

Financing Agriculture



A National Journal of Agriculture & Rural Development

November-December 2007

Volume 39 6 Rs. 50/-



Bank of Baroda's Financial Inclusion Project in Dungarpur District, Rajasthan



Harnessing Gender Power and Collective Action through Integrated Watershed Management for Minimizing Land Degradation and Sustainable Development

T.K. Sreedevi, Suhas P. Wani, P. Pathak
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

The detailed reviews of the watersheds programmes reveal that although the watershed programmes are silently revolutionizing the drylands, all is not well. There is need to address the issues of gender and equity to enhance participation and associated impact and sustainability of the watershed programmes. In this paper three selected watershed case studies in India were analyzed to study the impacts, the approaches adopted and most importantly gender analysis for identifying the strategies to harness the gender power for enhancing the collective action. There is an urgent need to enhance investments in watershed programs to include productivity enhancement measures and income-generating activities targeted for women and vulnerable groups.

Introduction

Asia emerges as the hot spot of poverty, malnutrition and severe land degradation in the world. In India, the situation is similar as out of 852 million poor in the world, 221 million are in India and 108.6 million ha land is degraded. There is an urgent need to break the unholy nexus between land degradation and poverty using community watersheds to manage the natural resources such as water and land sustainably for improving livelihoods. Watershed approach is adopted by Government of India as a growth engine for development of drylands.

Reduction in the producing capacity of land due to wind and water erosion of soil, loss of soil humus, depletion of soil nutrients, secondary salinization, diminution and deterioration of vegetation cover as well as loss of biodiversity is referred as land degradation. There is strong relationship between poverty, water scarcity and land degradation as

most of the world's poor are in water scarce regions where land degradation is also severe. Most of 852 million hungry and malnourished people in the world are in Asia, particularly in India (221 million) and in China (142 million). In Asia 75% of the poor are in rural areas and they depend on agriculture for their livelihood. About half of the hungry live in smallholder farming households, while two-tenths are land-less. (Sanchez et al 2005).

Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic vicissitudes and human activities is also referred as desertification. A global assessment of the extent and form of land degradation showed that 57% of the total area of drylands occurring in two major Asian countries namely China (178.9 m ha) and India (108.6 m ha) are degraded (UNEP 1997). Accelerated erosion resulting in loss of nutrient rich top fertile soil

however, occurs nearly everywhere where agriculture is practiced particularly without suitable land, water, and agronomic management practices and is irreversible. In India erosion rates of 5 to 20 t ha⁻¹ (up to 100 t ha⁻¹) are reported. In India alone some 150 million ha are affected by water erosion and 18 m ha by wind erosion. Thus, erosion leaves behind an impoverished soil on one hand resulting in low productivity, and siltation of reservoirs and tanks on the other. This degradation induced sources of carbon emissions also contribute to the far reaching global warming consequences. Recent on-farm participatory research by ICRISAT-led consortium in India revealed widespread deficiency of zinc, boron, and sulphur along with nitrogen and phosphorus in 80 to 100% rainfed farmers' fields even with subsistence level of production largely due to mining of these nutrients over a longtime and little replenishments through farm yard manure or chemical fertilizers (Rago



et al. 2005). The current scenario of water availability indicates that Asia has the lowest water availability (2500 cubic meters per head per annum) in the world. Numerous countries and river basins face acute physical scarcity. The future challenge at global as well as regional levels is to achieve water security that is directly related with the food and health security of the humankind.

There is a strong nexus between the water scarcity during the crop growing period or drought, associated land degradation due to poor land cover and soil erosion (water and wind) accompanied by nutrient depletion and poverty (Figure 1).

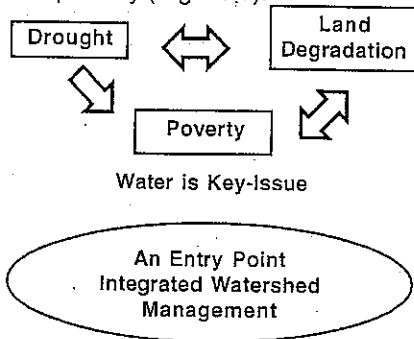


Figure 1 : Nexus between drought land degradation & poverty

This unholy nexus between the drought, land degradation and the poverty, which leads to desertification has to be broken for improving the livelihoods of millions of rural poor residing in the fragile agroecosystems (Wani et al. 2004 and 2006). Along with low systems' productivity, undeveloped markets, poor infrastructure and low investments in these areas contribute significantly to poverty in the region. Rainwater, the major source of water, need to be managed efficiently through its conservation and efficient use for reducing poverty and to arrest the process of desertification. Most suitable entry point to break this nexus is to manage water and land resources through

community watersheds for improving the livelihoods (Wani et al. 2006).

