

SOIL EROSION.

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Although the tea planting industry has a surfeit of new problems with which to deal at the present time, it would be a short-sighted policy to lose sight of such old-established questions as soil erosion. One frequently hears discussions on how best to maintain the capital value of estates which may, during a period of restriction, be relegated to a lower state than usual in both production and cultivation. No excuse should, therefore, be needed for returning to the consideration of the capital loss involved on estates through soil erosion.

It has recently been possible to make a study of the soil erosion work in progress throughout the world with a view to classifying the information available. Different groups of workers have approached the problem from different angles, because aspects that are of paramount importance in one place have only a subsidiary interest in others. Moreover, conditions of climate, soils and crops vary enormously. From such a jig-saw puzzle of information with many of the pieces, so to speak, still missing some idea of the resultant picture can nevertheless be obtained. It is proposed, therefore, to present a series of articles on soil erosion, each of which shall deal with a definite aspect of soil erosion waste and prevention.

THE MENACE OF SOIL EROSION.

One of the reasons why progress in soil erosion prevention is slow, lies in the fact that the cultivator who is primarily responsible for the damage is seldom in a position to assess the extent of the harm he is unwittingly causing. It is an unfortunate fact that, because the results are far-reaching, actually and figuratively, co-operation between interested parties is difficult to achieve. The losses from soil erosion and associated processes are by no means concentrated on the area that suffers in the first instance, and by the time the whole tale is told, the bill for potential loss to all concerned may be many times that of the original loser. By way of introduction it will not be out of place to indicate how serious the gross damage may be.

There is no doubt that the cultivator is a heavy loser, although he may not know it. In the United States the National Conservation Commission found that the loss of production on upland farms amounted to from seven to ten per cent of the normal. This figure compares roughly with the assessable loss due to disease in crops. Work on crop diseases has developed to a high degree of specialisation all over the world, yet except in the United States, soil erosion work is the Cinderella of the agricultural and forestry departments.

In the wake of soil erosion come floods. Floods will be less likely if a large portion of the rainfall can be continuously absorbed by the soil and discharged slowly as springs at seepage points. The spread of agricultural enterprise has accentuated a problem that has always existed in some degree. The Mississippi floods of 1927 are calculated to have done three hundred million dollars worth of damage.

The rapid loss of enormous volumes of rain from the surface of the ground in the form of run-off, in many cases, causes underground water shortage subsequently. Springs and wells dry up because there is a progressive fall in the level of the water table. Whilst the agriculturist feels the effect in drought conditions for crops and stock, a complaint frequently voiced in S. Africa, the community as a whole feels the pinch later.

When introducing a Bill for forest conservation into the U.S.A. Legislature, the case of Los Angeles was quoted showing that soil denudation had so lowered the level of profitable water supplies near at hand that sources 250 to 300 miles away had to be tapped. Domestic and industrial water supplies must of necessity be steady in capacity, and the flow of streams supplying them is the deciding factor in providing stability; any large fluctuation in the ratio of high and low water level endangers continuity of supply.

The soil that run-off water carries with it adds further to the water conservation problem. Dams and reservoirs become rapidly silted up and lose their efficiency. Measurements have been made on thirty reservoirs in the south-west of the U.S.A. where silting up was found to be proceeding at an average rate of a foot per annum. It was calculated that in this instance the useful life of a reservoir was no longer than 15 years.

From the silting up of reservoirs the association of ideas naturally leads to the silting up of rivers. In so short a time as forty years the navigable reach of the Mississippi has been noticeably curtailed. Nearer at hand, the findings of the Kelani Valley Railway Commission point in the same direction.

There is yet another aspect of soil erosion in general that is not sufficiently emphasized, namely the creation of waste deposits. It is true that the eroded site loses its best soil. This must be so since this soil, besides containing the bulk of the nitrogenous organic matter, is also the most highly weathered; it is a true soil and not merely a collection of mineral fragments. Soil lost in run-off becomes in many cases completely denatured; the process may be pictured as follows. Before being subject to erosion the soil particles are of very different shapes and sizes and are held together in crumbs by the organic material that coats their surface. Prolonged suspension in moving water destroys the cementing layer. The particles come apart, and their ultimate fate depends largely on their individual size. As the disintegrated soil is carried forward in the stream, the heavier particles are deposited first as the stream loses speed; these are largely unweathered mineral fragments. Later, smaller particles come to rest, but it is readily realised that what is happening is a progressive sorting out of particles into classes determined by their size and the velocity of the stream. One might say it was a winnowing of soil particles by water instead of air. These layers of mineral particles, which no longer deserve the name of soil, show no crumb structure and are physically and chemically unsuitable for really healthy plant growth. The finest particles of all are often carried out to sea or deposited in delta formations saturated with salt so that even they, the richest in chemical constituents, are no use to agriculture without costly reclamation processes. To quote an example of how waste deposits have been laid down by erosive action, in the Piedmont district a fertile black soil is rapidly being converted into an infertile sand several feet thick.

It is not contended that all these aspects of soil erosion and run-off damage occur in such striking magnitudes in Ceylon, but even in modified forms the economic loss is great. Estate agriculture cannot entirely disclaim responsibility for floods and water shortage, and waste deposits when the underlying causes are viewed in their proper perspective.