

Soil Conservation: Principles and Methods

Principles of soil conservation:

The chief agents of soil erosion are water and wind.

The actual art of soil conservation is based on certain basic principles which include:

- (i) Protection of soil from impact of rain drops
- (ii) To slow down the water from concentrating and moving down the slope in a narrow path,
- (iii) To slow down the water movement when it flows along the slope,
- (IV) To encourage more water to enter into the soil,
- (v) To increase the size of soil particles,
- (vi) Reduction in the wind velocity near the ground by growing vegetation cover, ridging the land etc. and
- (vii) To grow the strips of stubble or other vegetation cover which might catch and hold the moving particles of soil.

Keeping the above said principles in view, ecologists have devised following methods, which can prevent the loss of soil during its erosion.

Methods of soil conservation:

The various methods for soil conservation may be broadly arranged into the following types:

1. Biological methods:

These employ the use of plant or vegetation cover

(a) Agronomic practices:

Natural protection by growing vegetation in a manner that reduces soil loss.

These include:

(i) Contour farming:

The oldest method useful in areas with low rainfall in the preparation of the field with alternate furrows and ridges. Ridges at the same level are known as 'contours'. The water is caught and held in furrows and stored which reduces run off and erosion. On slopes, this type of farming is coupled with terracing at different places.

(ii) Mulching:

It is effective against wind as well as water erosion. Some plants such as maize stalks, cotton stalks, tobacco stalks, potato tops etc. are used a mulch (a protective layer formed by the stubble i.e. the basal parts of herbaceous plants, especially cereals attached to the soil after harvest). Mulches two to three inches thick reduce soil moisture, evaporation and increase amount of soil moisture through the addition of organic matter to soil.

(iii) Crop rotation:

It decreases soil loss and preserves the productivity of land. The same crop year after year depletes the soil mineral. This is overcome by cultivating different crops on rotation wise in each cultivating year.

(iv) Strip cropping:

It involves the planting of crop in rows or strips to check of water. It may be contour strip cropping, (strips planted along the contour at 90° to the direction of slope) field strip cropping (strip planted parallel to each other), or wind strip cropping (strip planted in straight parallel rows at 90° to the direction of prevailing wind.)

(b) Dry farming:

This practice is useful for croplands grown in low and moderate rainfall areas where ordinary farming is at risk. Crop production, animal husbandry and growing grazing fields are the possibilities of checking erosion. Methods employed differ in different areas. Some of them follow strip cropping, crop rotation of contour farming etc.

(c) Agrostological methods:

Grasses such as *Cynodon dactylon* are utilised as erosion-resisting plants. They are grown in strips between the crops. They act as stabilisers when grown in gully.

Such methods include:

(i) Lay farming:

This involves growing grasses in rotation with the field crops which helps in building up the structure of soil, preventing soil erosion and improving its fertility.

(ii) Retiring lands to grass:

It involves to grow grasses on such lands where major proportion of the top soil has been eroded. Generally grasses are allowed to grazing under suitable climate conditions.

2. Mechanical methods:

These methods are used as supplements to biological methods. These are:

(a) Basin listing. i.e., to construct small basin along the contours to retain water which also reduces its velocity.

(b) Counter terracing. i.e., to construct a channel along the slope to intercept and divert the runoff water.

This may be:

(i) Channel terrace, i.e., to dig channels at suitable intervals and the excavated soil deposited as a wide, lower edge along the lower edge of the channel.

(ii) Broad based ridge terrace. i.e., to construct a number of platforms along contours or suitable graded lines across the slope.

(iii) Bench terrace, i.e., to construct a number of platforms along contours or suitable graded lines across the slope.

3. Other method.

These include:

(a) Gully control:

To check the formation or widening of gullies by constructing, dams, drains or diversions through which excess runoff water is channeled.

(b) Stream bank protection:

To grow vegetation alongside the river bank, to construct drains, concrete or stone pitching etc. for checking the cutting and caving of river banks.

(c) Afforestation:

Trees as windbreaks are planted in deserts which check the velocity of wind.

Windbreaks are planted across the area at 90° to the prevailing wind. They check the spread of sand dunes or desert conditions or blowing away of the fertile top soil.

Windbreaks may be planted in several rows.

Afforestation is applied to Indian deserts, where such plants as *Lawsonia alba*, *Agave americana*, *Thevetia nerifolia*, *Colotropis gigantea*, *Ricinus communis*, *Zizyphus jujuba*, *Acacia catechu*, *Anelotica*, *Cassia*, *Dalbergia sissoo*, *Mangifera indica* and *Tamarindus indica* serve as useful windbreaks.