Watershed development in India is reckoned as the engine of growth and sustainable development in the rainfed and drought-prone areas. In the watersheds women play a critical role in management and conservation of natural resources. However, women were generally the losers of watershed development through losing the access to the common lands (Meinzen-Dick et al., 2004). In spite of guidelines to have specified number of women members, they were not recognized in their own right; they were viewed as being these to fill the quota required under the guidelines (Seeley et al. 2000). They play a dual role as primary managers as most activities they undertake are dependent on natural resources; for example, fetching and use of water for daily needs, fuel wood collection, animal rearing, planting trees, and field operations. Men generally play the role of spokesperson, farm operations and decision-maker in the family. For several interventions in the watersheds, collective action, dedication, and awareness enhancement are very critical. "Natural resource degradation is particularly costly for the women and poor farmers. Depletion of the resource base diminishes the capability of this group and increases their vulnerabilities to drought and other natural disasters". For harnessing gender power there is a need to delicately balance the roles, responsibilities, and decision-making powers/process for both men and women for enhancing collective action and impact in the watershed.

Mainstreaming Gender into Poverty Reduction Policies and Interventions

Discrimination based on sex, religion, race, ethnicity, class, and age

remains at the core of social exclusion, poverty, and human misery. Women are poorer than men because they are often denied equal rights and opportunities, lack access to assets, and do not have the same entitlements as men. Gender mainstreaming means being deliberate in giving visibility and support to women's contributions rather than making the assumption that women will benefit equally from gender-neutral development interventions. The United Nations Development Programme (UNDP) advocates for participatory approaches to budgeting, creating strategies and targets aimed at reducing gender disparities, examining linkages between poverty reduction and women's empowerment, and improving national capacity for gender-desegregated monitoring and analysis. Training women on planning, articulation, public speaking, and management of accounting and conflict resolution helps in promoting the participation of women in different activities of integrated watershed management. The involvement of women is sought in the watershed program right from the planning stage as against the present practice of involving them only in implementation. Improved agricultural technologies suitable to a particular region should be introduced to reduce and balance the drudgery for both men and women.

Impact of Watershed Development in three Case Study Areas

The basic goal of watershed management in rainfed systems is to reduce rural poverty and improve livelihood security while protecting or enhancing the sustainability of the environment and the agricultural resource base. Watershed development generates various types of benefits – tangible and non-



tangible – some captured by individual farmers and some by the entire community or society as a whole. Most watershed programmes being land-based activities, vulnerable groups like land-less people as well as women generally get excluded. In fact, it was observed that watershed programmes increased the workload on women without the concomitant benefits in terms of social status, financial or decision making powers. The issues of gender equity, community participation, sustainability, and efficient use of conserved natural resources have not been addressed adequately.

Adarsha Watershed, Kothapally

In Adarsha watershed, Kothapally, ICRISAT-led consortium adopted the farmer-centric, holistic, and participatory approach for developing the watershed to increase agricultural productivity and incomes. The meta analysis results and the interlocking constraints faced by farm households, prompted ICRISAT to launch its learnings of 25 years of strategic and on-farm development research. ICRISAT-led watershed espouses the Integrated Genetic Natural Resources Management (IGNRM) approach where activities are implemented at landscape level by the community (Wani et al. 2003). Research and development (R&D) interventions at landscape level are conducted at benchmark sites representing different SAT agroecoregions. The entire process revolves around the four Es (empowerment, equity, efficiency and environment), which are addressed by adopting specific strategies prescribed by the four Cs (consortium, convergence, cooperation and capacity building). The consortium strategy brings together institutions from scientific, non-government, government, and

farmers group for knowledge management and sharing. Convergence allows integration and negotiation of ideas among actors resulting in convergence of various programmes addressing the core issue of improving livelihood and protecting the natural resources. Cooperation enjoins all stakeholders to harness the power of collective action. Capacity building engages in empowerment of the communities for sustainability.

