effects for soil and water conservation and sustainable productivity growth in the rainfed regions (Wani *et al.*, 2008a). The study also noted that lack of appropriate institutional support is impeding in tapping potential benefits of the watershed programs. The isolated and piecemeal approach to watershed development has not been consistent with large-scale technology exchange and dissemination. It is indeed important to mention the role of people's participation in watershed development programs. Several experiences have already demonstrated that people's participation was recognized as important as the technical components of the watershed development programs (Wani *et al.*, 2003d, 2008a; Joshi *et al.*, 2005).

5.7.1 Collective action

The first generation watershed programs in the country were supply driven. In this approach, the implementing agency used to identify locations and decide various activities for implementation of the projects. This top-down approach did not match the needs of the stakeholders in the watershed. In the absence of people participation in the program, the potential benefits could not be realized and sustainability was a major concern wherever little benefits were achieved. Therefore, the involvement of the stakeholders in planning, development, and execution of the watershed activities is crucial for several reasons. The watershed is a community driven approach and hence it calls for community participation and collective action. The exclusion of an individual from

using watershed services (e.g., drought control) is difficult, if not impossible. The *quasi-public good* feature implies that several individuals can use the services simultaneously without diminishing each other's use values. However, the distribution of investment costs and benefits and the presence of unintended spillover effects determine farmers' technology choice, land use pattern, and investment strategies in the watershed (Joshi *et al.*, 2004). These spillover effects impact on economic profit and utility of users of these services (e.g., soil conservation) will not necessarily enter the decision calculus of the supplier of the services. These services are typically characterized by economies of scale in production and consumption.

In current watershed development projects, collective action is more focused towards resource management and production and enhancement, while input and produce marketing get largely neglected. Extension of collective strategies to output marketing could lead to substantial benefits to smallholder and marginal farmers who now face high transaction cost in marketing their small marketable surplus. Providing institutional and infrastructure support to ease the information and marketing bottlenecks is critical for the success of watershed projects. There is a pressing need for innovative strategies that improve farm-gate prices. Such interventions have the potential to improve economic incentives for the poor and marginal groups to participate in collective action.

5.7.2 Bottom-up approach

Watershed programs involve activities which are able to cater to the specific needs of local people and certainly attract higher participation. These programs aim to contribute to the micro-environment and beneficiaries. Therefore, assessing the needs of the stakeholders together by the implementing agency and the stakeholders is necessary. Since watershed has diverse/heterogeneous communities or groups of beneficiaries, every group should appropriately be addressed in the watershed. Evidence shows that most of the watershed programs were not sensitive to the needs of women and landless vulnerable groups (Meinzen-Dick *et al.*, 2004; Sreedevi and Wani 2007). Therefore, there should be conscious efforts right from the beginning to ensure integration of small and marginal farmers, women, and landless laborers.

5.7.3 Capacity building

According to Wani *et al.* (2008c), training and capacity building is the weakest link in watershed programs. In fact, most stakeholders including policy makers do not have required knowledge about the watershed activities. Most stakeholders believe watershed programs as construction of rainwater harvesting structures and never go beyond to include productivity enhancement, income-generating activities, livestock-based activities, institutions, monitoring and evaluation mechanisms, wasteland development, market linkages, etc. Therefore, unlike the first generation watersheds, the social and human development component in the present watershed programs receives high attention and is instrumental in achieving intended goal.

5.7.4 Knowledge-based Entry Point Activity

Unlike cash-based subsidized entry point activities (EPAs), knowledge-based activities provide a sense of ownership on the assets created in the project. Subsidies in the

form of wages for the construction of soil water conservation technologies can leave a legacy of dependency once support is withdrawn. Thus, knowledge-based EPAs can help achieving sustainability of the project.

It is now accepted that the problems related to water shortage in the rainfed systems are most appropriately addressed through the implementation of soil conservation and rainwater harvesting practices by adopting community watershed management strategy. To achieve this, community participation in program activities from planning, execution, and monitoring is critical for the success and sustainability of the interventions. However, mobilizing community participation is a challenging task and lack of community participation is identified as a major factor for lower or no impact of watershed programs (Farrington *et al.*, 1999; Kerr *et al.*, 2000; Wani *et al.*, 2003d; Joshi *et al.*, 2005).

