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**CONSERVATION OF LAND AND WATER—
THE ONLY ROAD TO PROSPERITY**

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CONSERVATION OF LAND & WATER—THE ONLY ROAD TO PROSPERITY

BY

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India has taken very bold steps to make use of science and technology to modernise itself. The country has, however, yet to pay serious attention to the very intense use of its natural resources—soils, land, water, forests, minerals etc. It is a well known fact that these resources are already over exploited and ravaged. While the water resources are not fully utilised at present, these will soon be found wanting, due to increase in human and animal population, due to rapid industrialization and with the consequent improvement in standard of living. Thus in India, as time passes, there will be greater need for conservation and better management of soil and water resources.

Problems of Soil and Water Conservation

It is estimated that out of 305.9 million hectares of land, 145 million hectares are in need of conservation measures. Agricultural land in major part of the country suffers from erosion. Apart from reduction of yield and loss of nutrients, the soil resource is wasted every year due to erosion. It is estimated that there are 2.3 to 3.6 million hectares of land which are already under ravines scattered all over the country. The ravines, apart from ruining the soil resource for ever, are a constant threat to adjoining fertile cultivated lands.

Denudation of forests and vegetation in Siwalik hills, the Himalayas, the Western Ghats, the Eastern Ghats and other mountain ranges of Deccan have resulted in flashy floods, chos and torrents which destroy good agricultural lands. In Himalayan regions, landslides and landslips are very serious problems caused by improper land management. Erosion problem along the mountain roads, which are vital for the economy of the neglected hill areas and security of the country, is assuming very serious threat.

Costly reservoirs constructed under river valley projects, are being silted up at an alarming rate due to denudation of forest vegetation, cultivation of steep slopes without conservation practices, land slides and torrents.

Studies on rates of sedimentation in 17 major reservoirs constructed in the 3rd and 4th plans have revealed that as against the average rate of designed sediment inflow of 2.93 ha/m/100 sq. km/annum, these reservoirs are receiving average sediment yield inflow of 9.17; which is 213% more than the designed rate.

Moreover, as the pressure on land increases, there will be tendency and demand to open up marginal and steep lands for cultivation. These lands will be in greater need of soil and water conservation.

As India is a developing country, we are yet to face the severe problems of environmental pollution. Pollutions of soil, water and atmosphere are round the corner as we increase the pace of our development and exploitation of resources. Sediment is certainly one of our greatest agricultural pollutants, particularly of water. If erosion is permitted to continue at its present rate, it is possible that all work will be reclamation, rather than soil and water conservation and management.

In view of these problems, there seems to be not alternative but to evolve efficient and economic basic resource conservation measures on national scale.

Soil & Water Conservation Research, Training and Development in Retrospect

Even during the framing of the First Five Year Plan (1952-57), attention was paid to soil and water conservation problems and a token allocation was made to tackle them. A chain of Soil Conservation Research, Demonstration and Training Centres was established late in the First Five Year Plan and early in the Second Five Year Plan, at Dehra Dun, Chandigarh, Ootacamund, Bellary, Hyderabad, Vasad, Kota, Agra, Jodhpur, Rehmankhara, Hazaribagh and Chatra (Nepal).

Soil and water conservation and management demands a multidisciplinary approach. While individual disciplines like Soils, Agronomy, Forestry, Engineering and Hydrology contribute to it, it is the multidiscipline approach which is essential for solution of complex problems associated with it. For the "science and art of good land use" there is need of merging and fusing the knowledge of the social, physical and biological disciplines. Fortunately in India, we have realised this quite early and the approach has been to associate all these disciplines to treat the land on watershed basis. During the past 17 to 20 years the Soil Conservation Research Centres have provided much needed know-how for erosion control, moisture conservation, ravine reclamation, terracing, means of estimation of run-off from watersheds, recycling of run-off water, hydrometeorological tools for design of structures, stabilization of landslides and torrents, management of denuded and degraded areas for production of fuel, fodder and so on.

