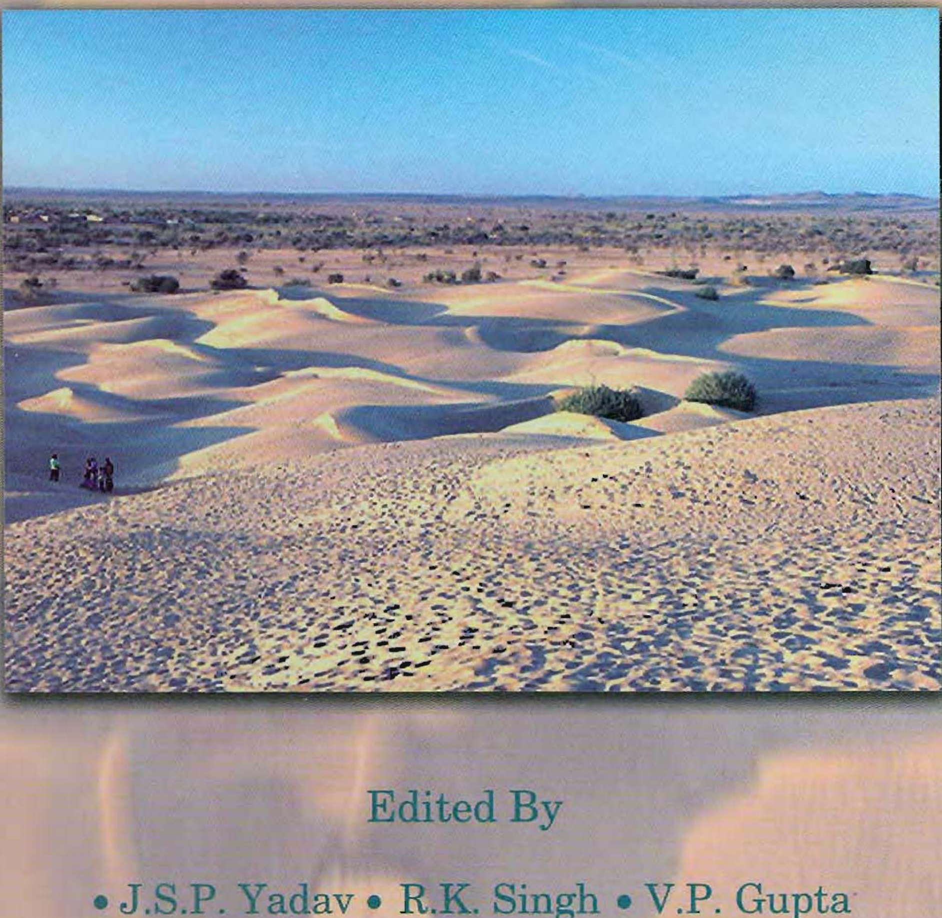
Converting Deserts into Oasis



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Poverty Pathways and Desertification: Strategy to Break the Unholy Nexus

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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 the rural areas, who depend on agriculture for their livelihood. About half of the hungry live in small holder farming households, while two-tenths are land-less and roughly 10 % are pastoralists, fishfolk and forest users. Hungry people are highly vulnerable to crises and hazards. The crises may be caused by natural disasters, such as major droughts or floods (Sanchez *et al.*, 2005). 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 to as land degradation. Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic vicissitudes and human activities is also referred to 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 and is often irreversible. The torrential character of the seasonal rainfall creates high risk for the cultivated lands. Of the estimated 173 million tonnes of sediment discharged into the oceans annually, this region alone contributes nearly half of the load, even though the actual land area is just one-third. This is an eloquent testimony to the intensity of the process and the consequential damage to the producing ability of land. In India, erosion rates of 5 to 20 t ha^{-1} (up to 100 t ha^{-1}) are reported, and some 150 million ha are affected by water erosion and 18 m ha by wind erosion. Thus, erosion leaves behind an impoverished soil on the one hand, and siltation of reservoirs and tanks, on the other. This degradation induced source of carbon emissions contribute also to far reaching global warming consequences. Recent on-farm participatory research by ICRISAT-led consortium in India revealed wide spread 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 long time and small replenishments through farm yard manure or chemical fertilizers (Rego *et al.*, 2005). If the current production practices are continued, the Asian countries will face a serious food shortage in the very near future.