Appropriately introduction of a watershed development program to the community has been recognized as an important activity and this is best done through EPA. An essential component of an EPA is building the rapport with the community, strengthening and sustaining it throughout the life of the program and beyond. To build a rapport between the PIA and the villagers before initiating the watershed programs, an EPA is envisaged. The EPA is identified through PRA. Realizing the importance of EPA, the Government of India watershed guidelines specifically allocate a financial budget of 4%, which works out as ₹0.4 million (US$8000) for a 1000-ha watershed (GOI 2008).

5.7.5 Empowering women and vulnerable groups

Since community participation plays an important role in determining the performance of watersheds, targeted activities should be economically beneficial to women and vulnerable groups (Sreedevi and Wani 2007). In order to restore active participation of marginal sections of the community, there should be more income-generating activities, and commercial scale activities which resulted in better participation as well as improved decision-making and better social status for women and landless families in the society (Joshi *et al.*, 2009). Sreedevi and Wani (2007) revealed that harnessing gender power by balancing activities for men and women, farmers, and landless people was found to be effective for enhancing the impact of community watershed programs.

To reduce drudgery for women, there should be specific interventions targeting drinking water supply, and efficient technologies for enhancing agricultural productivity through the operations undertaken by women. Targeted income-generating activities are must for women to get them additional cash in their hands which can enable them to improve their knowledge and social status and reduce workload accordingly.

5.8 SUSTAINABLE WATERSHED MANAGEMENT: ROLE OF COMMON GUIDELINES

Integrated watershed management approach is identified as a suitable approach to improve the rural livelihoods through increased productivity and efficient management of natural resources in the drylands (Wani *et al.*, 2003d, 2008a; Joshi *et al.*,

2009; Sreedevi and Wani 2009; Shieferaw *et al.*, 2009). However, lack of appropriate institutional support is impeding in tapping potential benefits of the watershed programs. The impacts have been identified in isolated cases due to lack of monitoring and evaluation process. Therefore, there is a need to concentrate more efficiently on market-led development holistic strategies than focusing on piecemeal approach.

The new common guidelines brought out by Government of India is the first set of guidelines that apply to watershed development projects across three ministries, viz., Ministry of Rural Development, Ministry of Agriculture, and Ministry of Environment and Forests. The common guidelines take into account significant lessons from the view point of policy formulation processes in the context of democratic setup within the country. The common guidelines reveal the difficulties in breaking out of the mindset of a fragmented view of schemes and programs and affecting a broad paradigm shift towards sustainable agriculture in general, and rainfed agriculture in particular, that involves simultaneous changes in a range of macroeconomic policies pertaining to technology, public expenditure in natural resource development, subsidies, pricing, etc. In the absence of such a shift, the basic agenda of sustainable agriculture could take diversion by the rapidly emerging policy prescriptions in favor of "privatization and corporatization", especially of small farm agriculture. In this context, the common guidelines offer a gradual expanding space for democratic intervention in the implementation and policy formulation processes.

5.8.1 Institutional responsibilities

The institutional arrangements suggested by the common guidelines strike a balance between different types of PIAs which may include department, VOs, NGOs, *Gram Sabhas, Gram Panchayats*, and CBOs created under watershed projects. It is imperative that the VOs/NGOs get their due share as PIAs, rather than getting relegated as agencies for community organization and awareness generation. The common guidelines also stipulate that not more than 25% of projects should be given to VOs/NGOs. This may be a good move on the part of common guidelines to identify and honor efficient and competent NGOs for effective implementation of the project.

5.8.2 Delegation of power to the states

The most critical feature of the common guidelines is the delegation of power to the states: the power of sanctioning and overseeing the implementation within the parameters of the common guidelines are to be vested with the state governments. This leaves substantial scope for calibration and fine-tuning of some of the concerns that may need an additional emphasis. A dedicated SLNA shall be constituted by the state government with an independent bank account for direct transfer of the financial assistance from the center. The SLNA will sign memorandum of understanding with the departments/nodal agencies that may be set up by the ministries in the Central Government. The common guidelines embody an unprecedented devolution of decentralization of powers to state, district, village, and community level. However, the issue of transparency and sharing of information or data and putting it in the public domain needs special attention.

