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General Research Paper

Watershed Management as a Tool for Changing the Kaleidoscope of Central India: A Case Study from Jhabua District of Madhya Pradesh, India

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ABSTRACT

Watershed management is an approach of area planning of natural resources to sub-serve the socio-economic needs of the human society or community concerned. At present this concept has become a key for improving the soil and water resources, productivity and ecological restoration of rain-fed areas. The present paper focuses on the impacts of implementation of watershed management practices adopted for the Jhabua district of Madhya Pradesh, India. The Rajiv Gandhi Watershed Mission Programme executed for the Jhabua district of Madhya Pradesh state has set an excellent model of natural resource conservation, management and ecological restoration process. It has been concluded with the note that there is a nationwide need to adopt such types of natural resource management practices.

INTRODUCTION

Due to the inadequate availability of water resources in many parts of the country, the integrated watershed management approach for the semi-arid regions of India is considered to be very important (Rao 2000, Singh et al. 2002, Das 2003, 2005). The watershed management programme is an approach of area planning of natural resources to sub-serve the socio-economic needs of the human society or community concerned (CAPART 1992, Kulkarni 1998, Honore 1999, Singh & Mishra 1999, Swallo et al. 2001, Khan 2005, Dutta 2007). This concept has emerged as a new paradigm for planning, development and management of land, water and biomass resources of rain-fed areas with a focus on social and environmental aspects following a participatory approach (Gupta 1996, Pande 1998, Kerr 2002, Kerr et al. 2004, UNWWDR 2003). The watershed management model involves balancing the use of soil and water resources between upstream and downstream areas within a watershed toward the objectives of natural resource conservation, increased agricultural productivity and a better standard of living for its inhabitants (CAPART 1992, Hazra 1998, Sikka 2002, Jain 2004, Sharma & Scott 2005). Due to this, in the recent times, the principle of decentralized management of natural resources has gained a considerable legitimacy among policymakers and practitioners in India (GOI 1994, GOI 1994b, NCIWRD 1999, Planning Commission Report 2001, Kolavalli & Kerr 2002, GoI 2003, Sastry et al. 2003, Joy et al. 2005).

CENTRAL INDIA: BACKGROUND INFORMATION

Madhya Pradesh falls under the semi-arid tropic (SAT) regions of the country. Till the year 1990, with very low human development indices including per capita state domestic product, life expectancy, literacy and infant mortality etc., the state was identified as one of the poorest states in India (GoMP 1998 a & b, Mahapatra 1999, Baviskar 2004). The poverty in the state was linked with lack of water and other natural resources, with key constraints like: (a) uneven spatial and inter-temporal rainfall requiring storage for capturing water, for which costs were rising prohibitively due to social and environmental impacts, (b) low level of utilization of developed water resources for irrigation and urban/rural water supply due to insufficient operation and maintenance and its poor cost recovery, (c) inter-sectoral competition, particularly between groundwater irrigation and water supply, (d) deteriorating surface and groundwater quality due to urbanization and over-exploitation, and (e) catchment degradation and poor management coordination. Due to such reasons, the agricultural developments were restricted in the State. Similarly, the other reasons against such restricted agricultural production in Central India were attributed to the reasons like low rainwater use efficiency for crop production, inherent low soil fertility, inappropriate nutrient management practices, low adoption of stress-tolerant crops for cultivation, insufficient pest management options and poverty etc. In addition to this, an additional drawback of the region was the population composition. A major portion of

the populace of the state, dependent upon water, land and forest resources, was the tribal people who had no exposure to education and the recent technological advancement in the country (Census of India 1991, Dar 1999, Wani et al. 2003, Times of India 2006, Envis News Letter 2008).