In the arid and semi-arid regions of Asia and Africa, the economy remains strongly dependent on agriculture. Water is a vital natural resource to sustain human development, poverty reduction, and health of the ecosystem. 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 the global as well as regional levels is to achieve water security that is directly related with the food and health security of the humankind. The second World Water Forum was a landmark event in the evolution of global water consciousness making "Water everybody's business" (Guerquin *et al.*, 2003).

Poverty-land degradation nexus

The poverty of Asia's poor is both a cause and a consequence of accelerating land degradation and declining agricultural productivity. The hazards also include factors such as insecure rights to land and other natural resources, lack of improved agricultural technology, inability to store produce after harvest, environmental degradation, lack of income-earning opportunities, poor health and so on (Sanchez *et al.*, 2005).

The challenge before R&D institutions is to understand the underlying determinants of poverty and the pathways to its alleviation. The sustainable livelihood approach for understanding poverty was highlighted in the 1997 UK Government White Paper on International Development (DFID, 1997). It provides an analytical structure to diagnose and design interventions to help the poor achieve preferred livelihood outcomes. It recognizes five capital assets on which these livelihoods depend: human, natural, financial, social, and physical. The World Bank's Participatory Poverty Assessment Project (PPAP) based on information from 60,000 poor people from 60 countries has provided useful information on the determinants of poverty and the pathways to its alleviation (Narayan *et al.*, 2000). The PPAP has revealed the similarities in the experiences of the poor everywhere: hunger, deprivation, powerlessness, violation of dignity, social isolation, resilience, resourcefulness, solidarity, state corruption, rudeness of service providers, and gender inequity. The poor rarely speak of income but focus, instead, on managing assets — physical, human, social, and environmental — as a way of coping with their vulnerability.

The major sources of income for the poor in rural areas of the SAT differ from those of the more affluent. In South Asia where rural poverty is closely associated with near or complete landlessness, farm and non-farm employment, crafts, trades, and transfers were the primary sources of income. Crop and livestock incomes are more important sources for the less poor. In sub-Saharan Africa, it seems that after crop production, remittances, and non-farm income represent the next major sources of income for the poor. This is followed by income from livestock. Contrary to South Asia, there is little landlessness in sub-Saharan Africa, and hence, the importance of crop income to the poor in the latter. In fact, non-farm income is a much more important source of income for the more affluent rural inhabitants in sub-Saharan Africa. Agricultural R&D strategies aimed at benefiting the poor should, therefore, emphasize labor-using interventions in South Asia and labor-saving ones in sub-Saharan Africa (Ryan and Spencer, 2001). 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,** *ICRISAT, unpublished*).

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

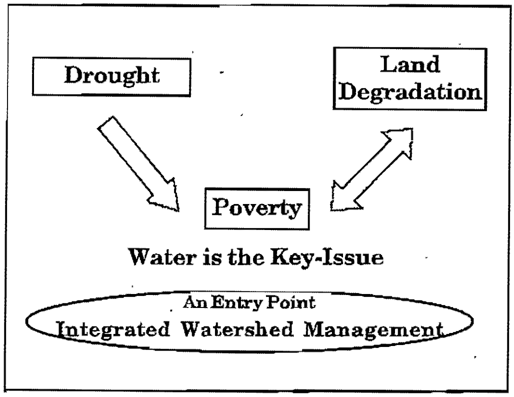


Figure 1 : Nexus between drought, land degradation and poverty

agroecosystems (Wani and Ramakrishna, 2005; Wani *et al.*, 2004, 2006). In the hot arid and semi-arid areas, water scarcity and its inefficient use along with the nutrient limitations for crop production, are the important constraints for enhancing productivity of the agricultural systems. Along with low productivity, undeveloped markets, poor infrastructure and low investments in these areas contribute significantly to poverty. Rainwater, the main source of water needs to be managed efficiently through its conservation and efficient use for reducing poverty and for arresting the process of desertification. Most suitable entry point to break this nexus is to manage water and land resources sustainably at the catchment scale for improving the livelihoods (Wani *et al.*, 2006).