5.8.3 Dedicated institutions

The most critical feature of the common guidelines is allotting dedicated institutions at various levels. These institutions have been assigned with specific functions. The SLNA and DWDU are the two major institutions at state and district level respectively which are key institutions in executing and monitoring watershed works. At the watershed level, institutional arrangements follow the 2001 revised guidelines. The Watershed Committee will receive and manage funds with guidance from *Gram Panchayat*. If the *Gram Panchayat* covers more than one village, subcommittees at village level are proposed. When a watershed consists of more than one *Gram Panchayat*, separate Watershed Committees will be organized for each *Gram Panchayat*. However, allocation and sharing of project funds between these Watershed Committees and *Gram Panchayats* may be a problem, since they will differ in area and requirements. Such aspects may have to be addressed in the course of preparation of the perspective plan and detailed project document or when the states draw up their own guidelines.

5.8.4 Convergence

The common guidelines make a special reference to convergence with other schemes such as NREGS, Bharat Nirman, and BRGF. They emphasize differential rates of cost-sharing privileging the resource-poor sections like SC and ST and clearly specify that the UGs in close collaboration with *Panchayats/Gram Sabha* should maintain structures and assets by using the Watershed Development Fund. The common guidelines suggest a compulsory amount of 5% for common property resources, 10% for private lands of general category, and 5% for SC/ST. Importantly, at least 50% of the Watershed Development Fund needs to be reserved for maintenance of assets created on community land or for common use under the project.

Convergence is becoming brand hallmark of any development project in recent years. In the context of watershed management approach, community watershed is used as an entry point to converge and to explicitly link watershed development with rural livelihoods and effective poverty reduction and in the process identify policy intervention at micro, meso, and macro levels (see Sreedevi and Wani 2009). For instance, APRLP has demonstrated the scope for issues related to suitable processes for change in micro practices, macro policies, convergence, and information and management systems. Convergence, therefore, can take place at different levels. For a successful convergence, socioeconomic institutional and policy needs are necessary to increase adoption of improved options by the rural people.

The process of convergence requires several components such as individual and community-based interventions, use of new science tools, empowerment of community and stakeholders, and consortium approach for technical backstopping. Therefore, convergence at the community level acts as a base flow to the bottom-up approach for promoting rural livelihoods. Convergence of crop-livestock based activities and other income-generating micro-enterprises in the watersheds by linking watershed development and research activities increases the effectiveness of holistic watershed programs through efficient use of conserved/harvested water and other natural resources for increasing production and income of the rural poor.

5.8.5 Consortium approach

There is a need for a multi-institutional consortium approach for technical backstopping to empower farmers and develop human and institutional resources through capacity building measures by integrating the activities of Krishi Vigyan Kendras (KVKs), farmers' training centers, NGOs, research organizations, and line departments of the state government for technical backstopping to undertake action research at watershed level. Consortium approach enables the addressing of equity, gender, sustainability, and improved livelihoods which are the pillars of inclusive and sustainable development (Wani *et al.*, 2002, 2009). For market-led development, the need for functional and effective linkages among watershed institutions and other institutions such as markets, banks, etc. is imperative for success of the program.

The common guidelines uphold the importance of consortium of resource organizations for capacity building support, which is a crucial component to achieve the desired results from watershed development projects. The common guidelines reinstate that the capacity building strategy and activities enumerated by NRAA, nodal agencies at the central level, and consortiums of resource organizations should be funded separately over and above the earmarked budget for institution and capacity building in the preparatory phase of the watershed development project. This not only strengthens the social and human resource development but also provides knowledge sharing opportunities for different actors in watershed management programs.

The common guidelines suggested key strategies for social and human development and that NRAA will collaborate with various resource organizations for developing national as well as state specific capacity building strategies. Emphasis has been laid on dedicated and decentralized institutional support and delivery mechanism and mechanism for effective monitoring and follow-up processes.

5.8.6 Addressing equity

Equity is an essential element in ensuring perennial benefits in the program. As indicated earlier, watershed program targeted overall development of local economy through natural resource development and productivity enhancement. Therefore, in order to distribute the benefits amongst all the beneficiaries, involvement of stakeholders is essential. Interestingly, landless and women have been inducted into the program through involvement in allied micro-enterprise activities. The SHGs have been promoted targeting women, assetless, and other socially and economically disadvantaged persons so as to minimize inequalities and social conflicts. They also set up micro-enterprises to provide supporting services to vulnerable sections. Further, 10% of the total budget was earmarked for livelihood activities for the assetless persons and 13% for production system and micro-enterprises. This is a positive move in equal distribution of watershed benefits.

