SOCIAL AND ECONOMIC ASPECTS OF SOIL AND WATER CONSERVATION

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India's primary need for the next ten years is to have a substantial increase in food production, but her soils have tended to deteriorate through long use and continuous erosion. Increase in agricultural productivity is possible through modern technology but in attempting this, important differences as well as similarities between the problems faced by the less developed and developed countries have to be borne in mind.

There are many factors that impede the expansion of food production in India, which include among others, inadequate soil and water conservation measures, excessive number of livestock in relation to available feed supply, old methods of farming, subdivision and fragmentation of holdings, insecurity of tenure; but none of them is either inherent or insurmountable obstacle to increase in food production. On the other hand, India is blessed with large water resources, tropical and sub-tropical climate and a potential to grow crops on a year-round basis; yet we find ourselves ranking low in food production per acre. The food problem is a complex one. It encompasses many variables and it crosses several disciplines while our understanding of these is limited.

To achieve economic growth, we need to improve output and productivity of our agricultural land. Many inter-related factors account for the large output and high productivity in developed countries like U.S.A., Canada, Australia, Japan but it is difficult to measure precisely the influence of each factor in our country where natural and economic conditions differ greatly from those in the well developed countries. Nevertheless a review of factors that impede the progress may suggest some ways in improving agricultural output.

SOIL AND WATER CONSERVATION

The problem of soil and water conservation is very acute in India. Broadly speaking, nearly 44.7 per cent of our land is under cultivation and only 18 per cent is under forest. No other country in the world today has such a high proportion of land under cultivation and yet they are able to produce much higher yields than ours. The present approach to soil conservation problem in India is mostly for the control of erosion in agricultural land and in the catchment of our major rivers.

Soil conservation in its broadest sense implies permanent maintenance of the productive capacity of the land. This is a much vaster concept than control of erosion. One of the principal reasons for low productivity in our agricultural land is the progressive deterioration of soil due to erosion. It has been estimated that about 200 million acres of land, that is almost one-fourth of the country's land resources suffer from soil erosion while 80 per cent of our agriculture is yet dependent on the vagaries of monsoon; as such the land under crop production remains mostly as single cropping system with all its disadvantages. It will, therefore, be not possible to maintain yields of crops on dry land, much less to

increase them if the soil is allowed to deteriorate. Such increases in our food production as are envisaged in the present context of increased population and low productivity level are not likely to come up quickly on this single crop system, with the present simple means of farming and soil management, as most of our tropical soils give poor harvest under simple means of management. Contour bunding and terracing of agricultural land offers an immediate way to make possible substantial increase in food production on many lakhs of acres of non-irrigated arable lands. However, this alone is not enough but a proper combination of practices for efficient land use without waste which is the essence of soil conservation, has got to be adopted. In order to improve the productivity of such lands on sustained basis, the technique of 'dry farming' which as a result of twenty years' research has developed a combination of improved practices to suit such dry lands, is to be followed.

Moreover, there are nearly 300 lakh acres which are now producing one crop in a period of three to five years (these are known in revenue classification as "fallow lands" other than current fallows.) These lands, not being in regular cultivation every year, have become rather hard and difficult to plough deep. Due to the poor quality of our bullocks deep ploughing has become an exception rather than a rule and the farmer is unable to devote much of his time to cultivate such lands; but if these lands (only those which are possible to be brought under production) are initially ploughed deep by tractor, through government or co-operative agency, the cultivator will be able to cultivate them every year and will be in a position to produce at least one crop every year. This will naturally add substantially to our production target.

There is yet another problem of common interest which is very much neglected. Excess of water during the monsoon rains frequently handicaps much of India's agriculture to the extent that it creates major problem of surface drainage and contributes to water-logging and development of saline and alkali soils. Nearly 120 lakh acres today suffer from salt effervescence and rising level of sub-soil water. There are places in India where lakhs of acres could be improved and made productive by surface drainage at lesser cost and in lesser time than required for developing new costly irrigation projects. Many such areas are known to be very productive and yet producing the lowest yield due to this annual calamity. Such lands with necessary conservation practices like sub-soil and field drainage can add substantially to the increase in crop production.