The challenge, therefore, is to develop sustainable and environment-friendly options to manage natural resources in the SAT's fragile ecosystem to increase farm productivity and income of millions of poor farmers. The Task Force on Hunger has recommended to enhance soil health, improve and expand small-scale water management, facilitate access to better seeds and other on-farm enterprises with high-value products, and establish effective agricultural extension services to increase agricultural productivity of the food-insecure farmers (Sanchez *et al.*, 2005). To meet the Millennium Development Goal (MDG) of halving the proportion of poor people, compared to 1990 by 2015, will require concerted research and development efforts in the rainfed areas (Rockstrom *et al.*, 2007).

The Response

Watershed programs are recognized as a potential engine for agricultural growth and development in the fragile and marginal rain-fed areas of India (Wani *et al.*, 2004). Since the Seventh Five-year plan, the Government of India (GOI) accorded high priority to the rain-fed areas. Approximately, US $ 5.93 billion were allocated for watershed development till March, 2006. An exhaustive review of 311 case studies on watershed programs in India by ICRISAT revealed that the watershed program is silently rejuvenating and revolutionizing the rain-fed areas with the mean benefit-cost ratio of 2.14 and the internal rate of return (IRR) of 22 %. The watershed programs generated enormous employment opportunities, augmented irrigated area and cropping intensity, and conserved soil and water resources. The returns were higher in the medium and low income states in India. However, large number of watersheds showed less than average B:C ratio (62 %) and IRR (47 %) (Joshi *et al.*, 2005).

The meta analysis results and the interlocking constraints faced by the farm households, prompted ICRISAT to launch its learnings of 25 years of strategic and on-farm development research using CGIAR priorities as its guide. ICRISAT-led watershed espouses the Integrated Genetic Natural Resources Management (IGNRM) approach where activities are implemented at landscape level (Wani *et al.*, 2003b). Research and development (R&D) interventions at landscape level are conducted at benchmark sites representing the different SAT agro-ecoregions. The entire process revolves around the four E's (empowerment, equity, efficiency and environment), which are addressed by adopting specific strategies prescribed by the four C's (consortium, convergence, cooperation and capacity building). The consortium strategy brings together the institutions from the scientific, non-government, government, and farmers group for knowledge management. Convergence allows integration and negotiation of the ideas among the actors (**Figure 2,** Wani *et al.*, 2003b). Cooperation enjoins all stakeholders to harness the power of collective action. Capacity building engages in empowerment of the communities for sustainability.

The important components of the new model, which are different from earlier models are:

- Collective action by the farmers and initiating participation from the beginning through cooperative and collegiate mode in place of contractual mode