Integrated watershed management deals with conservation and efficient use of rainwater, groundwater, land and other natural resources for increasing agricultural productivity and improving livelihoods. Water management is used as an entry point to increase cropping intensity, increase productivity thru enhanced water use efficiency, and also to rehabilitate degraded lands in the catchments with the aim of increasing productivity, enhancing biodiversity, increasing incomes and improving livelihoods. Such an approach demands integrated and holistic solutions from seed to final produce with involvement of various institutions and actors with divergent expertise varying from technical, social, financial, market, human resource development, and so on. Our program outputs are tuned to reduce poverty, minimize land degradation, increase productivity and production, building communities' resilience to shocks due to natural calamities such as drought and flooding as well as the climate variability due to global warming.

Impacts

Through the use of new science tools (i.e. remote sensing, GIS, and simulation modeling) twinned with an understanding of the entire food production-utilization system (i.e. food quality and market) and genuine

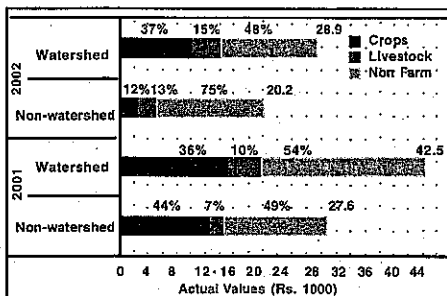
involvement of stakeholders, ICRISAT-led watersheds effected remarkable impacts to SAT resource-poor farm households.

Reducing poverty in the watershed communities is evident in the transformation of their economies. The ICRISAT model ensured improved productivity with the adoption of cost-efficient water harvesting structures as an entry point for improving livelihoods. Crop intensification with high-value crops and diversification of farming systems are leading examples that allowed households to achieve production of basic staples and surplus for modest incomes. Income-generating activities for women such as vermicomposting, nursery raising, plantation on degraded common land enabled program for enhancing their incomes.

Enhanced participation of the vulnerable groups like women and the landless thru capacity building and networking was observed. The self-help groups (SHGs) common in the watershed villages of India and building on social capital made the huge difference in addressing rural poverty in watershed communities. For example, Kothapally watershed is a prosperous village on the path of long-term sustainability and has become a beacon for science-led rural development. In 2001, the average village income from agriculture, livestock and non-farming sources was Rs.42,500 (US\$1036) (54% more) compared with the neighboring non-watershed village was 27,600 (US\$ 673) (Fig. 2). The villagers proudly professed "We did not face any difficulty for water even during the drought year of 2002. When surrounding villages had no drinking water, our wells had sufficient water". To date, the village prides itself with households owning 5 tractors, 7 lorries and 30 auto



rickshaws. People from surrounding villages come to Kothapally for on-farm employment. Improved livestock activities through artificial insemination in cross breeding program and improved fodder availability has resulted marketable surplus milk per month bringing in Rs. 18000/- (US\$ 439) additional cash in the village every month.



Source: Shiferaw et al. 2006
Figure 2. Income stability and resilience effects during drought year (2002) in Adarsha watershed, Kothapally, AP, India

In this model emphasis was laid on farm-based interventions as well as agriculture related allied income-generating activities for landless/women group members with the objective of increasing the income (Wani et al. 2003; Sreedevi et al 2004).

The implementation of soil and water conservation interventions resulted reduction in runoff and rise in the groundwater level. The mean of eight years runoff in treated sub watershed was 6.1% and in untreated sub watershed was 10.4% of seasonal rainfall. The mean of 8 years data reveals that about 41.4% of runoff and 58.4% of soil loss were reduced in the treated sub watershed compared to the untreated sub watershed. There is a significant reduction in peak runoff rate in the treated sub watershed, which is responsible for the soil erosion (Table 1).

Table -1
Rainfall, runoff and soil loss from Adarsha Watershed, Kothapally, Ranga Reddy district, A. P., India, 1999-2006.

