शोध संचयन
SHODH SANCHAYAN
ISSN 2249-9180 (Online)
ISSN 0975-1254 (Print)
RNI No.: DELBIL/2010/31292

Bilingual journal of Humanities & Social Sciences

Half Yearly

Vol. 2, Issue 1 & 2, (Joint Issue)
15 Jan-15 July, 2011

Impact Assessment of Watershed Activities in Tribal Area of District Satna, (M.P.)

V. P. Singh
Krishi Vigyan Kendra (Deendayal Research Institute), Satna-485331

S.N. Singh
Reader, Dept. of Economics, P.P.N. College, Kanpur

www.shodh.net

Impact Assessment of Watershed Activities in Tribal Area of District Satna, (M.P.)

V. P. Singh & S.N. Singh

A study was conducted during 2003-2009 to assess the impact of watershed activities implemented by Milli watershed Krishi Vigyan Kendra, majhgawan, satna (M.P.) during 1996-2003. Various soil and water conservation measures included loose bolder check dams, staggered contour trenches, earthen check dams, farm ponds, nalla bunds, percolation tanks for rainwater harvesting and recycling. The productivity of major crops and availability of water in the watershed-managed area has increased appreciably. The availability of ground water was increased up to 3.12 m and tremendous Increase in irrigated area (3170 ha) was also recorded. The average productivity of different crops by 33 to 68%. Fodder production has also increased significantly by utilizing degraded and community lands, enhancing in employment generation by 72 to 200%. Because of soil & water conservation measures the cropping intensity, family income and educational standards were also increase.

Key words: Crop production, cropping intensity, employment generation, Tribal area, Watershed activities.

Watershed management is an 'area development' strategy. In this strategy, the area being developed is a watershed area and the subject is soil & water conservation. Watershed management is the harmonious development and management of soil & water resources, within the natural boundaries of a watershed on the sustainable basis for the equitable benefit of the people, while delivering clean and controlled water flow down stream. Deendayal Research Institute Krishi Vigyan Kendra, Satna implemented this project in collaboration with the District Rural Development Agency, Satna (Govt. of M.P.) under the Rajeev Gandhi Watershed mission in Majhgawan block with the main objective of developing the natural resource base, sustain its productivity, improve the standard of living in the area, and endeavour to restore the ecological balance.

Country is presently under tremendous human pressure, the ecological interrelationship between people, plants. Animals and water have important implications for the role of watershed management in the formulation of policies that would lead to wise development and sustained productivity for the improvement of human welfare. Impact evaluation of dry land technologies is essential to know an overall impact of soil and water conservation measures adopted in the particular watershed. It is also helps in appropriateness of the method employed in carrying out the project activities and to estimate the medium and long term social and economic benefits of the activities, efficiencies and impact of the project in the context of its stated objectives (Gupta et al. 2000). Keeping in the view importance of post project evaluation, a study was undertaken to evaluate the impact of Watershed activities in Milli watershed Krishi Vigyan Kendra, majhgawan area district satna (M.P.).

Materials and methods:

Characterization of watershed and its problems

The study was conducted at Milli watershed Krishi Vigyan Kendra, majhgawan, situated in the Vindhya Hill Range. It extends from 240 51'15" to 240 57'30"N latitude and 800 43'30" to 800 54'15" E longitude in satna district (M.P.) at about 45 kms away from district place. The total area of the watershed is 12536 ha covering 17 micro watershed villages. It is characterized by its backwardness, poverty, illiteracy, soil erosion and low crop productivity along with other soil economic constraints. Annual rainfall of the area varies from 800 to 1100 mm. About 90% of the total rainfall received during monsoon. There is no dependable source of water in the area. The maximum and minimum temperature of the area is 480C and 30C, respectively. The Soil in the plains is sandy loam to loamy in texture. It is shallow in depth, poor in organic matter content and other plant nutrients. The soil's moisture holding capacity is low, so it is only able to support crops of an inferior nature under rain-fed conditions. During the high rainfall months, water flows freely on the ground surface, due to poor percolation and the compact nature of the soil. Socio-economically the farmers of the watershed area have poor economic base. The average land holding is 2.5 acre and it has to support on an average 06 family members with 8-10 livestock heads. The general

शोध संचयन
SHODH SANCHAYAN
ISSN 2249-9180 (Online)
ISSN 0975-1254 (Print)
RNI No.: DELBIL/2010/31292

Bilingual journal of Humanities & Social Sciences

Half Yearly

Vol. 2, Issue 1 & 2, (Joint Issue)
15 Jan-15 July, 2011

Impact Assessment of Watershed Activities in Tribal Area of District Satna, (M.P.)