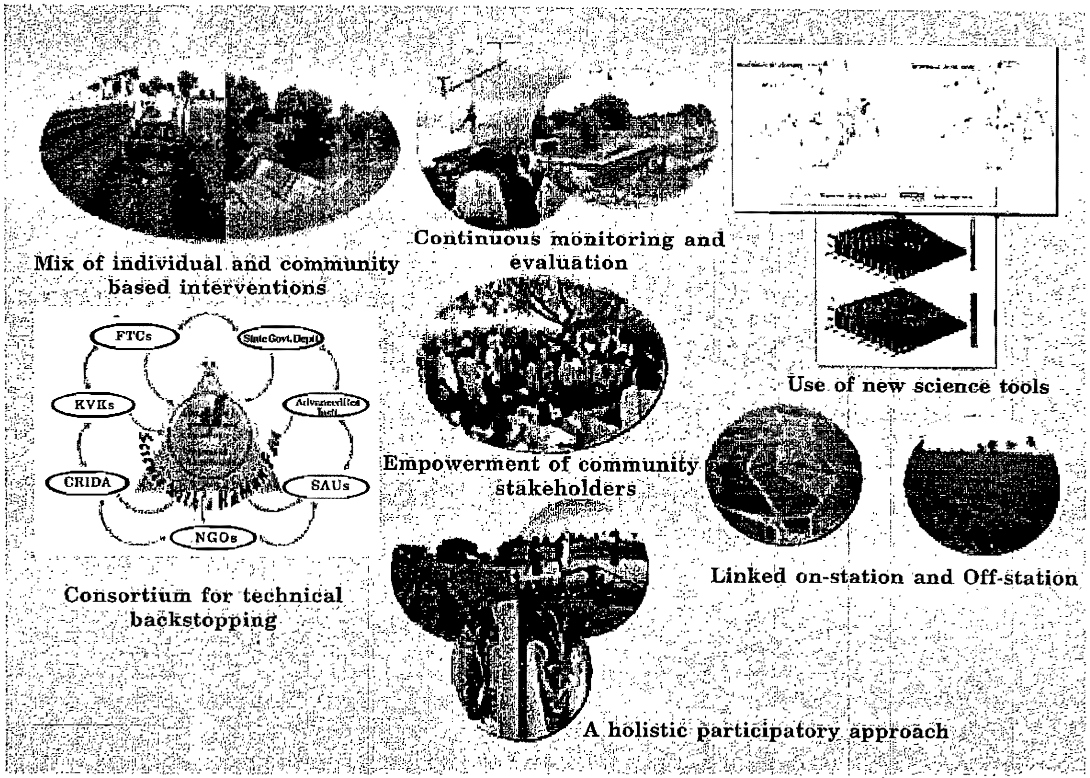


Figure 2 : Farmers participatory consortium model for integrated

- Integrated water resource management (IWRM) and holistic system approach through convergence for improving livelihoods as against traditional compartmental approach
- A consortium of institutions for technical backstopping **(Figure 2)**
- Knowledge-based entry point to build rapport with the community, and enhanced participation of farmers and landless people through empowerment
- Tangible economic benefits to the individuals through on-farm interventions enhancing efficiency of conserved soil and water resources
- Less costly and environment-friendly soil and water conservation measures throughout the toposequence for more equitable benefits to larger number of farmers
- Income-generating activities for landless and women through allied sector activities and rehabilitation of waste lands for improved livelihoods and protecting the environment

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 and also to rehabilitate degraded land 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. The 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 brought about remarkable impacts to SAT resource-poor farm households.

Reducing rural poverty in the watershed communities is evident in the transformation of their economies. The ICRISAT model ensured higher 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 the households to achieve required production of basic staples and surplus for the modest incomes.

Building capacity of the farm households through training and networking for improved livelihoods, enhanced participation especially of the most vulnerable groups like women and the landless. The self-help groups (SHGs) common in the watershed villages of India and an improved initiative in China provided income and empowerment of the women. The environmental clubs whose conceptualization is traced from Bundi watershed of Rajasthan, India inculcated environmental protection, sanitation and hygiene among the children.

Building on social capital made huge difference in addressing rural poverty in the watershed communities. A case in point is Kothapally watershed, which is today, 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) compared with the neighboring non-watershed village with Rs 27,600 (US$673) (**Figure 3,** Shiferaw *et al.,* 2006). The villagers professed proudly "We

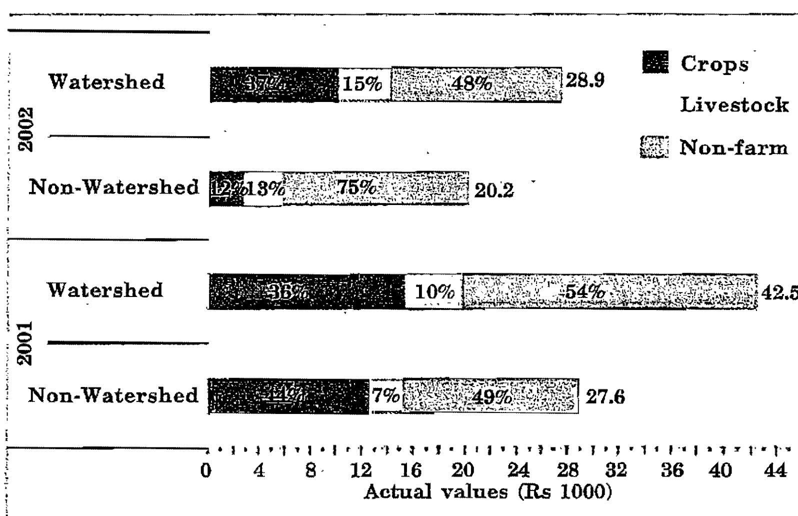


Figure 3 : Income stability and resilience effects during drought year (2002) in Adarsha watershed, Kothapally, AP, India

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. There were evidences to suggest that with more training on livelihood and enterprise development, migration is bound to cease. Between 2000 and 2003, investments in new livelihood enterprises such as seed oil mill, tree nursery, and worm composting increased average income by 77 % in Powerguda, a tribal village in Andhra Pradesh.