Year (mm)	Rainfall (mm)	Runoff (m ³ /s/ha)		Peak runoff rate loss(t/ha)		Soil	
		Untreated	Treated	Untreated	Treated	Untreated	Treated
1999	584	16	*	0.013	*	*	*
2000	1161	118	65	0.235	0.230	4.17	1.46
2001	612	31	22	0.022	0.027	1.48	0.51
2002	464	13	Nil	0.011	Nil	0.18	Nil
2003	689	76	44	0.057	0.018	3.20	1.10
2004	667	126	39	0.072	0.014	3.53	0.53
2005	899	107	66	0.016	0.014	2.82	1.20
2006	715	110	75	0.003	0.001	2.47	1.56
Mean	724	75(10.4%)	44(6.1%)	0.054	0.051	2.55	1.06

* Not installed

Due to additional groundwater recharge (Fig 3), about 200 ha in rainy season and about 100 ha in post-rainy season are cultivated with different crops and cropping sequences. Adoption of improved practices like use of high-yielding cultivars and integrated nutrient and pest management by the farmers

resulted in increased crop productivity and profitability. The productivity of maize increased 2 to 2.5 times with an average yield of 3640 kg ha⁻¹ under sole maize and upto four-fold under maize/pigeonpea intercropping system (Table 2).

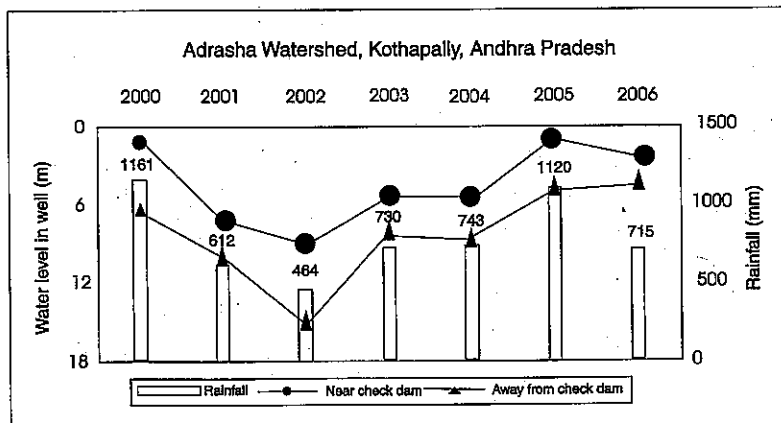


Figure 3. Effect of watershed interventions on groundwater recharging at Adarsha watershed, Kothapally, Ranga Reddy district, A.P., India, 2000-2006.



Table 2. Crop yields in Adarsha watershed, Kothapally during 1999-2007.

Crop	1998 base-line yield	Yield (Kg ha ⁻¹)									Average yields	SE _±
		1999- 2000	2000 -2001	2001- 2002	2002- 2003	2003- 2004	2004- 2005	2005- 2006	2006- 2007			
Sole maize	1500	3250	3750	3300	3480	3920	3420	3920	3635	3640	283.3	
Improved Intercropped maize	—	2700	2790	2800	3083	3129	2950	3360	3180	3030	263.0	
Traditional inter-cropped maize	—	700	1600	1600	1800	1950	2025	3275	2150	1785	115.6	
Improved inter-cropped pigeonpea	640	940	800	720	950	680	925	970	860	120.3		
Traditional inter-cropped pigeonpea	190	200	180	-	-	-	-	-	-	190	-	
Improved Sole Sorghum	-	3050	3170	2600	2425	2290	2325	2250	2085	2530	164.0	
Traditional Sorghum	1070	1070	1010	940	910	952	1025	1083	995	1000	120.7	
Intercropped Sorghum	-	1770	1940	2200	-	2110	1980	1960	1850	1970	206.0	

The area under maize/pigeonpea and maize-chickpea has increased more than three-fold and two-fold, respectively. Farmers could gain about Rs. 16,510 and Rs. 19,460 from these two systems, respectively. Farmer incomes from crop production have doubled in 2001 compared to the 1998 levels. Many women have adopted vermicomposting as a micro-enterprise and have become earning members of the family by selling vermicompost @ Rs.4 kg⁻¹ in bulk. Each SHG member undertaking vermicomposting earned additional income of Rs. 10,000 (US\$ 244).

Demand driven selection of the watershed, quality technical support, more participation by the farmers, integrated approach, team effort and collective action by the stakeholders, social vigilance and transparency in financial dealings, increased confidence of the farmers, low-cost water harvesting structures which provided benefits to several farmers, tangible economic benefits to a large number of small farm holders, good local leadership, and concerted local capacity building efforts were some of the drivers of higher impact (Sreedevi et al. 2004).