Gender issue has been addressed by making provision to include women and SHG members in watershed committees. Various UGs have been suggested with due representation from women and vulnerable groups. SHGs have been dominant in project implementation at the grassroots level for planning, execution, and monitoring.

5.8.7 Project management

A positive step considering the watershed development program in three phases, viz., preparatory, works, and consolidation phase, can make a difference, if the progression from one phase to the next is made conditional on meeting the objectives, indicators, and targets of the previous phase, otherwise automatic progression would make little difference on the ground[7]. The duration of the project has been enlarged into minimum four to maximum seven years depending upon the activities and ministries/departments.

5.8.8 Post-project sustainability

Sustainable watershed management lies in the hands of communities. The common guidelines emphasize handing over responsibility to *Panchayats* and/or UGs as part of the withdrawal phase. This is important as there is a need to ensure actual performance or sustenance in the post-project phase. Continued long-term monitoring of the project impacts and the arrangements for future management is essential to address the sustainability issue. However, this needs to be ensured through proper capacity building and technical backstopping at the grassroots level. Social and human resource development is an essential component in ensuring the post-project sustainability.

5.9 OPERATIONALIZING POLICIES

The real challenge in achieving success in watershed development program lies with operationalizing policies. Special efforts are needed to enable these policies. However, the performance of a watershed depends on certain specific factors, for example, people's participation. While significant progress has been made in operationalizing a particular form of watershed management, much remains to be done for scaling-up the approach and seeing it translate into tangible benefits for communities. One of the key challenges lies in the formulation of appropriate institutional arrangements for more widespread application, given the isolation of different disciplines – and of research from development – within existing institutions. To move forward here, it is important to take a systematic look at the tasks and skill base required to operationalize watershed management program, and the degree to which existing institutions can be mobilized to fill the gap.

Another key challenge lies in forging stronger linkages between research and development, so that development is linked to and given at least equal status as research, and action research given equal weightage as more conventional empirical research. For this, university training, institutional mandates, incentive systems, and opportunities for social learning at local and institutional levels must be given close consideration if the integrated mandate embodied in integrated watershed management is to be enabled. In this direction, the new common guidelines have paved the way for new ideas through

[7] For example, fund releasing procedure is conditional on meeting the objective and proper certification and submission of documents after completion of each phase (Para 9 of Common Guidelines).

consortium approach in achieving the success of watershed development approach. For the first time in the history of watershed development, in CLNA, research organizations such as ICRISAT, Central Research Institute for Dryland Agriculture (CRIDA), Central Soil and Water Conservation Research and Training Institute (CSWCRTI) along with NGOs and departments and ministries are working together for proper operationalization of common guidelines. This is a remarkable institutional reform process which plays a major role in technology transfer as well as multidisciplinary integration for approaching watershed problems.

Most importantly, the mindset of different actors has to be tuned into the new policies. As the implementing departments and PIAs feel comfortable with earlier policies, there seems to be difficulty to adjust with new guidelines. The change should occur at various levels. However, it should begin with bottom level actors starting from farmers to PIAs, SLNA, and political representatives. The political commitment and the bureaucratic support should ensure the progress in new direction. The mindset of bottom level actors can be tapped with continuous consultation through capacity building and meetings. However, at the top level, it should be self-driven spontaneously.

To operationalize, people need more handholding. Local knowledge and skills need to be tapped through appropriate channels. People's involvement is a key in technology exchange as well as to spread knowledge among farmers' community. Therefore, people's participation has to be ensured in all phases of the project for communicating the goals of the project.

Climate change issues should be addressed. Climate-induced increase in surface temperatures can impact hydrological process of a watershed system and has potential implications on water quantity and quality at a regional scale. Further, increasing demand from population growth and economic development will lead to exacerbating water stress. Therefore, policy and institutional reform is necessary through: (a) clarifying rules governing roles of various stakeholders; (b) minimizing fragmentation and overlap of mandates of various agencies; (c) supporting decentralization and capacity building of local agencies; and (d) prioritizing watershed related research and technology development. In the new common guidelines the roles and responsibilities of CLNA, SLNA, DWDU, and PIAs have been specified. These responsibilities must be adhered to ensure transparency and sustainability of the project.