Crop-Livestock integration is another facet harnessed for poverty reduction. The Lucheba watershed, Guizhou province of southern China has transformed its economy through modest injections of capital-allied contributions of labor and finance, to create basic infrastructures like access road and drinking water supply. With technical support from the consortium, the farming system was intensified from rice and rape seed to tending livestock (pig raising) and horticultural crops (fruit trees like Ziziphus; vegetables like beans, peas, sweetpotato and groundnuts). Forage production specifically wild buckwheat as an alley crop was a good forage grass for pigs. This cropping technology was also effective in controlling erosion and increasing farm income in the sloping lands. This holds true in many watersheds of India where the improvement in fodder production has intensified livestock activities like breed improvement (artificial insemination and natural means) and livestock center/health camp establishment, resulting in increased incomes.

In Tad Fa and Wang Chai watersheds in Thailand, there was a 45% increase in farm income within three years. The farmers earned an average net income of US$ 1195 per cropping season. A complete turnaround in livelihood system of farm households was inevitable in ICRISAT-led watersheds. Ex-ante impact assessment studies for Andhra Pradesh Rural Livelihoods Program (APRLP) in 5 districts revealed impressive returns of US$ 608 million in 10 years for four major crops (sorghum, groundnut, pigeonpea and maize).

Increasing crop productivity is common in all the watersheds and has been witnessed within a short period from the inception of watershed interventions. To cite few cases, in benchmark watersheds of Andhra Pradesh, improved crop management technologies increased maize yield by 2.5 times and sorghum by three times (**Table 1,**

Table 1 : Crop yields in Adarsha watershed Kothapally during 1999-2005

Crop	1998 Base-line	Yield (kg ha^{-1})						
		1999	2000	2001	2002	2003	2004	2005
Sole maize	1500	3250	3750	3300	3480	3920	3420	3920
Intercropped maize	—	2700	2790	2800	3080	3130	2950	3360
(Traditional)		700	1600	1600	1800	1950	2025	2275
Intercropped pigeonpea	190	640	940	800	720	950	680	925
(Traditional)		200	180	—	—	—	—	—
Sole sorghum	1070	3050	3170	2600	2425	2290	2325	2250
Intercropped sorghum	—	1770	1940	2200	—	2110	1980	1960

ICRISAT, unpublished). Over-all, in 150 community watersheds in India (each measuring approximately 500 ha), implementation of best-bet practices resulted in significant yield increases in sorghum (35-270 %), maize (30-174 %), pearl millet (72-242 %), groundnut (28-179%), sole pigeonpea (97-204 %) and as an intercrop (40-110 %). In Thanh Ha watershed of Vietnam, yields of soybean, groundnut and mungbean increased by three to four folds (2.8-3.5 t ha^{-1}) as compared with the baseline yields (0.5 to 1.0 t ha^{-1}), thereby reducing the yield gaps (**Figure 4,** *ICRISAT, unpublished).* A reduction in N fertilizer (90-120 kg urea ha^{-1}) by 38 % increased maize yield by 18 %. In Tad Fa watershed of northeastern Thailand, maize yield increased by 27-34 % with improved crop management (Thawilkal *et al.*, 2005).

Improving water availability in the watersheds was attributed to efficient management of rainwater and *in-situ* conservation, establishing water harvesting structures (WHS) and increased groundwater levels. The results in most of the watershed sites reveal that open wells located near WHS have significantly higher water levels compared to those away from the WHS. Even after the rainy season, the water level in wells nearer to WHS sustained good groundwater yield.

