

## Soil Conservation Measures

The conservation and restoration of land is necessary to protect our cultivated farms and to expand available land for agriculture with a view to augmenting food production for the future. Conservation measures must therefore fulfil the following objectives: (i) protection of the surface from the impact of raindrops, (ii) increase in rainwater infiltration, (iii) decrease in the volume and velocity of surface runoff, (iv) enhancement in soil resistance to erosion by judicious modification of the physical and chemical properties of soil resource. The soil conservation measures are mainly of two types: (a) crop management, and (b) providing mechanical protection and soil conservation devices and practices. Before initiating soil conservation measures, some steps should be followed: (i) extensive survey of affected areas, (ii) classification of agricultural and forest lands on the basis of land capabilities, (iii) identification of areas affected by low, moderate and severe soil erosion, and (iv) enlisting the prime priorities of soil conservation and land reclamation.

The two main measures of soil conservation are discussed below.

**(1) Crop Management** Proper crop management decreases both the amount of exposed surface area and the duration of exposure of surface area to the negative impact of raindrops. There are several measures of crop management.

Proper selection of crops reduces surface exposure to precipitation, resulting in reduced loss of soil. For example, the previous practice of maintaining fallow lands after the harvesting of rabi crops during the rainy season caused an immense loss of valuable top soils. But after the initiation of green revolution in India, such practices have been, generally, abandoned. The fallow lands have been converted into lands growing paddy and leguminous crops. Such crop management techniques have effectively reduced soil erosion.

Those crops should be selected that can cover maximum area and restore the soil particles. However, a complete changeover to a new crop system may not be possible because of other factors, such as local demand, commercial value, individual bias, calorific value, irrigation requirements, etc.

Crops should be sowed so as to ensure that the surface areas do not remain bare for long durations. In Rhodesia, for example, methods like early plantation of tobacco have reduced soil degradation by almost 50 per cent.

Agriculture practices like intercropping and mixed cropping are effective in soil conservation. Such techniques are followed in India during the kharif season, when maize, leguminous crops, *arhar* and millet are raised together.

Techniques like *stubble mulching*, in which the roots, stems and leaves are left over in the agricultural fields after harvesting, help to conserve soil. *Trash farming* is a similar technique where chopped crop residue are spread and ploughed in order to produce a better tilth in the soil.

Application of chemical fertilisers can enhance soil fertility. But this technique is not free from negative effects like decrease in the content of organic matters in the soils. As an alternative, practices like organic farming, i.e., maintaining fertility of the soil by raising leguminous crops, are gradually becoming popular.

Lands affected by rill and gully erosion should be brought under mechanical conservation techniques. During the process, no cultivation and grazing should be allowed.

Extensive reforestation and afforestation have the potential of preventing erosion, particularly in mountainous areas.

**(2) Mechanical Soil Protection Techniques** Ploughing, hoeing, cultivation etc., are mechanical soil protection techniques and are of use especially over slopes. They minimise overland flow, enhance rainwater infiltration and reduce the velocity of surface flow. The major techniques are discussed below:

(i) **Contour farming** refers to cultivation practices transverse to the slope gradient. Surface flow is reduced as each furrow acts as a temporary dam. The system allows infiltration of rainwater, reduces formation of channels, rills and gullies, and cultivators can hold water.

(ii) **Tied-ridging** is mainly practised in East Africa. The cultivable land is ploughed transverse to the slope while ridges are made parallel to the slope. So, the agricultural field is segregated by many smaller basins which check overland flow and allow rainwater to infiltrate. In the USA, a similar technique is called *Basin-listing*.

**(iii) Criss-cross ploughing** is practised in the valleys of rivers. In India, for example, slopes in valleys are cultivated parallel i.e., transverse to the main channel during the rabi season. The slopes are never irrigated, rather dried up soils receive the first summer shower and are slumped into the main river by overland flow.

**(iv) Contour bunding or terracing** involves the construction of level-floored benches on general slopes bordered by earthen embankments in order to obstruct water flow down the slope. This technique is popular in South Asia and South Africa, where steep slopes are subjected to heavy erosion, particularly during heavy rainstorms. In India, terrace cultivation is practised in the Himalayas, the Western Ghats and the North-eastern hilly regions.

**(v) Prevention of gully erosion** may be achieved by building a series of check dams, and trapping silts behind such dams. These steps would slow down the velocity of water flow in the gullies as the channel gradient will be reduced by increased sedimentation. Other steps would be to reduce the gradient of walls and heads of gullies, planting grasses, vines, bushes to stabilise the walls and heads, and plugging the gully-heads with stone-filled iron nets so that head-cut advancement can be checked.