In addition, it is important to include a monitoring and evaluation system that seeks to ensure integration through periodic re-assessment. For the purposes of component integration, monitoring must assess the impacts of activities on diverse system components. Therefore, monitoring must address the impact of activities on diverse components (water, livestock, crop yield, and soil fertility). To operationalize this, it is important to consider all potential interactions between the activity conducted and different components, and to identify priority indicators from scientific and/or local perspectives that will be monitored for each. The recommendations of comprehensive assessment are worth noting here (Wani *et al.*, 2008a).

The recommendations include: (i) mid-term evaluation and impact assessment after program completion and post-project phase will enable PIAs to make mid-course corrections and government to adjust policies; (ii) a broad assessment to be made that takes into account total environmental and socioeconomic impacts rather than the current focus on income, productivity, water enhancement, and employment generation; (iii) baseline information and needs-assessment in uniform format must be undertaken

before funds for works released. Further, only limited numbers of separate, tangible, and easily measurable indicators need to be tracked and current participatory monitoring, resource mapping, and social audit will enhance transparency and equity; and (iv) cost-effective and sustainable watershed development needs hydrological and environmental data from benchmark watersheds in each agroecoregion and district. This will also enable an assessment of impacts outside the watersheds. Such work needs adequate financial support.

In terms of multidisciplinary integration, it is important that interdisciplinary planning be done in detail, down to the level of activities, and the approach to be used to carry them out. In social terms it becomes critical as how to motivate and mobilize the community for balancing short- with long-term benefits, and farmer investments with project inputs. In economic terms, market opportunities should be identified prior to the selection of the agro-enterprises or crop varieties to be field-tested to counter the supply-driven emphasis of smallholder farming systems. Most importantly during the implementation phase, both intermediate planning and monitoring and evaluation should be done by multidisciplinary teams at project level and by multiple local stakeholders.

As an effort in operationalizing new common guidelines, model watersheds have been established in each state/district as sites of learning. As a first hand exercise, ICRISAT and ICAR institutes such as CSWCRTI are implementing these model watersheds in the country. ICRISAT is implementing 13 watersheds across nine states covering south, north, and western India while CSWCRTI covers north and northeastern states. The new components have been added in the implementation of model watersheds.

5.10 CONCLUSION

The issues discussed in this chapter are based on the information elicited from micro-level studies and macro-level changes with regard to policy and institutional structure in watershed management. It attempts to analyze the supporting role of existing policies and programs in augmentation of watershed benefits in the country. However, it is clear that watershed management has got good policy support from central and state governments in addressing the needs of poor sections of the society through watershed development approach. The discussion clearly reveals that common guidelines were helpful to evolve new approaches which accounts for varying needs of the community. However, the institutional support was not adequate during early phase of watershed management. This is due to underestimation of the role of UGs and other beneficiary groups in ensuring participation.

However, the new common guidelines were evolved taking into account lessons learnt from success and failure cases of earlier programs to guide watershed management program more effectively. They are focusing more on livelihood aspects taking into account all sections of the community in ensuring higher participation and gender equity. However, it is essential that benefits of all stakeholders should match their contributions and costs. Therefore, equity in benefit sharing contributes for greater collective action and participation which ensures sustainability of the program.

Besides all these, functional and effective linkages among watershed institutions and other institutions such as markets, banks, etc. are imperative for success of the program. Institutions at all levels need to further strengthen their capacities in order to successfully cope with contemporary challenges and to adopt innovative management styles. Capacity building is a multidimensional concept: it requires scientific as well as non-scientific competencies; it requires cooperation that enable knowledge sharing and mutual learning; and it requires institutionalized linkages between the producers of scientific knowledge and local knowledge. Capacity building measures should finally create conditions that are needed to make productive use of knowledge instead of solely creating that knowledge.

In the present system, inputs and produce markets are largely neglected. Extension of collective strategies to output marketing could lead to substantial benefits to smallholder and marginal farmers who now face high transaction cost in marketing their small marketable surplus. Therefore, future watershed policies need to reflect and influence the wider policy environment, especially policies related to agricultural development, agricultural input and output marketing, and other linked sectors like infrastructure. This can set the path of a sustainable and strong resilient rural economy.

REFERENCES

Falkenmark, M., and J. Rockström. 2004. Balancing water for humans and nature: the new approach in ecohydrology. London, UK: Earthscan.

