Need for Watershed Management Programmes for Rural Development in India

Om Prakash, Y.V.R.Reddy, G.Sastry and ***H.P.Singh***

Central Research Institute for Dry land Agriculture (ICAR)
Saidabad, Hyderabad–500059. (AP) India
E-mail: yvrreddy@crida.ap.nic.in

Abstract: Watershed Management Programme (WMP) is a tool for socio-economic change and improvement in standard of living of rural people in semi-arid regions of India. Ralegan Siddhi, village hamlet is a typical example where Watershed Management Programmes responded positively. During implementation process, Watershed Associations, Watershed Teams, User Groups, Self Help Groups, etc., were constituted for water resource development for agriculture, horticulture including cultivation of vegetables, agro-forestry systems and livestock in the delineated watershed area. The stakeholders promised to contribute labor for development of common property resources in the village voluntarily, apart from free grazing of animals and tree felling. Upon implementation of programme the productivity of crops and income per unit area has increased manifold and provided constant source of income and employment leading to the balanced food taken by the people in the post-project period. Thus, there is an all-round development of land resources due to WMPs, increase in productivity and replicability as evidenced by data.

1 Introduction

Watershed is a geo-hydrological unit where rainwater flows to a common point of area and reaches to a common point. The watershed area may extend from a few hectares to hundreds of hectares. Based on the availability of funds and number of villages/households in watershed area, the size of the area is decided and extended further to cover other areas. The concept of watershed program, though it is known, has been given due importance since 1980 and Government of India launched WMPs during 1983—1984 for increasing land productivity from rain fed eco system. Indian Council of Agricultural Research (ICAR), New Delhi implemented WMPs in 47 model watersheds under different agro-climatic conditions in different states of India through its Research Institutes viz., Central Research Institute for Dry-land Agriculture, Hyderabad and Central Soil and Water Conservation Research & Training Institute, Dehradun. Based on the increase in cropping intensity, productivity, per capita income, standard of living, social awareness etc., in addition to micro-climate improvement during 1983—1984 to 1989—1990, Government of India initiated allocating about Rs.1,100 crores annually since then for rural development in dry land farming regions.

1.1 Need for watershed development programs in india

Though food production has increased from 51 million tonnes in 1951 to 200 million t by the turn of the century, the increase has been mainly due to development of irrigation potential through reservoirs, application of chemical fertilizers, use of plant protection measures and improved/hybrid seeds coupled with good agronomic practices. The irrigated area increased from 10 Mha to 55 Mha and the cultivated area increased from 110 Mha to 142.8 Mha during the years 1951—2001. The cost for the development of one hectare of area under irrigation was estimated to be more than Rs.60,000 and lead to mono-culture from diversified cropping systems. Due to cultivation of staple crops like wheat, paddy and sugarcane were cultivated on large scale in irrigated areas resulting alkalinity/salinity problems increased gradually due to improper use of water and mono-culture and cropping program.

The forests are denuded and vegetative cover was reduced leading to soil erosion/loss, in addition to quick rain water flow causing detrimental to afforestation measures. The fire-wood requirement has been

estimated to be one ton/person/ year. This adds further damage in development of forests in the country.

Owing to land degradational processes such as, overgrazing, felling of trees and uncare of common lands, wastelands, fallow lands, the soil erosion has become a major problem in dryland farming tracts in India. Soil erosion posed a big threat to productivity of dry land crops. Even if all infrastructural development takes place in bringing entire cultivated area as irrigated area in India with unlimited resources and money, fifty percent of the area still remains as dryland farming area. Hence, there is a need to manage dry land farming with available resources to increase food, oilseeds, fruits, vegetables - production, firewood, grass/fodder and grazing facility as dryland farming is subject to serious soil erosion, severe drought problems and degradation etc. The cost of production and returns from irrigated lands has been declining with additional expenditure. Hence, there is scope to improve socio-economic conditions of people in dry land farming areas through judicious management of natural resources which was realized through implementation of watershed programs in India. Now, government of India through Ministry of Agriculture, and Ministry of Rural Development started executing watershed programs. The amount per hectare is allocated @ Rs.6,000 at present as against Rs.4,000 during the last five year plan and allocation of money in the budget by government of India will be more in future for watershed programs in India, as it solves to some extent the above explained problems.

1.2 Watershed management approach

Though natural resources-soil and rain water management will be executed on watershed basis covering 2—6 cluster of villages in 500 ha—1,500 ha area, other activities such as crop improvement, implementation of soil erosion control measures, water resource development, dairy, sericulture, fishery, horticulture, agro-forestry, development of human skills, special trainings/programs for self employment/income generation etc., will also be covered in watershed villages covering all categories of rural families including landless. This has been a unique program for rural development in less cared/ scarce rainfall zone villages. If proper marketing infrastructure and remunerative prices for produce are created, it will be a boon to farmers/laborers in rain fed farming areas.