From the point of view of soil erosion, hilly areas, denuded forests and wastelands pose a serious problem. Over-grazing, shifting cultivation and indiscriminate felling of trees have led to the present situation. To this is added the heavy livestock population of nearly 330 million (1961), nearly one-fifth of the world's entire population. For the country as a whole, the density of cattle alone works out to 116 cattle per 100 hectares of gross cropped area or 40 cattle per 100 persons.[1] Due to poor quality of Indian bullocks, deep ploughing has become rather infrequent. To this poor quality of bullock as calculated by Dr. W. Burns falls the lot of cultivating nearly 11 acres per pair. Well-developed grazing lands

1. "Census Figures Reveal New Trends in Cattle Population Growth," S. C. Chaudhri, *Indian Livestock*, 1963.

or pasture are either not available or developed to provide feed and fodder to this enormous livestock population. These, therefore, have to be fed on the same produce coming out of our arable lands. The difference between a well-developed country and that of ours in respect of grain producing capacity is reflected in the maintenance of a large number of livestock. The difference between North America producing 1,100 kilograms of grain per person per year and Asia producing only 225 kg., is the difference between an economy which can afford to convert a large part of its grain output to livestock products and one which requires for direct human consumption nearly all the grain produced.

SOIL CONSERVATION AND RURAL ECONOMY

The achievement of soil conservation based only on physical factors like land and its productivity cannot be effective unless due consideration is given to the economic and social condition of the farming people. The three factors, namely, physical, economic and rural, on which any soil conservation plan is based, are so inter-related that they must move forward in constant balance and co-ordination.

The economic and social life of our peasants is very much intermixed with our agriculture. Among the economic factors the most significant factor in determining the character of the land problem of a nation is the density of population in relation to the degree of industrialization. Where the economy is predominantly industrial a much larger population can be maintained without excessive pressure on agricultural land resources which are limited. In India 75 to 80 per cent of our population is mainly engaged in agriculture, with four-fifth of our agriculture depending on the vagaries of monsoon. Naturally as a result of heavy dependence on rain, only one crop is raised in a year on most of the land with all its disadvantages. Apart from yielding low economic returns to the cultivators, single crop agriculture is an obstacle to the maintenance of the productivity of the soil. Even where the soil is very productive and less likely to be injured, single crop farming usually means a poor living for the cultivator and also to his cattle wealth which do the work for him. In single crop farming, a farmer may be rich in one year and poverty-stricken in the next when rains fail. Natural calamities like insect pest attacks and plant diseases may ruin the crop—the only crop over which he spends all his labour and energy. Therefore, single cropping system will always be insecure. The living of thousands of farm families and their security of farming can be greatly improved by growing more commercial crops or mixed farming wherever possible.

With abundant labour readily available for farming, the necessity to consider productivity in terms of man-hours work becomes increasingly important. Throughout the history of agricultural development in the United States, the amounts of land and capital combined with labour have increased greatly. Farm output per worker employed in farming has gone up and output per man-hour has averaged about $4\frac{1}{2}$ times higher in the last few years compared to that in 1930. In India labour accounts for nearly two-third of all production inputs while other capital is hardly 20 per cent of the total. Effective use of abundant labour as a source of capital investment may be more important in our country than it was in the United States.

Indian agriculture and industry are ill-balanced. The ill-balance of agriculture and industry is specially serious because of the fluctuating character of farm income coupled with natural calamities like failure of monsoon and floods which introduce instability into rural life. In times of industrial prosperity rural population is drawn into cities. In depression large and burdensome number returns to rural areas for support. Farming in India has not reached the stage of commercial farming whereby a large family can be supported without any difficulty. A large proportion of the farm families in India is employed primarily in production for family use with at best some incidental production of small quantities for sale. Industrialization will help to eliminate certain chronic defects in the agricultural economy. Today nearly 80 per cent of the population is engaged only in subsistence farming and producing food for the whole country, while in U.S.A. only 7 per cent of the total labour force is employed on farms as compared with 70 per cent 150 years ago and producing food not only for their own country but also for other countries. One farm worker now supplies food and other farm products for 29 people at home and abroad. This approach will gradually help us to get over the obstacles in the agricultural economy such as sub-division and fragmentation of the holdings and to increase the productivity of land and labour.

In India such a change is very necessary specially in areas where inadequate rainfall is a rule rather than an exception. The soil conservation methods, however, may be useful and helpful in increasing the productive capacity of our land, yet the economic conditions of our farming people are at such a stage that no individual cultivator is in a position even to try these useful methods on his farm because of the several factors mentioned above. Yet the conservation of our soil is of permanent importance in our agricultural economy. Considering the vastness of the problem and the inability of our farmers to take individual action in soil conservation, the best way would be to plan our programme on "area saturation basis."

Similarly, industrial development will contribute to improvement of agricultural output and productivity in two major ways : (1) By supplying capital inputs including such things as fertilizers, pesticides, tools, implements and other material required for improved farm production and marketing methods and (2) by improving job opportunities for farm people outside agriculture. Therefore, increased crop production per acre and output per man hour probably ranks as one of the most important ways of increasing farm output for a low income country of ours.