FAOSTAT. 2005. http://faostat.fao.org/

Farrington, J., C. Turton, and A.J. James. (eds.) 1999. *Participatory watershed development in India: challenges for the 21st century*. New Delhi, India: Oxford University Press.

GOI. 1994. *Guidelines for watershed development*. New Delhi, India: Department of Land Resources, Ministry of Rural Development, Government of India.

GOI. 2000a. *Report of the inter-ministerial sub-committee on formulation of common approach/principles for watershed development*. New Delhi, India: Government of India.

GOI. 2000b. *Guidelines for National Watershed Development Project for Rainfed Areas (NWDPRA)*. New Delhi, India: Ministry of Agriculture, Government of India.

GOI. 2001a. *Guidelines for watershed development*. (Revised 2001) New Delhi, India: Department of Land Resources, Ministry of Rural Development, Government of India.

GOI. 2001b. *Report of the working group on watershed development, rainfed farming and natural resource management for the Tenth Five Year Plan*. New Delhi, India: Planning Commission, Government of India.

GOI. 2007. *Report of the working group on natural resources management, Eleventh Five Year Plan (2007–2012), Volume I: Synthesis*. New Delhi, India: Planning Commission, Government of India.

GOI. 2008. *Common guidelines for watershed development projects*. New Delhi, India: Department of Land Resources, Ministry of Rural Development, Government of India.

Joshi, P.K., A.K. Jha, S.P. Wani, Joshi, Laxmi, and R.L. Shiyani. 2005. *Meta-analysis to assess impact of watershed program and people's participation*. Research Report 8. Comprehensive Assessment of Watershed Management in Agriculture. Patancheru, India: International Crops Research Institute for the Semi-Arid Tropics; and Manila, Philippines: Asian Development Bank.

Joshi, P.K., A.K. Jha, S.P. Wani, and T.K. Sreedevi. 2009. Scaling-out community watershed management for multiple benefits in rainfed areas. In *Rainfed agriculture: unlocking the*

potential, ed. S.P. Wani, J. Rockström, and T. Oweis, 276–291. Comprehensive Assessment of Water Management in Agriculture Series. Wallingford, UK: CAB International.

Joshi, P.K., Vasudha Pangare, B. Shiferaw, S.P. Wani, J. Bouma, and C. Scott. 2004. Socioeconomic and policy research on watershed management in India–Synthesis of past experiences and needs for future research. *Global Theme on Agroecosystems*, *Report No*. 7. Patancheru, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Kerr, J., G. Pangare, V.L. Pangare, and P.J. George. 2000. *An evaluation of dryland watershed development projects in India*. EPTD Discussion Paper No. 68. Washington, DC, USA: International Food Policy Research Institute.

Kerr, J., N.K. Sanghi, and G. Sriramappa. 1996. *Subsidies in watershed development projects in India: distortions and opportunities*. Gatekeeper Series 61. London, UK: International Institute for Environment and Development.

Meinzen-Dick, R., M. DiGregorio, and N. McCarthy. 2004. Methods for studying collective action in rural development. *Agricultural Systems* 82:197–214.

Molden, D. (ed.) 2007. *Water for food, water for life: a comprehensive assessment of water management in agriculture*. London, UK: Earthscan; and Colombo, Sri Lanka: International Water Management Institute.

Raju, K.V., Abdul Aziz, S.S. Meenakshi Sundaram, Madhushree Sekher, S.P. Wani, and T.K. Sreedevi. 2008. Guidelines for planning and implementation of watershed development program in India: a review. *Global Theme on Agroecosystems Report No*. 48. Patancheru, Andhra Pradesh, India; International Crops Research Institute for the Semi-Arid Tropics.

Reddy, V.R. 2005. Costs of resource depletion externalities: A study of groundwater overexploitation in Andhra Pradesh, India. *Environment and Development Economics* 10:533–556.

Reddy, V.R. 2006. Getting the implementation right. Can the proposed watershed guidelines help? *Economic and Political Weekly* 41(40):4292–4295.

Reddy, V.R., M. Gopinath Reddy, Y.V. Malla Reddy, and John Soussan. 2008. Sustaining rural livelihoods in fragile environments: resource endowments and policy interventions – a study in the context of participatory watershed development in Andhra Pradesh. *Indian Journal of Agricultural Economics* 63(2):169–187.

