Water and Soil Conservation through Simple Techniques – A Case Study

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ABSTRACT

Water is essential for our life, but it cannot be produced by technological means. Same is the problem with soil.In India, there is very little area free from the hazard of soil erosion. It is estimated that out of 305.9 million hectares of reported area, 145 million hectares is in need of conservation measures. Severe erosion occurs in the sub-humid and per-humid areas due to high rainfall and improper management of land and water. If erosion is permitted to continue at its present rate, it is possible that all work will be the reclamation of soil rather than the conservation and management of soil and water. Hence it is necessary to adopt techniques to conserve water which will conserve soil automatically It is also important that technology to conserve the soil and water should be easily adoptable and economically viable.

This paper presents one such case study where large amount of rainwater is tried to conserve. Ambedkar Nagar is a small locality situated near KIT's college of Engineering, Kolhapur. Under Social Forestry Department, some measures have been adopted to conserve the water resources, but it has been found that a large quantity of water runs off in smaller durations without entering in the ground. This results not only in water loss but also soil loss on large scale. Hence it is planned to take such measures which will direct this extra runoff to ground water storage. These measures will be adopted by local people and also will be economically viable

The most significant feature of our project is that if such technologies are developed and adopted at larger scale in different areas, it will prevent such areas from water supply by tankers. Moreover this will also

help us to tackle the issue of flood which mainly occurs due to excess runoff. Thus the project can be of great importance from view point of economic losses due to shortage of water as well as excess water i.e. flooding.

KEYWORDS: Water and soil conservation, Ridge to valley approach, Continuous contour trenches, watershed development, Staggered contour trenches

INTRODUCTION

In spite of sufficient rainfall, people have to depend upon tankers for their domestic water supply in summers in most of the areas. This is mainly due to large runoff which is responsible for water loss as well as soil loss of the land. A raindrop, when flows along the slope, carries the loose soil along it. In this case the topmost layer of soil is lost rapidly. Due to high intensity rainfall, it is estimated that, more than 100 tons of soil is lost. The watershed management through soil and water conservation means implies, the judicious use of all the resources i.e. land, water, vegetation in an area for providing an answer to alleviate drought, moderate floods, prevent soil erosion, improve water availability and increase food, fodder, fuel and fiber on sustained basis. Watershed to achieve maximum production with minimum hazard to the natural resources and for the well being of people. The management should be carried out on the watershed basis. The task of watershed management includes the treatment of land by using most suitable biological and engineering measures in such a manner that, the management work must be economic and socially acceptable. If we take steps to encourage each drop of rainfall to penetrate in the ground at the point where it strikes earth, it will result in addition of one drop to our useful water supply and subtraction of one drop from a potential flood. It is the management of each raindrop falling on the ground. This is possible by water and soil conservation techniques adopted in the area as per its topography.

A variety of essential soil moisture and water conservation technologies must be adopted to reduce the cost of irrigation, extend it throughout and promote sustainable small-scale irrigation on a watershed basis. These technologies are essential especially in drought-prone areas. Even though drought is a purely natural calamity caused by the failure of (monsoon) rain, it can be minimized by careful planning and operation. (R.K. Sivanappan) . During good rainy years, excess rainwater should be stored in the soil and also underground using suitable soil moisture conservation measures and water harvesting structures on a watershed basis. This stored water can subsequently be used for irrigation.

WATER AND SOIL CONSERVATION

The problem of conserving soil and moisture is also of very great importance in the extensive regions of low and uncertain rainfall, forming parts of Punjab, Madhya Pradesh, Maharashtra, Andhra Pradesh and Karnataka. These tracts are characterized by scanty, ill-distributed and highly erosive rains, undulating topography, high wind velocity and generally shallow soils. The period of heavy downpours from August to October is the period of the heaviest erosion in these regions. Agricultural land in the major part of the country suffers from erosion. Apart from reducing the yields through the loss of nutrients, erosion destroys the soil resources itself every year. For example, in Maharashtra over 70 per cent of the cultivated land has been affected by erosion in varying degrees and 32 per cent of the land having been highly eroded is no longer cultivable. It is possible to give work through watershed development through water and soil measures to the vast majority of the villagers during their enforced idleness due to single crop farming. Thus by having soil and land management along with water management thus developing the watersheds, overall development of rural area is possible.

