Unlocking potential of rainfed agriculture through Community Watershed Management

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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 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. Water (freshwater) is a limiting natural resource and plays an important role in providing livelihood support for rural populations where agriculture is the key occupation. Water scarcity is a significant problem for farmers in Africa, Asia, and the near East where 80 - 90 per cent of water withdrawals are used for agriculture. Rain-fed agriculture that constitutes the livelihood base for the vast majority of rural inhabitants (about 75 per cent of the poor in south Asia, and about 80 per cent of the population in east Africa) in the developing countries is a source of food security, employment and cash income. It is estimated that about 80 per cent of the world's agricultural land is rain-fed, contributing to about 58 per cent of the global food production.

An insight into the rain-fed regions shows a grim picture of water-scarcity, fragile environments, drought and land degradation due to soil erosion by wind and water, suffer from low rainwater use efficiency, high population pressure, poverty, low investments in water use efficiency measures, poor infrastructure and inappropriate policies.

The vast potential of the rainfed agriculture need to be unlocked through knowledge-based management of natural resources for increasing the productivity and incomes to achieve food secured developing world. Long-term studies at ICRISAT have demonstrated over last 30 years that productivity of vertisols can be increased to 4.7 tonnes per hectare with a carrying capacity of 18 persons per hectare per year as against the current productivity of 0.95 tonnes per hectare with carrying capacity of 4 persons per hectare per year. Yield gap analysis carried out in number of countries in Asia and Africa have shown that yields of cereals, legumes and oil seeds can be increased by 2.3 times to 3 times. Successful case studies at specific locations revealed considerable opportunities to increase crop productivity by two to three folds of rain-fed systems through productivity-enhancing agricultural technologies. Adarsha watershed, Kothapally, Andhra Pradesh, India is a successful example where productivity-enhancing technologies were adopted through new IWM model featured by a consortium of institutions with farmer participatory and convergence mode that brought in increased incomes and improved rural livelihoods. The benefits reaped from on-farm watershed at Kothapally are being scaled-up across India and Southeast Asia, in 360 satellite and nucleus watersheds in Andhra Pradesh, three districts of Madhya Pradesh and Rajasthan, and Northeastern Thailand, North Vietnam and Southern China. The IWM model provides 'win-win' solution for sustaining productivity, enhanced rural employment opportunities and improve the livelihoods of rural people while protecting the environment, which are the major challenges in the rainfed areas.

In the on-farm Adarsha watershed, Kothapally, Ranga Reddy district, Andhra Pradesh, farmers obtained high maize yield ranging from 2.2 to 2.5 times with improved technologies as compared to the yields of sole maize (1.5 t ha^{-1}) in 1998. In case of intercropped maize with pigeonpea, improved practices resulted in four fold increased maize yield (2.7 t ha^{-1}) compared with farmers' practices where the yields were 0.7 t ha^{-1}. In case of sorghum the improved practices adopted increased yields by three-folds within one year. Yield of intercropped pigeonpea with improved management practices increased by five times in 2003.

Amendments with widespread deficient micro and secondary nutrients enhanced the productivity of rainfed crops by 28 to 120% along with increased rainwater use efficiency. Integrated watershed management (IWM) not only increased the productivity but also reduced runoff by 26 to 66% and soil loss by 20 to 43%. It also resulted in increased groundwater recharge and the groundwater level were improved by 4 to 5 meters. In conclusion, in the water scarce semi-arid tropical region of the world, it is paramounting importance to manage the water efficiently and sustainably. Integrated watershed management provides win-win-win solution for increasing productivity, minimizing environmental degradation and improving livelihoods and food security for the rural poor. Most important need is to infuse science-led development in the semi-arid tropics by sharing the knowledge with various stakeholders potential rainfed agriculture can be unlocked.