Rockström, J., N. Hatibu, T. Oweis, and S.P. Wani. 2007. Managing water in rainfed agriculture. In *Water for food, water for life: a comprehensive assessment of water management in agriculture,* ed. D. Molden, 315–348. London, UK: Earthscan; and Colombo, Sri Lanka: International Water Management Institute.

Rockström, J., L. Karlberg, S.P. Wani *et al.* 2010. Managing water in rainfed agriculture – the need for a paradigm shift. *Agricultural Water Management* 97(4):543–550.

Rosegrant, M., X. Cai, and S. Cline. 2002. *World water and food to 2025*: *Dealing with scarcity*. Washington DC, USA: International Food Policy Research Institute.

Rosegrant, M., W. Ringler, C. Benson *et al.* 2006. *Agriculture and achieving the Millennium Development Goals*. Washington, DC, USA:World Bank.

Seckler, D., and U. Amarasinghe. 2000. Water supply and demand, 1995 to 2025. In *IWMI Annual Report* 1999–2000, 9–17. Colombo, Sri Lanka: International Water Management Institute.

Seckler, D., U. Amarasinghe, D. Molden, R. de Silva, and R. Barker. 1998. *World water and demand and supply, 1990 to 2025: scenarios and issues*. Research Report 19. Colombo, Sri Lanka: International Water Management Institute.

SEI. 2005. Sustainable pathways to attain the millennium development goals – assessing the role of water, energy and sanitation. Document prepared for the UN World Summit, 14 September 2005, New York, USA. Stockholm, Sweden:Stockholm Environment Institute.

Shah, A. 2005. Economic rationale, subsidy and cost sharing in watershed projects. *Economic and Political Weekly* 40(26):2663–2671.

Sharma, R. 2002. Watershed development adaptation strategy for climate change. Presented in South Asia Expert Workshop on Adaptation to Climate Change for Agricultural Productivity. Organized by the Government of India, UNEP, and CGIAR in New Delhi, India.

Shiferaw, B., and C. Bantilan. 2004. Rural poverty and natural resource management in less-favoured areas: revisiting challenges and conceptual issues. *Journal of Food, Agriculture and Environment* 2(1):328–339.

Shiferaw, B., J. Okello, and V. Ratna Reddy. 2009. Challenges of adoption and adaptation of land and water management options in smallholder agriculture: Synthesis of lessons and experiences. In *Rainfed agriculture: unlocking the potential*, ed. S.P. Wani, J. Rockström, and T. Oweis, 258–275. Comprehensive Assessment of Water Management in Agriculture Series. Wallingford, UK: CAB International.

Shiklomanov, I. 2000. Appraisal and assessment of world water resources. *Water International* 25(1):11–32.

Sreedevi, T.K., B. Shiferaw, and S.P. Wani. 2004. *Adarsha watershed, Kothapally: understanding the drivers of higher impact*. Patancheru, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Sreedevi, T.K., and S.P. Wani. 2007. Leveraging institutions for enhanced collective action in community watersheds through harnessing gender power for sustainable development. In *Empowering the poor in the era of knowledge economy,* ed. S. Mudrakartha, 27–39. Ahmedabad, Gujarat, India: VIKSAT.

Sreedevi, T.K., and S.P. Wani. 2009. Integrated farm management practices and upscaling the impact for increased productivity of rainfed systems. In *Rainfed agriculture: unlocking the potential,* ed. S.P. Wani, J. Rockström, and T. Oweis, 222–257. Comprehensive Assessment of Water Management in Agriculture Series. Wallingford, UK: CAB International.

Sreedevi, T.K., S.P. Wani, R. Sudi *et al.* 2008. Impact of watershed development in low rainfall region of Maharashtra: a case study of Shekta Watershed. *Global Theme on Agroecosystems Report No*. 49. Patancheru, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Turton, C., Michael Warner, and Ben Groom. 1998. *Scaling up participatory watershed development in India: a review of the literature*. Network Paper No. 86. London, UK: Agricultural Research and Extension Network, Overseas Development Institute.

Wani, S.P., K.H. Anantha, T.K. Sreedevi, R. Sudi, S.N. Singh, and Marcella D'Souza. 2011. Assessing the environmental benefits of watershed development: evidence from the Indian semi-arid tropics. *Journal of Sustainable Watershed Science and Management* 1(1):10–20.