Powerguda Watershed

In Powerguda, though the approach adopted was similar to the Adarsha watershed, it was distinct as the women self-help groups (SHGs) implemented the watershed program and being a tribal area the community had access to the forest resources. The SHGs with the watershed programs had six-fold higher savings than those without such programs in Adilabad district. The introduction of improved land management practices such as broad-bed and furrow and bullock-drawn tropicultor, along with high-yielding cultivars and technical



backstopping increased agricultural productivity by 20 to 350%. Powerguda farmers, particularly many women, learned new techniques in planting, land preparation, and intercropping. Many of them grew vegetables for the first time. Over three years, there was a remarkable change in cropping patterns shifting from cotton to soybean and vegetables (D'Silva et al. 2004)

A women SHG managed an oil extracting machine [worth Rs 375,000 (US\$ 9145) provided by Integrated Tribal Development Agency (ITDA)] to support income-generating activities in the community. Seeds of *Pongamia*, neem, and other trees are crushed in this machine to extract oil that is sold in the market. The oil mill has become an important source of income to Powerguda. The women SHG planted about 8,500 *Pongamia* trees in 2002 and 2003 and 10,000 in 2004 to augment the oilseeds supply in future. Since October 2003, Powerguda has discovered a new income-generating activity in tree nurseries. The community decided to invest in a *Pongamia* nursery Rs 30,000 (US\$ 730) received from the World Bank as part of environmental service payment. For the first time, 147 tons of Carbon Emission Reduction (CER) was sold from India to the World Bank (D'Silva et al 2004)

Average family income increased by 77% in three years from Rs 15,677 (US\$ 382) in 1999-2000 before the government invested in watershed development to Rs 27,821 (US\$ 679) in 2002-03. Seasonal migration from villages has ended totally, or is negligible. It appears that watershed and agricultural development, complemented by other investments, have provided sufficient employment and income

opportunities for the rural people to escape poverty and to stay in the village.

Since 1999, Powerguda has charted a new path of development using watershed management as the growth engine, women SHGs as institutional anchor, and a total ban on the consumption of alcohol in the village as a social platform. These steps have enabled Powerguda to march ahead of the old village and other neighboring hamlets. The people, specially the women leaders, are very proud that they have been able to outperform other villages in social, financial, institutional, and environmental development. Powerguda is distinguished from other hamlets due to the strong leadership provided by women through SHGs. Three of the four SHGs are run by women who dominate most of the development activities in the village. Trust, social cohesion, a sound local leadership and democratic functioning of local institutions are among the features of social capital in Powerguda.

In Powerguda, it is the women who pay men for the work done. Men are paid the same wage as women, except for a few specialized tasks in which men excel. Men have accepted the role reversal. They admit women are better managers of money, more transparent in financial dealings, and more successful in getting new work for the village. So long as there is sufficient work, and they are paid a decent wage, men are unlikely to complain. Men feel comfortable that due to collective action by women, their families are benefiting. This is an excellent example of harnessing gender power for prosperity and harmony.

Powerguda is unique in that the women SHGs are the dominant institutions in the village. These SHGs have gone farther than thrift.

They now deliver some of the services which previously were the responsibility of government agencies. For example, the village runs a *Pongamia* nursery with a capacity for 20,000 saplings. Also, the SHGs have replaced private contractors in implementing some of the public works. For example, local residents under the management of SHGs have built all the watershed structures in the village. These activities have helped to build the confidence of the SHG leadership while also increasing the coffers of the group. In the watershed contracts, there is an opportunity to save between 18% and 25% of the cost of the structures.

Janampeth Watershed

The Janampeth watershed village is a step further than the Powerguda and Adarsha watersheds. With the supporting policies from the government, the SHGs at the village, mandal, and district levels are federated to increase their bargaining power as also financial and political leverage. The women SHGs federation provides a forum for women to discuss common problems. Trained women are handling information technology center and providing quality service to their federation members. The SHG members consider the unity and solidarity among women to be one of the most important benefits of SHG membership. At the mandal-level federation meetings, women of different castes and class come together. This solidarity enables them to share their problems and seek help. Also by standing guarantees for SHGs, the federations can help the SHGs to borrow money from financial institutions at lower interest rates. These loans are particularly useful for value-added services such as running a highway restaurant and other micro-enterprises. The



federation takes care of book keeping and training functions of SHGs. The Mahila Samayka Adarsha Women Welfare Society is a federation of women SHGs and Janampeth SHGs are the members of the federation. The impact in terms of increasing the family incomes, building the social capital as well as

trust amongst the women members from Janampeth is superior than the Powerguda or Adarsha watersheds.