Because of all these limitations, the state was forced to face the situations like: (a) drought and sometimes water logging types of conditions for the crops due to variation in the seasonal rains, (b) noticeable fall in the river discharge, as a result of improper management of available water resources, (c) significant decrease in groundwater levels in most of the areas along western boundaries of the state. Therefore, promoting sustainable and efficient water management while addressing the cross-sectoral linkage and concerns became a major challenge in the state, calling for integrated, participatory and decentralized water resource management (GoMp 1998 a & b, Mahapatra 1999, Baviskar 2004).

RAJIV GANDHI WATERSHED MISSION IN MADHYA PRADESH

In the year 1994, Madhya Pradesh Government initiated the Rajiv Gandhi Watershed Mission Program (RGMWD) for keeping in pace with the nationwide trend and its own policy of decentralisation (Indian Express Newspapers 1998). The main objective of the programme was to integrate concerns of poverty reduction and environmental regeneration through participatory watershed management. The project was initiated with the primary objectives viz., (a) to augment, conserve and optimize the utilization of soil and water resources (ground and surface) in rain-fed areas to reduce the vulnerability to droughts and stabilize the fluctuations in agricultural production, (b) to develop an easily available repository of scientific and technological inputs, especially for the field level implementing agencies which could facilitate detailed and area specific planning, (c) to maximize people's participation in concept, planning, implementation and maintenance of soil and water conservation activities in watershed area so that the entire corpus of scheme can become effective as well as transparent in working, and (d) to focus on disadvantaged communities through equitable distribution of resources and sharing of benefits. In connection with the project, in the initial stage, it was decided to improve the economic condition of the villagers by providing them employment through their involvement in the construction of water harvesting structures and different soil and water conservation practices. Further, it was also planned to intensify the agricultural activity by providing a source of irrigation. The main idea behind the project was to involve people in the work and educate them to create a self generating system of land and water conservation measures (Mahapatra 1999). For the effective implementation of the project, twelve Governmental and eight Non Governmental Organisations (NGOs) as a Project Implementation Agencies (PIA) were identified, whose targets were assigned to improve the 1.2 million hectares of land spread area over several watersheds by the year 2000 (http://jhabua.nic.in/watershed.htm).

CASE STUDY OF JHABUA: A JOURNEY WITH A DIFFERENCE

Jhabua district, situated in the upland regions of western Madhya Pradesh, spreads over an area of total 6793 sq. km land. The district has slowly lost its natural wealth over the period of last few decades. The reduction of vegetation cover in the area was mainly attributed to the reasons like comparatively less annual rainfall, non-existence of post monsoonal rains and wide variation in the annual rainfall from year to year, etc. Such conditions have resulted into the formation of extensive hill, gully and ravine type of soil erosion in the area. The undulating topography of the district also had favoured the rapid run-off process due to which most of the forest cover areas were degraded severely. Since such upland areas were used for cultivation without terracing, the humus and fertile layer of soil had lost and soil erosion was also accelerated in the area. The free grazing further had affected the vegetative cover of the land. The intensive cultivation on uplands led to an ecological disaster, resulting in loss of land productivity, decline in employment opportunities, and distressed out-migration of people. The district was thus, on the threshold of an ecological disaster a few decades ago. The impact was greater on the tribal people, as 83% of the district's population was consisted of tribal people, whose survival was closely linked to forest (Baviskar 1997, RGWM/TARU 2001).

Earlier, during 1966-68, Jhabua district witnessed its first famine since independence. There was another severe drought in 1985, wherein the area recorded only 308 mm of rainfall, the lowest since 1911. The area also has witnessed the first food riot after the independence. Due to all such causes, many people migrated from the area in search for better employment opportunities. In almost all the landholding categories, except large farmers, more than one-third of the households underwent migration (GoMP 1998a). This had prompted the Central Government to shift its thinking from short term public relief to long term drought proof policies and programs. Thus, Jhabua was identified as a pilot district to introduce a new strategy of integrated water resource management under the National Drinking Water Mission (Gopalkrishna 1994, Baviskar 1997).