In the various watersheds of India like Lalatora, treated area registered a groundwater level rise by 7.3 m. At Bundi, the average rise was at 5.7 m and the irrigated area increased from 207 ha to 343 ha. In Kothapally watershed, the groundwater level rise was at 4.2

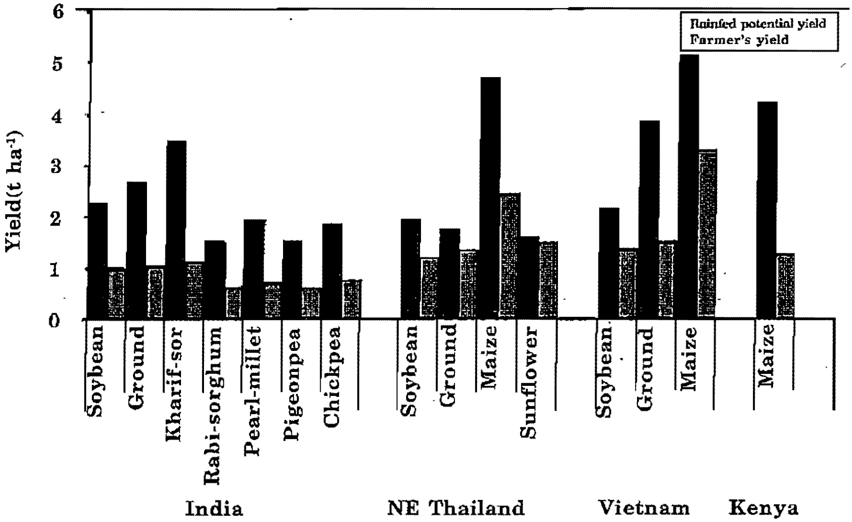
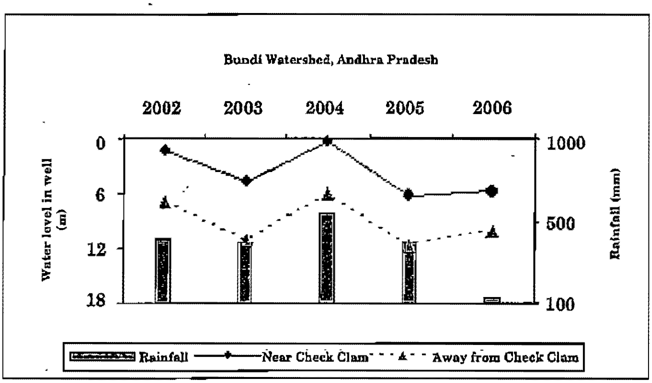
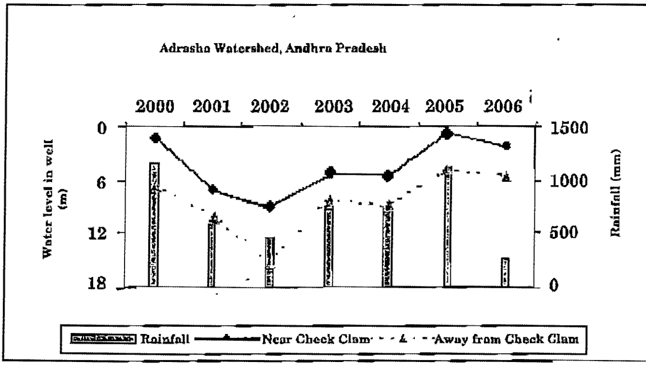


Figure 4 : Yield gap analysis in some countries of Asia and in Kenya

m in the open wells (**Figure 5,** *ICRISAT, unpublished*). The various WHS resulted, on the average, in an additional groundwater recharge per year of approximately 4,28,000 m^3. With this improvement in groundwater availability, the supply of clean drinking water was assured. In Lucheba watershed, a drinking water project, which involves provision of a water storage tank and pipelines to the farm households, was a joint effort of the community and the watershed



(a) Estimated additional groundwater recharge due to watershed interventions = 6,75,000 m^3 per year



(b) Estimated additional groundwater recharge due to watershed interventions = 4,27,800 m³ per year

Figure 5 : The impact of watershed interventions on groundwater levels at two benchmark sites in India

project. This solved the drinking water problem for 62 households and for more than 300 livestock. Earlier, every farmer's household used to spend 2-3 hours per day fetching drinking water and this dismal situation was the main motivation for the excellent farmers' participation in the project. In Thanh Ha watershed, Vietnam collective pumping of well water and establishing efficient water distribution system enabled the farmers group to earn more income by growing watermelon with reduced drudgery for women who had to carry water on their heads from a long distance.