Gender Analysis of the Case Study Watersheds

The results from the studies in all the case study villages over the period and through focused group

discussions revealed that the IWMP approach adopted differed from the traditional watershed approach (Table 3).

In Adarsha watershed, Kothapally and Powerguda it was an integrated approach with emphasis on productivity enhancement as well as

Table 3. Gender analysis of three watershed case studies in Andhra Pradesh.

Sl.No	Description	Powerguda	Janampet	Kothapally
1	Rights			
	Property	Men	Men/Women	Men
	Financial resources of the family	Men	Women	Men
	Employment	Men/Women	Men/Women	Women
	Education	Men	Men	Men
	Social status of women	Medium	Good	Medium
	Awareness among women	Leader fully aware	Very good	Not to the mark
	Agricultural decision making	M/W*	M/W	M/W
	Resistance by men	Nil	Initial	Nil
2	Workload on women	++	+++	++
	Wages (Rs/day)			
	Men	50	50	50
	Women	30	30	30
	Load of invisible work	Same	Same	Same
	Work load on men	No	No	Yes
	Time spent on economic work by women	+	+++	++
	Time on social/ community work	High	High	Medium
	Marketing of agriculture produce by women	-	Yes	-
3	Access to Assets			
	Access to community assets	Men/Women	Men/Women	Men/Women
	Access to credit	Women	Women	Women
	Access to income	Women	Women	Women
	Access to information	Yes	Yes	Yes
	Access to service	Nil	Yes	Yes
4	Control on family financial resources	Low	High	Low
5	Self-confidence	Slowly building-up	High	Low
6	Opportunities for exploration	Minimum	Very high	High
7	Understanding on health	Medium	High	Medium
8	Distressed Migration	0	0	0
9	Driver identified	Leader	Mahila samakhya (Federation of women)	Improved water availability

* M = Men, W= Women ** + = Low, ++ = Medium and +++ = High



agriculture or natural resources related allied income enhancement activities. In Powerguda the collective action was mainly for the service providing function which was a step higher in the ladder of commercialization over Kothapally where collective action was mainly for enhancing the land productivity with a limited opportunity for direct economic gain. In Janampeth, the approach for improving livelihoods was on the commercial scale and direct economic gain was the main purpose. The women SHGs were federated and the collective action was at a macro-level. Women could get the benefits of common learning, exposure, and opportunity to interact with more and diverse group members and transaction costs were reduced. In Kothapally and Powerguda the collective action was restricted at small group level in the village and exposure for the members was restricted and transaction costs were higher in terms of load on the leadership.

The impact of the model/approach adopted was distinctively evident in the case study villages (Table 3). Janampeth ranked on top for property rights where women held the property rights along with men. In Janampeth the commercial nature of the collective activities resulted in control of family financial resources by women. In Kothapally as well as in Powerguda although women were earning members, the control of family financial resources rested with men. In Kothapally the women group activities provided employment to women members mainly because of the type of the activity undertaken. In Powerguda and Janampeth the collective action of women created employment opportunities for men as well as women. The right for education was noted more with men. In Kothapally the education of boys and girls is

distinctively same as in this village no child labor exists whereas in Powerguda or Janampeth child labor exists. In Powerguda the remarkable change is observed amongst women who say "we don't want our children to be like us and we send them for education to mandal place. Our girls are studying in boarding schools in Mandal head quarter now". Girls are in the highschools and colleges whereas earlier they were married quite early (child marriage). The social status of women in all the three study watersheds was better than the normal watershed village. However, amongst the three watersheds Janampeth women enjoyed higher social status in the society than the women in Kothapally and Powerguda. The nature and extent of collective action was also directly related with the awareness of the women members. The women members in Janampeth had high level of awareness about the activities undertaken. In case of Powerguda the women leader Ms Subhadrabai was well aware but the group members were not much aware about the operations as well as rules and procedures to be adopted. In Adarsha Watershed, Kothapally, awareness amongst the members was low as most of the banking and financial transactions had to be done at mandal-level bank situated 15 km away from the village. Decisions related with agriculture were taken jointly by men and women. Men members did not resist the progressive measures of women in all the case study watersheds although in Janampeth initially there was some resistance by the men family members.