IMPLEMENTATION OF RAJIV GANDHI WATERSHED MISSION PROGRAM IN JHABUA DISTRICT

The water and soil conservation is foundation of any watershed program. By keeping this fact in mind, a targeted approach to achieve effective, efficient and site-specific soil and water conservation by adopting ridge-to-valley treatment was planned for the area. Under the concept of "Ridge to Valley", the treatment of the hilltops and hill slopes was completed at first. The treatment of land was initiated from a higher elevation and gradually lands of lower elevations were taken up, and finally the land areas at the bottom of the valley were treated. Such treatment ensures the reduction in soil erosion and protection of lower catchment areas and in turn helps the water conservation as well as recharge of the groundwater (www.jhabua.nic.in/watershed.htm, RGWM/TARU 2001).

Accordingly, in case of Jhabua area, the free movement of run-off water and the displacement of loose soil cover from the hilly parts were decided to be controlled by arresting the free flow of run-off water on the hill slopes, instead of allowing it to carry away top soil cover. For the purpose of water conservation, the water resource development and conservation measures such as vegetative contour bunds, percolation tanks, check dams, etc. were constructed across the minor and major drainage lines. Structures like contour trenches, staggered pits, gully control measures (Fig. 1), drainage line treatment were taken up in the recharge zone of the watershed area. However, other suitable site specific structures like contour bunds, earthen embankments, nallah bunds, sub-surface dykes, percolation tanks (Fig. 2) and other water conservation and harvesting structures were build in transition and discharge zones. These intensive soil-water conservation treatment works were completed on nearly 13430.50 hectares of land area (Dar 1999, RGWM/TARU 2001).

For the purpose of artificial recharge of groundwater, beside the other water conservation and harvesting measures, extra 83 percolation tanks and 21 subsurface dykes were constructed. The selection of sites was done with the help of advance technique of remote sensing. With the help of local people's participation, a total of 350 community assisted water harvesting tanks were constructed in the district (Fig. 3). For the said construction purpose, villagers have contributed 50% of the total expenditure. In order to store the running water, 143 small tanks were made at suitable places. By enhancing the retention time, the collected water was allowed to percolate into the sub-surface and in turn recharge the groundwater (Mahapatra 1999).

Similarly, implementation of land use planning in the area was made on the basis of integrated agriculture, fodder development and livestock management like farming systems, mainly because of undulating topography, thin soil cover, scanty rainfall and poor groundwater potential, etc. The integrated land use approach has been considered as a more suitable and remunerative than marginal sole agriculture practices. Therefore, the farming systems like silviculture, agro-forestry and agro-horticulture were adopted in the area. For the development of fodder, plantations of suitable species were carried out in the recharge zone of the watershed area. Similarly, agronomic measures like intercropping, intensive cropping, etc. along with pasture development and silvi-pastoral activities were taken up on transition and discharge zone. Fodder development in 2950 hectares of land of the area was promoted on private as well as governmental land, in which grass beds, silvi-pastoral and pasture development were given emphasis. Fodder development provides immediate returns to the villagers, environment for biomass generation and soil conservation. Therefore, species like *Stylosanthes hamata*, *Panicum pediseletum*, Sukli and Batodi were planted in the area. To supplement the watershed activities, soil working and seed sowing in vast expanses were taken up. Varied types of plant communities including *Jatropa*, *Anona squamosa*, *Moringa oleifera*, etc. through seed sowing, fruit bearing species like *Magnifera indica*, *Emblica officianalis*, *Zizyphus jujuba*, *Psidium gujava*, multipurpose trees like *Bombax cieba*, *Pethocellebium dulce*, *Dendrocalamus strictus*, *Eucalyptus* sp., *Citrus limone*, energy plantations (high density) of 4.25 million plants of *Acacia ferruginea* and *Acacia nilotica* were taken up on private lands. The assisting and ensuring natural regeneration from dormant seeds, coppices and gap planting techniques were taken up in 2900 hectares of degraded forest areas (RGWM/TARU 2001). Barren land before and after the implementation of the programme is shown in Figs. 4 and 5.