V. P. Singh
Krishi Vigyan Kendra (Deendayal Research Institute), Satna-485331

S.N. Singh
Reader, Dept. of Economics, P.P.N. College, Kanpur

www.shodh.net

Information on the watershed is summarized in table 1, which clearly reveals the distinct feature in terms of land use characteristics.

Resource base development Strategies

Over-exploitation of forests for major and minor products, uncontrolled grazing, faulty crop management and inadequate soil and water conservation had resulted in a high rate of water runoff and soil loss in vast tracts of the project area. To face these challenges, and meet the needs of people within the watershed boundary, an integrated programme of resource conservation, development and management was implemented under the Rajiv Gandhi Watershed area management mission. The total area covered was 12536 ha through 17 micro-watersheds. The major task was soil and water conservation, and the development of vegetal cover.

Strategies adopted to over come the problems
Conservation of soil through
Contour trenching on sloppy lands
Loose boulder check dam.
Gabion structure
Stone dyke.
Conservation of water received through precipitation
Nala bund
Farm ponds
Percolation tank
Development of unproductive and waste land through
Plantation of MPTs / TBOs /fruit trees.
Pasture development
Cultivation of crops
Improvement of socio economic condition of farm families through
Improvement of soil fertility and productivity.
Formation of Self help groups
Cultivation of high valued / cash crops
Value addition of farm and forest produce
Improving the skills of traditional artisan
Conservation measures adopted in watershed

Detailed topographical, hydrological, benchmark and capability surveys were conducted to assess the problems, resources and potentials of the area for development. Different soil and water conservation measures were planned and implemented. The development plan focused on farm forestry, improved crops and cropping pattern, agri-horticulture, agri-pasture, environmental improvement in severely eroded area, safe disposal and harvesting of runoff water, creation of permanent assets like ponds, nalla bunds, orchards, pasture, animal health cover and human resource development through farmer's training. Various treatments planned and executed in the watershed area were broadly classified in three categories.

Mechanical measures:

Mechanical measures (also called engineering measures) usually involve construction of mechanical barriers across the direction of flow of rainwater to retard or retain the runoff and thereby reduce the soil and water losses. These measures, as practiced in India, include contour cultivation, contour bunding, graded bunding, bench terracing, trenching, construction of grade stabilization structures, retention or detention reservoirs.

The important principles to be kept in view while planning mechanical control measures (Rama Rao, 1960) are:

Increasing the time of concentration of runoff and thereby allowing more of it to be absorbed and held by the soil.

Intercepting a long slope into several short ones so as to maintain less than a critical velocity for the runoff water.

Protection against damage due to excessive runoff.

To retard velocity of flowing water, different types of activities performed under watershed programme like 5078 loose stone check dams, 13 brushwood check dams, 104454 contour trenches and 02 gabion structures. To ensure the availability of water in the project area, 36 rain water harvesting ponds and 203 earthen nala bunds were constructed at potential sites for providing life saving irrigation and to meet domestic water needs.

शोध संचयन
SHODH SANCHAYAN
ISSN 2249-9180 (Online)
ISSN 0975-1254 (Print)
RNI No.: DELBIL/2010/31292

Bilingual journal of Humanities & Social Sciences

Half Yearly

Vol. 2, Issue 1 & 2, (Joint Issue)
15 Jan-15 July, 2011

Impact Assessment of Watershed Activities in Tribal Area of District Satna, (M.P.)

V. P. Singh
Krishi Vigyan Kendra (Deendayal Research Institute), Satna-485331

S.N. Singh
Reader, Dept. of Economics, P.P.N. College, Kanpur

www.shodh.net

Agronomical measures:

In soil and water conservation programme, soil conservation agronomy or the agronomic practices, which govern soil erosion have to be considered in co-ordination with other measures and not in isolation, therefore, soil conservation agronomy goes hand-in-hand with mechanical measures such as, contour bunding or bench terracing, adopted on agricultural lands. Generally speaking, soil conservation agronomic practices on agricultural lands from the second line of defense, the first being mechanical or engineering measures to arrest soil immediately.