Wani, S.P., P.K. Joshi, K.V. Raju *et al.* 2008a. Community watershed as a growth engine for development of dryland areas. A comprehensive assessment of watershed programs in India. *Global Theme on Agroecosystems Report No. 47*. Patancheru, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

Wani, S.P., P.K. Joshi, Y.S. Ramakrishna, T.K. Sreedevi, P. Singh, and P. Pathak. 2008b. A new paradigm in watershed management: a must for development of rain-fed areas for inclusive growth. In *Conservation farming: enhancing productivity and profitability of rainfed areas*, ed. Anand Swarup, Suraj Bhan, and J.S. Bali, 163–178. New Delhi, India: Soil Conservation Society of India.

Wani, S.P., A.R. Maglinao, A. Ramakrishna, and T.J. Rego. (ed.) 2003a. *Integrated watershed management for land and water conservation and sustainable agricultural production in Asia*. Proceedings of the ADB-ICRISAT-IWMI Annual Project Review and Planning Meeting, Hanoi, Vietnam, 10–14 December 2001. Patancheru, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Wani, S.P., P. Pathak, L.S. Jangawad, H. Eswaran, and P. Singh. 2003b. Improved management of Vertisols in the semi-arid tropics for increased productivity and soil carbon sequestration. *Soil Use and Management* 19:217–222.

Wani, S.P., P. Pathak, T.K. Sreedevi, H.P. Singh, and P. Singh. 2003c. Efficient management of rainwater for increased crop productivity and groundwater recharge in Asia. In *Water productivity in agriculture: limits and opportunities for improvement,* ed. J.W. Kijne, R. Barker, and D. Molden, 199–215. Wallingford, UK: CAB International.

Wani, S.P., P. Pathak, H.M. Tam, A. Ramakrishna, P. Singh, and T.K. Sreedevi. 2002. Integrated watershed management for minimizing land degradation and sustaining productivity in Asia. In *Integrated land management in the dry areas*. Proceedings of a Joint UNU-CAS International Workshop, 8–13 September 2001, Beijing, China, ed. Z. Adeel. 207–230. Tokyo, Japan: United Nations University.

Wani, S.P., Y.S. Ramakrishna, T.K. Sreedevi *et al.* 2006a. Issues, concepts, approaches and practices in the integrated watershed management: experience and lessons from Asia. In *Integrated management of watershed for agricultural diversification and sustainable livelihoods in Eastern and Central Africa: lessons and experiences from semi-arid South Asia*. Proceedings of the International Workshop held at ICRISAT, Nairobi, Kenya, 6–7 December 2004, ed. B. Shiferaw, and K.P.C. Rao, 17–36. Patancheru, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Wani, S.P., H.P. Singh, T.K. Sreedevi *et al.* 2003d. Farmer-participatory integrated watershed management: Adarsha watershed, Kothapally, India, an innovative and upscalable approach. A case study. In *Research towards integrated natural resources management: Examples of research problems, approaches and partnerships in action in the CGIAR*, ed. R.R. Harwood, and A.H. Kassam, 123–147. Washington, DC, USA: Interim Science Council, Consultative Group on International Agricultural Research.

Wani, S.P., P. Singh, K.V. Padmaja, R.S. Dwivedi, and T.K. Sreedevi. 2006b. Assessing impact of integrated natural resource management technologies in watersheds. In *Impact assessment of watershed development–issues, methods and experiences,* ed. K. Palanisami, and D. Suresh Kumar, 8–58.

Wani, S.P., T.K. Sreedevi, S. Dixit, K. Kareemulla, R. Singh, and K. Tirupataiah. 2009. Consortium approach for capacity building for watershed management in Andhra Pradesh: a case study. *Global Theme on Agroecosystems Report No*. 51. Patancheru, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Wani, S.P., T.K. Sreedevi, T.S.V. Reddy, B. Venkateshvarlu, and C.S. Prasad. 2008c. Community watersheds for improved livelihoods through consortium approach in drought prone rainfed areas. *Journal of Hydrological Research and Development* 23:55–77.

Wani, S.P., T.K. Sreedevi, R. Sudi, P. Pathak, and Marcella D'Souza. 2010. Groundwater management an important driver for sustainable development and management of watersheds in dryland areas. In *2nd National Ground Water Congress,* 22 March 2010, New Delhi, 195–209. New Delhi, India: Government of India, Ministry of Water Resources.