Workload on women was higher in Janampeth than in Kothapally and Powerguda. The Powerguda women employed men for undertaking specific activities and paid them higher wages than women

considering the nature of the work undertaken. Similarly in Janampeth also the women members compensated their family labor in the field by hiring additional labor from the market. The financial independence permitted women SHGs to workout alternate arrangements to reduce their workload suitably. However, in all the three watersheds the wage differences between men and women labor existed and men were paid higher (Rs 50 per day) than women (Rs 30 per day). Traditionally men and women undertake specific farm activities and as noticed in Powerguda the women felt that the specific jobs done by men need to be paid differently. In Janampeth only women undertook marketing of agricultural produce whereas in Powerguda and Kothapally men undertook this activity.

In all the three watersheds only women had the access to financial credit as the SHGs are for women only. This is attributed to the current policy of the Government. In all the three watersheds the new watershed approach encompassing productivity enhancement and livelihoods approach had direct and positive impact on reducing the distressed migration of men and women from the villages. The drivers of success varied in all the three case study watersheds. In Powerguda the success was directly associated with the strong and capable leadership provided by Ms Subhadrabai. In Kothapally the main driver of the growth and success was increased availability of water resources resulting in increased agricultural productivity and establishment of agriculture-related micro-enterprises such as vermicomposting with technical backstopping. In Janampeth, the collective action and supporting government policy enabled the



women SHGs to undertake commercial activities successfully with the help of the leadership.

The matrix of community participation indicates that the mode of participation starts or is initiated through a co-opting or contractual process and slowly moves towards cooperative, consultative, collaborative and finally reaches to the successful collective action (Table 4). Janampeth watershed was found on the highest ladder of community participation where

Based on the three watershed case studies for achieving gender equity for women through integrated watershed management approach, the following issues need to be addressed. Efforts must be undertaken to achieve higher functional literacy for women. Enhanced awareness of women's rights through deliberate efforts is critical for sustainable development of watersheds by harnessing the women power equitably. There is a need to involve the younger

functional literacy through empowerment and training could enable the women to lead their groups well and the social capital development further enhanced the sustainability as well as the impact of the programmes. Moreover, enhanced incomes for the women also resulted in decision making powers as well as provided them the necessary freedom to reduce the workload and drudgery. Income-generating activities in the watershed programmes and continued

Table 4 Matrix of community participation

Mode of participation	Type	Outside Control	Potential for Stability
Co-opted	Tokenism	██████████	██████████
Co-operating	Tasks are assigned. Outsiders decide agenda	██████████	██████████
Consulted	Local opinion sought. Outsiders analyze data and decide on the course of action	██████████	██████████
Collaborating	Working together but outsiders directing the process	██████████	██████████
Collective action	Local people set agenda and mobilize to carry it out, utilizing the outsiders as required and not as initiators or facilitators	██████████	██████████

collective action or collegiate mode of participation is reached. This level of participation in the collective action is quite sustainable and the group can overcome most of the problems through their collective wisdom and opportunities. The Powerguda watershed is one step below for participation and they are acting together through co-learning. However, as there are limited market opportunities due to poor infrastructure facilities their sustainability relies on outside support. In case of Kothapally the women groups are collaborating together and have to strive to achieve sustainability through more collective action and explore new opportunities to increase the income from the collective action.

generation of girls in building up the social capital. The educational and nutritional needs of girls should consciously be addressed to promote a more equitable society. Considering the basic rule of collective action that under stress people cooperate better and that greed for higher personal benefits affects the collective action, there is need to harness the gender power through harmony in the watersheds at all the levels starting from the family to watershed. Most important learning from these case studies is that targeted activities for women as well as also for other vulnerable groups are very much needed as component activities in the watershed programmes. Secondly,

interactions amongst the SHG members not only brought the sustainability for the institutions but also benefited the members through their experiences and learning from the other SHGs. Increased investments in watersheds to undertake income-generating activities targeted for women and vulnerable groups enhanced collective action and impact of watersheds.