The first step in water erosion control is the control of splash (detachment of soil practices) resulting from the impact of rain drops followed by the conservation of transported soil through runoff water. Soil conservation agronomic practices help in reducing the impact of raindrops through interception and thus reduce splash erosion. These practices also help in increasing infiltration rates and thereby reduce runoff overland flow. Reduction in runoff and soil losses is achieved through land management practices, choice of crop and crop management practices and associated agronomic practices, such as, mulching and crop-residue management and its included crops and improved varieties, primary seed bed preparation, seed rate and crop geometry, cropping systems, soil fertility management, plant protection, pasture/grasses development, tree plantation. Horticulture and agri-horticulture. Plantation of different tree species under aforestation and silvipastoral system were undertaken to meet the fuel and fodder requirement of the area and to maintain ecological balance in the watershed area.

Socio-economic measures:

Various training programmes, Farmer's meeting, exposure visits, demonstrations and farmers fair were organized for farmer's motivation and their active participation and creating awareness about watershed programme.

After four years, a survey was conducted for the impact study; sampling with single stage stratification technique was applied by covering different social groups of the watersheds. 170 farmers were selected from each social group. Participatory Rural Appraisal (PRA) techniques were applied to collect the information's on project accomplishments and feedback from farmers. Secondary data on land use statistics, crop yields etc., and were also collected. Pre project period (1996) data were considered as the benchmark to judge the impact of the project.

Results and discussion:

Each of the micro-watershed areas under independent an integrated approach by the KVK for area management has given the area economic benefits that are for greater than the sum of its parts. This has changed the overall scenario of the treated area with increased agricultural forest produce. The results of the treatment on the socio-economic status of the village was visible from the first year it self, and by the time the project was complete, approximately 60% of the villagers were no longer living below the poverty line. Training was given to the villagers in all economic disciplines that were relevant to the integrated development plan for the village. Motivation and support for the village from the KVK is continuing, and the whole village should be able to lift themselves above the poverty line in a short period of time.

Crop productivity:

Implementation of watershed management programme in relation to sustain agricultural productivity was found to be very effective in changing the scenario of land capability of the area as well as to sustain the food requirements of farmer's family. In this regard various comprehensive trials were under taken by us to evaluate economic prospects of important crops & cropping system adopted in this watershed village with the main objective to provide solution of low productivity & monoculture system to attain self sufficient in food production. The productivity of different crops, grass and legumes in watershed-managed areas has increased appreciably. Pre/post treatment results are given in table 02.

Ground water recharge

The cumulative effect of different treatments on hills, foot hills, nallas, surface ponds, bunding and leveling of agricultural lands had caused significant improvement on recharge capacity of water in the wells and hand pipes. Prior to launching the project wells of the village use to become dry during the critical summer months April to June. The observations made in the wells of the village showed the positive trend of water availability is given in the table 3.

शोध संचयन
SHODH SANCHAYAN
ISSN 2249-9180 (Online)
ISSN 0975-1254 (Print)
RNI No.: DELBIL/2010/31292

Bilingual journal of Humanities & Social Sciences

Half Yearly

Vol. 2, Issue 1 & 2, (Joint Issue)
15 Jan-15 July, 2011

Impact Assessment of Watershed Activities in Tribal Area of District Satna, (M.P.)

V. P. Singh
Krishi Vigyan Kendra (Deendayal Research Institute), Satna-485331

S.N. Singh
Reader, Dept. of Economics, P.P.N. College, Kanpur

www.shodh.net

There was a gradual increase in the water level of wells year after year and an increasing trend was noticed during the year 2003 and 2009 in spite of low annual rainfall in harvesting years. This is because of improvement in percolation of harvested rainwater and down ward, laterals movement of seepage & restores water that automatically caused more recharge of the ground water in the wells (Kanaujia et al). It was interesting to observe that accumulation of the water was more in the wider and deeper wells in comparison to narrow and shallow wells. It was further noticed that near the perennial sources recharge capacity of ground water in the well had also enhanced. The observation of this phenomenon further helped in planning and implementation of watershed programme in the next phases of villages. The beneficial impact of various treatments was also observed in the form of safe drinking water through hand pipes too.