Sustaining development and protecting the environment are the two-pronged achievements of the watersheds. The effectiveness of improved watershed technologies was evident in reducing run-off volume, peak run-off rate and soil loss, and in improving groundwater recharge. This is particularly significant in Tad Fa watershed where interventions such as contour cultivation at midslopes, vegetative bunds planted with *Vetiver,* fruit trees grown on steep slopes and relay cropping with rice-bean reduced seasonal run-off to less than half (194 mm) and soil loss less than $1/7^{th}$ (4.21 t ha^{-1}) as compared to the conventional system (473 mm run-off and soil loss 31.2 t ha^{-1}). This also holds true with peak run-off rate where reduction is approximately $1/3^{rd}$ (**Table 2,** *ICRISAT, unpublished*).

Large numbers of fields (80-100 %) in the SAT were found severely deficient in Zn, B, and S along with N and P. Amendment of the

Table 2 : Seasonal rainfall, runoff and soil loss from different benchmark watersheds in India and Thailand

Watershed	Seasonal rainfall (mm)	Runoff (mm)		Soil loss (t ha^{-1})	
		Treated	Un-treated	Treated	Un-treated
Tad Fa, Khon Kaen, NE Thailand	1284	169	364	4.21	31.2
Kothapally, Andhra Pradesh, India	743	44	67	0.82	1.90
Ringnodia, Madhya Pradesh, India	764	21	66	0.75	2.2
Lalatora, Madhya Pradesh, India	1046	70	273	0.63	3.2

deficient micro- and secondary nutrients increased crop yields by 30 to 70 %, resulting in overall increase in water and nutrient use efficiency (Rego *et al.*, 2005). Introduction of integrated pest management (IPM) and improved cropping systems decreased the use of pesticides worth US$ 44-66 ha^{-1}. Crop rotation using legumes in Wang Chai watershed substantially reduced N requirement for rainfed sugarcane. IPM practices which brought into use local knowledge using insect traps of molasses, light traps and tobacco waste led to extensive vegetable production in Xiaoxingcun (China) and Wang Chai (Thailand) watersheds.

Improved land and water management practices along with integrated nutrient management (INM) comprising applications of inorganic fertilizers and organic sources such as crop residues, vermicompost, farm manures, *Gliricidia* loppings as well as crop diversification with legumes not only enhanced productivity, but also improved soil quality. Increased carbon sequestration of 7.4 t ha^{-1} in 24 years was observed with improved management options in a long-term watershed experiment at ICRISAT (Wani *et al.*, 2003a). By adopting fuel-switch for carbon, women SHGs in Powerguda (a remote village of Andhra Pradesh, India) have pioneered the sale of carbon units (147 t CO_2 C) to the World Bank from their 4,500 *Pongamia* trees, seeds of which are collected for producing saplings for distribution/promotion of biodiesel plantation (D'Silva *et al.*, 2004). Normalized difference vegetation index (NDVI) estimation from the satellite images showed that within four years, vegetation cover could increase by 35 % in Kothapally (Wani *et al.*, 2003b). The IGNRM options in the watersheds reduced loss of NO_3-N in run off water (8 vs 14 kg N ha^{-1}). Introduction of IPM in cotton and pigeonpea substantially reduced the number of chemical insecticidal sprays during the season, and use of pesticides reduced the pollution of water bodies with harmful chemicals. Reduced runoff and erosion reduced risk of downstream flooding and siltation of water bodies that directly improved environmental quality in the watersheds.

Conserving biodiversity in the watersheds was improved through participatory NRM. The index of surface percentage of crops (ISPC), crop agro-biodiversity factor (CAF), and surface variability of main crops changed as a result of integrated watershed management (IWM) interventions. Pronounced agro-biodiversity impacts were observed in Kothapally watershed where farmers now grow 22 crops in a season with a remarkable shift in cropping pattern from cotton (200 ha in 1998 to 100 ha in 2002) to a maize/pigeonpea intercrop system (40 ha to 180 ha); thereby changing the CAF from 0.41 in 1998 to 0.73 in 2002. In Thanh Ha, Vietnam the CAF changed from 0.25 in 1998 to 0.6 in 2002 with the introduction of legumes (Wani *et al.*, 2005). Similarly, rehabilitation of the common property resource land in Bundi watershed through the collective action of the community ensured the availability of fodder for all the households and income of US $ 1670 y^{-1} for the SHG through sale of grass to the surrounding villages. Above-ground diversity of plants (54 plant species belonging to 35 families) as well as below-ground diversity of microorganisms (21 bacterial isolates, 31 fungal species and 1.6 times higher biomass C) was evident in rehabilitated CPR as compared to the degraded CPR land (9 plant species, 18 bacterial isolates and 20 fungal isolates of which 75 % belong to *Aspergillus* genus) (Dixit *et al.*, 2005).