EVALUATION OF THE WORK

The implementation of watershed management plan in Jhabua district has shown a remarkable change in the area and has set an excellent example of community based management of water resources. The four year (i.e., 1994-1998) evaluation highlights identified for the selected watersheds of Jhabua area are summarised as follows.

1. The wasteland area was reduced by 66% in the 11 micro-watersheds of Jhabua area.
2. Most of villages became self sufficient in fodder and forage, and food production was found to be increased by 35% in the mentioned five years span.
3. The groundwater table was found to be increased by 0.64 m on an average in 19 watersheds due to which consequently the cropped area and area under Rabi (winter crops) was also increased (Mahapatra 1999). The irrigated areas were increased to 1,115 ha in 18 micro-watersheds, which were nearly doubled the irrigated area of 1994-1995.

Fig. 1: Terracing and gully-control measures in Jhabua (http://www.jhabua.nic.in/)

Fig. 2: Community-assisted water harvesting tanks in Jhabua.

Fig. 3: Water conservation and harvesting measures in Jhabua.

Fig. 4: Barren land in the area before implementation of watershed management programme.

Fig. 5: Barren hills being transformed into green paradise after implementation of watershed management programme.

4. The project has provided the wage labour to the local people, due to which the migration of villagers was significantly declined.
5. Under RGMWD programme, as on 1 April 2005, a total of 96.13% of rural habitations were fully covered with the drinking water facilities (Gopalkrishnana 1994, Greenfile 1999, Mahapatra 1999, planningcommission.nic.in/plans/mta/mta-9702/mta-ch9.pdf, Tiwari 2000, http://www.unep.org/desertification/successstories/16.htm,).

CONCLUSION

Jhabua district of Madhya Pradesh is an outstanding effort to involve the people on a large scale in integrated land and water management, probably the first of its kind in India. The Madhya Pradesh watershed development program remains a participatory model for land management that can be implemented nationwide. It has shown that how involvement of local people directly in the environmental reconstruction and improvement of their own land and water resources helps to manage its environment. However, there still lies a great potential in future to tap our natural resources, just there is a need to manage them wisely, and the prospects lie in the goodwill of people towards nature and planet earth.

The highlights for successful watershed management programme summarised on the basis of Jhabua study are:

1. A more holistic approach making use of latest technological updates, and time-proven beneficial agricultural practices should be opted for optimum gains from the available resources of land and water.
2. Just construction of artificial catchments like dams, weirs and canals is not sufficient. The use of primitive agricultural practices and low use of modern agricultural techniques coupled with low literacy, may spell doom, in spite of construction of water structures in the direction of conserving our natural resources.
3. Cost-effective and environment-friendly soil, water, nutrient, crop and pest management practices should be used for wider and quicker adoption and synchronize the environment with maximum production capability, and for raising the carrying capacity of the system. Such measures are not only cost-effective but are also eco-friendly, which help the symbiotic growth of rural environment and economy.

In addition, farmers in the watershed area should be encouraged for voluntary participation and allowed to collectively identify and prioritize the problems. Such an approach will greatly help in considering the possible technical interventions that could be opted to tackle the *in situ* field problems. The holistic system approach for watershed management should also strongly emphasize upon measures and action plans to uplift the standard of living of the rural populace. In the drive, there should be additions to water and land resource conservation measures. Some of them can be given as rainwater harvesting, afforestation, horticulture and pasture development. There should be encouragement towards adoption of resource conservation technologies such as zero-tillage, reduced tillage, surface seeding, bed-planting use of drip and sprinkler irrigation and agronomic practices that promote precision agriculture, save water, energy and improve productivity. Educating the farmers and the villagers about the close interrelation between the surface water discharges, ground water aquifer and vegetation cover is a vital component of project implementation. Therefore, in the current scenario the example of Jhabua can be used as a model of sustainable development. Authors have, therefore, concluded with the note that there is a need to adopt such type of natural resource management practices throughout the country.

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