APPLICATION

The monsoon water and groundwater being supplementary, their management is a continuous process. The ridge to valley approach for executing soil and water conservation measures could be successfully handled only through the watershed concept. (V.A.Swami,2011) Efforts have been made through NGOs and Government Departments to improve the water situation in villages in Rajasthan, to uplift the Rural India by Watershed Management Programs, to arrest ground water decline and improve its levels, to trap the rainwater wherever it

falls. The measures taken for water and soil conservation also helped to give employment to the unemployed through watershed development programs, to conserve forests and to harvest the rainwater, to help the rural poor to make the water flow for them, and to minimize the adverse effects of drought on crop production.

The interdependent monsoon and groundwater management is of double benefit. During draught years one can depend upon the assured availability of ground water. The excess water available during unexpected downpour in short period can be used to saturate groundwater reservoir adequately instead of allowing it to be lost by runoff. Thus the conjunctive management would provide the maximum utilization of surface water as well as groundwater which is the aim of watershed management. As such, some general guidelines are to be followed for forcing the runoff to meet to groundwater reservoir.

METHODOLOGY:

The methodology adopted for the present area includes the collection of data

- By observation and discussion with local people
- By personal interviews of the local people.
- Through Questionnaires prepared and getting filled them by people.
- Through Social Mapping of the areas for developing the social relationship with the local people.
- By Technical Survey including contour surveys giving land use details.

AREA SELECTED FOR STUDY

Area selected for study is Ambedkar Nagar near KIT's College of Engineering; Kolhapur .It is a very small residential area with only 17 households and hardly 100 people living there. The total area admeasures 2.5 Hectares and the annual rainfall there is 1200mm, thus making 30 TCM water available on the area. The area consists of one natural pond which fulfills the domestic water needs of the residents up to month of February. People in the area have to face the problem of water scarcity in the summers as pond goes dry and people have to fetch the water from the only bore well available nearly 2 kms. away from the locality. The area is located in a hilly area and has a medium slope on upstream of the residential locality. Under Social Forestry Department, some measures have been adopted to conserve the water resources, but it has been found that a large quantity of water runs off in smaller durations without entering in the ground. This results not only in water loss but also soil loss on large scale. Hence it is planned to take such conservation measures which will direct this extra runoff to ground water storage. These measures will be adopted by local people and also will be economically viable

STRUCTURES ALREADY CONSTRUCTED IN THE AREA:

- Staggered Contour Trenches
- Loose boulder structures
- Earthen Bunds
- Pond
- Continuous Contour trenches
- Terraced Bunds

WATER AVAILABILITY IN THE AREA :

Catchment area: 2.5 Ha.

Available water: 30000 CM

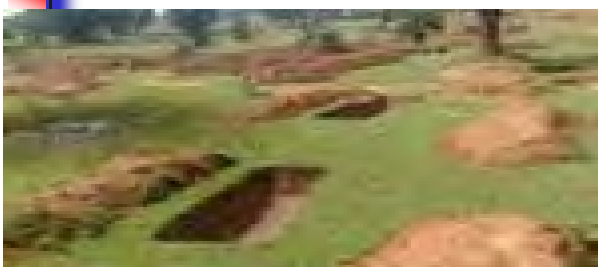
PROPOSED WORKS IN THE AREA

- Construction of continuous contour trenches on upstream side of the hill.
- Plantation of 'Madras Anjan' grass on hilly slope, 'Stylo' grass on downstream of continuous contour trenches and 'Khus' and agave plant in the form of biological bunds constructed on pond.
- Constructing 60 cm high bund on the downstream edge of pond which is available on downstream of the residential locality for rainwater conservation.
- Plantation of grass for muroom strata for first 3 to 4 years and Continuous Contour Trenches there afterwards.
- Provision of biological bunds in form of agave plantation as bank of pond.
- Provision of percolation pits with a depth of more than 10 ft. in the roadside drains at suitable distance from each other.
- Constructing loose boulder structures on the gulleys on upstream of existing pond.
- Constructing contour trenches in front of the existing houses and proposing plantation on downstream side of the trenches.

LOOSE BOULDER STRUCTURES

CONTINUOUS CONTOUR TRENCHES

CONTOUR TRENCHES



EARTHEN BUNDS AND BIOLOGICAL BUNDS

CONCLUSION :

Along with the measures taken by Social Forestry Department, if we will adopt the biological as well as technical measures for rainwater harvesting, it will certainly add to the ground water storage. . The work will be executed with the help of local people with the financial help of Government; hence it will be economically viable.

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