Acknowledgements

The authors thank the District Water Management Agency (DWMA), Government of Andhra Pradesh; Central Research Institute for Dryland Agriculture (CRIDA), Gram Panchayat, Kothapally, Ranga Reddy



district, Andhra Pradesh, India; Integrated Tribal Development Agency (ITDA), Government of Andhra Pradesh; Jungubai Self-Help Group, Powerguda, Adilabad district, Andhra Pradesh, India; Andhra Pradesh Rural Livelihoods Programme (APRLP), Hyderabad, India; Adarsha Mahila Samaikhya, Addakal, Mahabubnagar district, Andhra Pradesh, India for their help, logistical and technical support.

References

- Cheetham, N. 2002. Community participation : What is it. www.advocatesforyourth.org. *Transitions*, Vol. 14, No. 3, April 2002
- D'Silva E, Wani SP and Nagnath B. 2004. The making of new Powerguda: Community empowerment and new technologies transform a problem village in Andhra Pradesh. *Global Theme on Agroecosystems, Report no. 11. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 28 pp.*
- Rego TJ, Wani SP, Sahrawat KL and Pardhasaradhi G. 2005. Macro-benefits from boron, zinc and sulfur application in Indian SAT: A step for Grey to Green Revolution in agriculture. *Global Theme on Agroecosystems Report no. 16. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 24 pp.*
- Ruth Meinzen-Dick, Monica DiGregorio and Nancy McCarthy. 2004. *Methods for studying collective action in rural development*. Elsevier. *Agricultural Systems* 82(2004)197-214.
- Sanchez P, Swaminatha MS, Dobbie P and Yuksel N. 2005. *Halving Hunger: It Can be Done*. Summary version of the report of the Task Force on Hunger, New York, USA. The Earth Institute at Columbia University.
- Seeley J, Menaakshi Batra and Madhu Sarin. 2000. *Women's participation in watershed development in India. Gatekeeper Series no. 92. London, US: International Institute for Environment and Development. 20 pp.*
- Shiferaw B, Bantilan C and Wani SP. 2006. *Policy and institutional issues and impacts of integrated watershed management: Experiences and lessons from Asia. Pages 37-52 in Integrated Management of Watersheds for Agricultural Diversification and Sustainable Livelihoods in Eastern and Central Africa: Lessons and Experiences from esmi-Arid South Asia (Shiferaw B and Rao KPC, eds.). Proceedings of the International Workshop, 6-7 December 2004, Nairobi, Kenya.*
- Sreedevi TK, Shiferaw B and Wani SP. 2004. Adarsha watershed in Kothapally: Understanding the drivers of higher impact. *Global Theme on Agroecosystems, Report no. 10. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 24 pp.*
- Wani SP, Singh HP, Sreedevi TK, Pathak P, Rego, TJ, Shiferaw B, and Shailaja Rama Iyer. 2003. *Farmer-Participatory integrated watershed management: Adarsha watershed, Kothapally India, an innovative and upscalable approach. A Case Study. Pages 123-47. Research towards integrated natural resources management: Examples of research problems, approaches and partnerships in action in the CGIAR (Harwood RR and Kassam AH, eds.). Washington DC, USA and Rome, Italy: FAO: Interim Science Council, Consultative Group on International Agricultural Research.*
- Wani SP, Balloli SS, Kesava Rao AVR and Sreedevi TK. 2004. *Combating drought through integrated watershed management for sustainable dryland agriculture. Proc. of the UNESCAP/NRSA Regional Workshop on Agricultural Drought Monitoring & Assessment using Space Technology. May 3-7, Hyderabad.*
- Wani SP, Ramakrishna YS, Sreedevi TK, Long TD, Thawilkal Wangkahart, Shiferaw B, Pathak P and Kesava Rao AVR. 2006. *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 6 - 7 December 2004 at Nairobi, Kenya. pp. 17-36.*
- UNEP (United Nations Environment Programme). 1997. *World atlas of desertification. Second edition. London, UK: Edward Arnold Pub. Ltd. 79 pp.*
1. T.K. Sreedevi, Scientist (Watershed Development), GT-Agroecosystems
 2. Suhas P. Wani, Regional Theme Coordinator (Asia) and Principal Scientist (Watersheds), GT-Agroecosystems
 3. P. Pathak, Principal Scientist (Soil and Water Management), GT-Agroecosystems
- ICRISAT, Patancheru 502 324, Andhra Pradesh.

"There's nothing either good or bad - but thinking makes it so."

William Shakespeare