The availability of safe drinking water in hand pipes caused significant change in social life of people of these watershed villages, as they are able to save their time for procurement of water from long distance during summer months. Further, children are less suffering from dysentery and worm problems.

Impact on irrigated area

Various water conserving and holding measures caused visible impact in increasing the irrigated area. This increase is due to bringing the new additional area of about 3170 ha under irrigated condition (Table 04).

Outputs and outcomes

After successful completion of watershed development the cropping intensity in the watershed area showed steady increase reaching to 141% and the average family income of the watershed area increased by Rs.17457 per annum

Pre - and Post implementation scenario

Prior to implementation of the project, where agriculture was a secondary enterprise, but with the implementation of the watershed development activities, the ground water level in the wells has shown a steady increase and the farmers who use to migrate towards cities/towns, started farming on subsistence level. Thereby the area under agricultural crops has increase substantially in the villages and the income of farmers increased by 166.57 percent.

Change in social aspects

Concerted efforts made by Krishi Vigyan Kendra in relation to Implementation of watershed development programme for improvement of the sustainable village conditions, led change in attitude of tribal families towards the education, health, environmental protection human right, self realization for future production and co-operative life. Beginning of the project where only 55 children were noticed to go school. But with improvement of lifestyle of villagers in the area in 2009, 1174 students were recorded to seek education. Even most of the tribal families have started to send their children in chitrakoot and satna for better education. Awareness about environmental protection has been realized by villagers as a result more reduction in forest restoration is visible co-operative system has also developed to maintain natural resources of village as farmers are voluntarily contributing Rs. 50.00/acre as irrigation charges in watershed area.

With an objective of improving the socio economic status of the people in the watershed areas. Self Help Groups (SHGs) were formed of actual users and people with similar interests living below the poverty line. These groups were imparted vocational training on goat rearing, nursery raising, dona-pattal (leaf cup and plates), poultry, fishery, bamboo crafts etc. and were guided in the functioning

Conclusions:

This study has clearly shown that watershed activities offer a viable solution to the irrigation problems in tribal area. This can lead to substantial improvement in the socio economic condition of the small and marginal farmers in tribal area. But it needs missionary zeal in implementing agencies and the beneficiaries. Such type of programme should be carried out in the people's participation mode and beneficiary families should make the decision regarding programme implementation in consultation with the technical experts of the various development agencies. After constructing the rain water harvesting need based structures, farmers should be

शोध संचयन
SHODH SANCHAYAN
ISSN 2249-9180 (Online)
ISSN 0975-1254 (Print)
RNI No.: DELBIL/2010/31292

Bilingual journal of Humanities & Social Sciences

Half Yearly

Vol. 2, Issue 1 & 2, (Joint Issue)
15 Jan-15 July, 2011

Impact Assessment of Watershed Activities in Tribal Area of District Satna, (M.P.)

V. P. Singh
Krishi Vigyan Kendra (Deendayal Research Institute), Satna-485331

S.N. Singh
Reader, Dept. of Economics, P.P.N. College, Kanpur

www.shodh.net

educated to make judicious use of the stored water and various efficient water use technologies should be demonstrated in the farmer's fields to generate maximum impact of the invested resources.

References :-

1. Singh, B.1998. Impact evaluation: Integrated watershed development project (hills) Punjab.
2. Institute for development and communication, 1126-27, sec. 22-B, Chandigarh pp. 1-222.
3. Kanaujia, V. K., Singh V.P., Raghuvanshi, R.P.S. & Bhagwandeen 2001. Watershed management for Enhancing crop production and economic advantages in tribal area. In (Eds dhyani et al.)Resource conservation and watershed management: technology option and future strategies. AISWC, Dehradun: 289-294.
4. Gupta, V.P., Sharma, R.P. & Goyal, R.K. 2000. Impact assessment of conservation measures in arid areas: a case study of osian Bigmi (Jodhpur) watershed. Proc. International conf. on integrated water resource management for sustainable development, New Delhi: 1012-1019.
5. Rama Rao, M.S.V.1960. Soil Conservation in India. Indian Council of Agriculture Research, New Delhi.
6. Ministry of Water Resource, GOI. 2003. Water Resources of India and Word, News letter on Fresh water-2003.