2 Works in watershed villages

The integrated watershed program covers several activities/works that would generate employment opportunities and income for increased standard of living of rural people in watershed villages covered under the selected watershed program. The works are detailed below:

2.1 Soil conservation and water harvesting structures

Land slopes are mild to moderate leading to soil erosion in dryland farming region and is a major problem due to lack of green/vegetative cover, undulated terrain and lack of moisture for long enough periods in the soil profile (December through March) and free movement of grazing livestock etc. Hence, soil conservation techniques cover contour bunding, diversion channels, vegetative barriers, mechanical-cum-vegetative barriers, gully plugging, ravine reclamation, shelter belts in arid/desert areas, etc., so as to prevent soil erosion. Water harvesting structures include, check dams, brushwood check dams, percolation tanks, farm ponds, sunken ponds, percolation wells, cement/earthen dams etc., so as to harvest rain water excess and utilize effectively for higher productivity of crops in addition to augmenting ground water resources. In situ moisture conservation encompasses land leveling, land smoothening, small section bunds, deep ploughing, dead furrow, contour cultivation / sowing, intercropping system, other improved practices etc., so as to conserve rain water for protecting dryland crops from drought spells to some extent.

2.2 Crop improvement

Improved/hybrid seeds/short duration varieties of different crops were introduced to overcome effect of drought spells and early withdrawal of monsoon. The improved varieties coupled with improved

agronomic practices including application of fertilizers, use of plant protection chemicals in addition to contour farming were followed in watersheds for higher productivity.

2.3 Agroforestry systems

It covers, agri-horticulture, silvi-agriculture, silvo-pastoral-horticultural systems, pastoral systems, agro-plantations etc., in private and or common/community lands in the watershed areas. Afforestation measures were introduced in degraded lands to restore micro climate/eco system.

2.4 Livestock management

It covers dairy animals, poultry, duckry, goatry, sheep rearing, piggery, bee keeping, fishery etc., which provide assured employment and income generation to all categories of people in villages of watershed areas.

2.5 Human resource development

Artisans, tailors and skills of people can be developed/improved so as to improve the earning capacity of people through proper training and extensive education. Ladies/others can be trained in making detergents, soaps, powders, pickles, some of preservable food products, tailoring, embroidery, garments etc., for self-employment and income generation in addition to women empowerment and rural development.

2.6 Self Help groups (SHGs)

SHGs consisting of a maximum of 20 members were constituted to create awareness among the women and to lead developmental activities in watershed villages and to assure their participation. They also hold meetings weekly with a subscription of Rs.10, 20, 25, 30, 50 or even Rs.100/ member every week so as to meet the demand of needy persons with nominal interest and to achieve economic freedom. This process kept money lenders away from these villages and ladies developed confidence to solve problems together and started participating in decision making with male family members. This helped to create awareness among all women in villages and they became active partners in developmental activities in watershed villages. This created people's participation.

Thus, several activities have been initiated for development of rural areas through watershed programs. However, all activities have not been carried out in all watershed villages due to lack of staff, budget, appropriate machinery etc. Nevertheless, watershed program created awareness among people in rural areas of dry farming tracts in India. Impact of model watershed in Ahmednagar district of Maharashtra state is briefed in this paper as the program yielded good results.

3 Impact of watershed program

The Ralegan Siddhi watershed, located in Ahmednagar district towards North-East side of Pune city was selected for study. The topography of the village is very undulating having a range of small hills around the village and it is an acute drought prone areas of the district. The temperature varies from 12℃ to 44℃ and rainfall is scanty i.e., 450 mm to 650 mm. The soil is shallow with low fertility status of black cotton soils which limits the potential of agricultural production. The geographical area of the village measures 971.56 ha out of which 691 ha area is under cultivation and 130 ha area is under forests. The cultivated area is 345 ha in kharif and 655 ha in rabi season.