Soil and Water Conservation Measures Pay for Themselves

It has been conclusively demonstrated by large scale sampling that in sloping agricultural lands even a simple practice like contour cultivation reduces run-off and prevents soil erosion in the major soil groups of India viz. alluvial, black and deep. Apart from this, contour cultivation conserves soil fertility and increases crop yield.

The beneficial effects of another simple soil and water conservation practice namely contour *bunding* and levelling of land have been extensively demonstrated in the semi-arid alluvial plains of U.P. where 35%, 63% and 98% increase in yield of *kharif* and *rabi* crops has been obtained by *bunding* alone, levelling alone and *bunding-cum* levelling respectively. *Bunding* has increased yields of *Setaria*, cotton and *jowar* by 18, 11 and 17% in large scale field trials in Madras State. As a result of contour *bunding* 24.5% and 25.2% increase in yield of *rabi jowar* and *bajra* respectively in Maharashtra; 35.6% and 25.4% increase in yield of *jowar* and *bajra* respectively in Tamilnadu; 20% increase in yield of groundnut in Tamilnadu; 21.4%, 15.0%, 19.7% and 13.9% increase in yield of wheat, gram, maize and *bajra* respectively in Punjab is reported. If the run-off is properly conveyed and then stored in a pond, the water can be recycled either for giving a life saving irrigation to a crop or establishing a new crop. Experiments at Bellary have shown that with one life saving irrigation to *rabi jowar* at boot leaf stage after cessation of rains, the yield of *jowar*

was increased by 158% and every cm of water applied gave 13.4 kg/ha of additional yield of grain over no irrigation.

The lands which are not suited for agriculture are best left under permanent cover of grasses and trees. Grasses and trees not only conserve the soil and water, reduce floods, yield clean water, reduce the rate of sedimentation but also provide much needed fodder for the cattle and fuel for the people. Once again it has been demonstrated all over the country that by adopting a simple practice like closure to grazing and other biotic interferences, there is a qualitative and quantitative increase in the yield of fodder and fuel. The yield of grasses and fuel/small timber can be further increased, if better suited/adapted varieties of grasses and trees are planted and properly managed.

Afforestation trials at Vasad in degraded and denuded habitat of ravines have shown that *Shisham* yields Rs. 666/-, Bamboo yields Rs. 1370/-, *Eucalyptus* yields Rs. 444/- and Teak yields Rs. 1080/- per ha per annum.

Indirect benefits of Soil and Water Conservation

Apart from the above direct benefits, soil and water conservation measures yield many indirect benefits which can not be easily quantified. If soil is conserved, the land continues to produce crops indefinitely, if the water is conserved, the streams flow for longer period, the water is clean, there are no floods and there is no sedimentation of reservoirs. Silting up of 60% capacity of Sukhna lake is the most dramatic example of lack of soil and water conservation in the catchment of a reservoir. However, studies conducted at Chandigarh have shown that with appropriate soil and water conservation measures, the rate of sediment can be reduced from 80 tonnes/ha/annum to 6-7 tonnes/ha/annum within 5-6 years of treatment. At Vasad the latest studies have shown that when 1422 tonnes of sediment from an untreated catchment of 67 ha were delivered to a treated catchment of 72 ha all the sediment was contained in the later as result of soil and water conservation measures. As a result of field *bunding* 60% reduction in run-off is observed at Dehra Dun. These are very dramatic results which indicate that with appropriate measures it is possible to reduce the run-off, floods and sediment in run off.

Need of Trained Manpower to Execute the programmes

Since the soil and water conservation development programmes were undertaken with the advent of planning, enough trained personnel were not available in the country to implement the programme. Therefore great emphasis was placed on training personnel for manning the soil and water conservation projects undertaken by different States. Training of supervisory staff has been the responsibility of the Government of India; the responsibility for the training of middle level technicians has been shared by the Centre and State Governments. So far 1057 supervisory staff and 3450 middle level technicians have been trained upto Sept., 1977. These training courses have been standardised and made use of by international agencies like Food and Agricultural Organization (FAO) of United Nations and Colombo Plan. In addition, a good number of officers, professors and other specialists have been trained in short special courses.

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