Enhancing partnerships and institutional innovations through the consortium approach was the major impetus for harnessing watershed's potential to reduce households' poverty. The underlying element of the consortium approach adopted in ICRISAT-led watersheds is engaging a range of actors with the local people as the primary implementing unit. Complex issues were effectively addressed by the joint efforts of ICRISAT and key partners, namely, the national agricultural research systems (NARS), non-government organizations (NGOs), government organizations (GOs), agricultural universities and other private interested groups with the farm households as the key decision-makers. In SHGs, like village seedbanks, these were established not just to provide timely and quality seeds, but these also created the venue for receiving technical support and building the capacity of members like women for the management and conservation of natural resources and livelihood development activities. Incorporating knowledge-based entry point in the approach led to the facilitation of rapport and at the same time enabled the community to take rational decisions for their own development. As demonstrated by ICRISAT, the strongest merit of consortium approach is in capacity building where farm households are not the sole beneficiaries. Researchers, development workers and students of various disciplines are also trained, and policymakers from the NARSs sensitized on the entire gamut of watershed activities. Private-public partnership has provided the means for increased investments not only for enhancing productivity but also for building institutions as engines for people-led natural resource management.

Moreover, the consortium approach has also contributed to sealing through the nucleus-satellite scheme and building productive alliances for further research and technical backstopping. With cooperation, a balanced R&D was implemented rather than a 'purist model' of participation or blind adherence to government guidelines. A balanced R&D in watersheds has encouraged scientific debate, and at the same time, promoted development through tangible economic benefits.

The other international agricultural research centers (IARCs) like the International Water Management Institute (IWMI), International Livestock Research Institute (ILRI) and World Wildlife Fund (WWF) have also become allies because of common denominators like goal (poverty reduction) and subject (water resources). It must be reckoned that while centers have their own mandates, these will have to be addressed from a holistic perspective, seeking the assistance and contributions of other centers; their technical expertise and findings. This not only maximized the use of resources, but also allowed for an integrated approach requiring the alliance of institutions and stakeholders. Similarly, the various networks like the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and Cereals and Legumes Asia Network (CLAN) have provided an added venue for exchange and collaboration. This led to a strong south-south partnership.

Conclusions

Asia is the hot spot of poverty, malnutrition as well as degradation of natural resources, as out of 852 million hungry, 363 million are in India and China. Similarly, out of 173 million tones of sediment discharged into ocean annually, Asia contributes half of the load. Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic vicissitudes and human activities is also referred to as desertification. The poverty of Asia's poor is both a cause and a consequence of accelerating land degradation and declining agricultural productivity. The strong nexus between poverty, land degradation and drought could be broken through water management as an entry point for improving the livelihoods by adopting integrated watershed management approach. Watershed programs in India have silently revolutionized the rain-fed agriculture and are used as growth engine for agriculture development.

Based on the learning from the meta analysis of 311 watershed case studies in India and 30 years of strategic and on-farm research, ICRISAT and its partners have developed an innovative farmers participatory consortium watershed management model. This model addresses the issues of equity, efficiency, environment and economies by adopting principles of consortium, convergence, cooperation, and capacity building. By adopting this approach crop productivity is doubled, water availability enhanced, cropping intensity increased, soil erosion and runoff reduced, and most importantly, the social and institutional capital built, resulting in doubling and tripling of the family incomes. Livelihoods of millions of rural poor can be improved by scaling out the benefits of integrated watershed management approach with technical backstopping through a consortium of institutions. The nexus between desertification and poverty could be successfully broken through rainwater management as an entry point. Experiences based on the work in 368 micro watersheds in four countries in Asia and south-south collaboration between India and ASARECA in southern and eastern Africa are discussed.

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