The total geographical area of the village was sub-divided into four sub-watersheds based on contour map. The strategy adopted constituted of conserve soil by arresting run-off water leading to higher infiltration and thus help in a watershed approach with a ridge to valley perspective and an emphasis on soil conservation and biomass generation was adopted. Only 417 cultivators living in Ralegan Siddhi participated actively and made two systems i.e., environment system and production system for

improvement in the village. Environment system covers afforestation, soil conservation (afforestation cum pasture development, contour bunding, land leveling etc.) and water conservation (*nala bunding*, percolation tank, K.T.Bandhara and *Gabrion* structures). Production system covers improved agricultural practices, horticultural development and drip irrigation. The expenditure incurred was almost Rs.75 lakhs to complete works in this watershed. People contributed voluntary labor for village development. They preferred a motto of - "One for all" and "All for one" so as to develop their village. The impact of watershed management is tremendous and presented in the Table 1 below:

Table 1 Impact of the integrated watershed development program

Sl.No.	Indicators	Before watershed	Present status	Increase
1	Agriculture			
(1)	Double cropped area (ha)	630	956	52%
(2)	Cropping intensity (%)	98	164	66%
(3)	Oilseed area (ha)	20	134	6 times
(4)	Pulse area (ha)	27	96	3.7 times
(5)	Intercropping area (ha)	—	65	Full area
(6)	Use of improved seed (ha)	50	860	17 times
(7)	Seed treatment (ha)	40	410	10 times
(8)	Use of chemical fertilizers (t)	8	83	10 times
(9)	Area covered with Plant protection measures (ha)	45	301	6.7 times
2	Irrigation area (ha)			
(1)	Well irrigation	56	448	8 times
(2)	Canal irrigation	—	18	18 times
(3)	No. of wells	34	103	3 times
(4)	No. of community wells	—	5	All
3	Biogas plants (No.)	—	39	All
4	Two bowl seed drill (No.)	—	48	All
5	Sprayers (Nos.)	—	10	All
6	Threshers (Nos.)	—	5	All
7	Electric pumps	15	103	7 times
8	Magazine subscribing farmers (No.)	10	247	25 times
9	Value of average per capita yield of all crops (*Rs.*)	446	6,466	15 times

Such an increased and sustained land productivity resulted in rural poverty alleviation and thus, village stakeholders benefited and improved the socio-economic status of people. Milk producers formed an Association and a milk collection center in this village was established. Milk production enhanced to 3,000 liters per day and was marketed to the near-by town. This lead to the assured daily income to the cultivators from dairy farming. Farmers also raised horticultural gardens and vegetable crops leading to higher income to the farmers compared to no income situation before implementation of WMPs. Improved seeds coupled with fertilizer use/plant protection chemicals in addition to soil and water conservation techniques increased the productivity of crops to the tune of 2—4 times. New crops like wheat, maize were introduced. High water requiring crops like sugarcane were prohibited to avoid exploitation of water in the region. Farmers were made to prefer dry land crops/dry irrigated crops only. The economic viability of a number of watershed management projects in different agro-ecological regions has been worked out and data show that WMPs are viable, Table 2.

Table 2 Benefit cost ratios for various watershed programmes

Name of Watershed	AER	Projectwise, yrs	Discount Rate, %	BCR	Net present value, m *Rs*	Internal Rate of Retuns, %
Fakot	14.2	25	10	1.92	0.5	24
Relmajra	9.1	20	12	1.20	0.7	—
Sukhomajri	9.1	25	12	2.06	—	19
Tejpura	4.4	10	10	3.42	—	—
Navamota	5.2	30	12	2.00	0.8	—
Rebari	4.1	20	12	2.65	0.9	37.5
Chhajawa	5.2	20	10	2.06	—	—
Joladarasi	3.0	15	15	1.45	1.7	—
Chinnatekur	7.1	15	15	1.88	18.5	—
G.R.Halli	8.2	15	15	1.48	0.9	—

More than ten Self Help Groups were formed in the watershed/village and each group has more than 0.1 million rupees so that loans to members for agriculture, dairy, domestic purposes can be advanced. This resulted exiting money lenders from the villages who were active before implementation of WMPs. Several families became self-sufficient due to watershed program activities. More than 80% of labor force during summer and 40% of labor force regularly used to leave village for work in other vilages, but the present situation is just opposite. About 40—60 people visit Ralegan Siddhi for work due to increased works in agriculture and dairy and allied enterprises due to WMPs. Women folk in this village participate in all decisions taken by the Watershed Implementation Team Ralegan Siddhi. Thus, **Ralegan Siddhi** became a model watershed in India due to increased sustained socio-economic status and standard of living of people.

Table 3 Increase in cropped area and cropping intensity in different agro-eco regions

Watershed	Cropped area (ha)		Cropping intensity, %	
	Pre-project	1989	Pre-project	Post -project
Kolhewadi	305	305	110	120
Yernal	375	375	112	132
Padalsinghi	297	295	106	127
Thakarda	97	101	108	148
Rendhar	712	712	101	156
Rejpura	520	651	83	183
Chevella	635	655	105	165
Sasure	117	117	95	134
Mittemari	490	583	115	150
Munsiguda	329	329	100	126
Raugoli	653	685	105	126
Ralegan Siddhi	630	956	98	164