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Land (utilization agricultural, pastoral, horticulture, silvicultural) soil degradation and management.

Soils are derived from parent rocks by the process called weathering .In the weathering process rocks are disintegrated and decomposed into smaller pieces by physical, chemical and biological agencies. There are many utilizations of soil like -

Agricultural utilization

Agricultural land is typically land devoted to agriculture .The systematic and controlled use of other forms of life particularly the rearing of livestock and production of crops to produce food for humans it is thus generally synonyms with both farm land and crop land.

Pastoral utilization

Pastoral farming in some regions is also known as livestock farming or grazing. It is aimed at producing livestock rather than growing crops examples include dairy farming raising beef cattle and raising sheep for wool mixed farming incorporates livestock and crops on a single farm. Some mixed farmers grow crops purely as fodder for the livestock, some crops farmers grow fodder and sell it. In some cases pastoral farmers are known as graziers. The rural farmers adjust to fit the needs of their animals by improvements that include drainage, tank irrigation etc.

Horticulture utilization

Horticulture is the growing of flowers, fruits and vegetables and of plants for ornament and fancy. It also includes plant conservation landscape, restoration soil management landscape and garden design culture does not include large scale crop production or animal husbandry . At present Horticulture may be defined as the science and technique of production processing and merchandising of fruits vegetables flowers spices plantation medicinal and aromatic crops.

Silvicultural utilization

Silviculture is the practice of controlling the growth composition and quality of forest to meet value and needs specifically timber production. The name comes from the Latin "*silvery*" meaning forest and *culture* meaning growing and study of forest and Woods. It also focuses on making sure that the treatment of forest and are used to conserve and improve their productivity. General silviculture is a science and art of growing and cultivating forest crops.

Soil degradation

soil degradation has been defined as a process that leads to decline in the fertility of future productivity capacity of soil as a result of human activity. Degraded soils which result in poor or no production are also called problem soils. Wastelands are those which for one or the other reason have lost the life sustainability property. The wasteland can be made useful by increasing productivity of land by using some useful methods as afforestation or by using biofertilizers . Soil degradation is a complex phenomenon derived by interaction between natural and socio-economic factors . The degradation or



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deterioration of soil may be caused by the following factors:

Physical factors example loss of fertile topsoil due to water or wind erosion

chemical factors example depletion of nutrients for toxicity due to acidity or alkalinity of water logging
biological factors which affect the micro flora and reduce the microbial activity of the soil. These factors reduce the yield .

Some other factors are as deforestation , extensive cultivation on marginal land improper cultivation practices like monocropping poor manuring, misuse of fertilizer, excessive irrigation, overgrazing , adverse weather and mining may accelerate the process of soil degradation. During last decade nutrient deficiency has been considered as a main cause of poor productivity and crop failures. The study of the current trends in agronomic practices has suggested that the nutrient deficiency is further aggravated by continued use of high yielding crop varieties, intensive cropping pattern and relatively poor fertilizers. Among the major causes of degradation water erosion is considered to be the most severe one, which covers most 87% of the affected area. The main cause of water erosion is removal of vegetation over exploitation of vegetation overgrazing and improper agricultural practices. The latest data revealed that erosion has rendered 200 million hectares or 36 % of the total area of the country barren.

Causes of soil degradation

The main reasons for degradation of soils are as follows

Nutrient disorder

Most of the Indian soils are deficient in nutrients and organic matter. Organic matter is rapidly decomposed and leached, eroded by heavy rains. In addition to these causes, intensive cultivation using high yielding short duration and fertilizers responsive cultivars of Crop has further accelerated the loss of plant nutrients which is much greater than what is supplemented through fertilizers. According to an estimate of 1992 every year 20.2 million tons of NPK is removed by growing crops. Data published by National Bureau of soil survey and land use planning show that about 3.7 million hectare land suffers from nutrient loss or depletion of organic matter. The problem is more severe in the cultivated areas of the subtropical belt out of 20.2 million tones NPK removed by the plants only 2.6 million tones comes from fertilizers and 3 million turns from organic sources. If the loss of nutrient due to soil erosion is included, the loss of nutrients from top soil is 43 million tons.

Water logging

soils become waterlogged when the water balance of an area is disturbed because of accessories recharge. Important sources of water are heavy rains, overland flows towards basins seepage from canals and distribution system and tidal flooding natural basins without outlet for water. Low permeability of subsurface horizons, internal drainage, low intake rate of surface soil and obstructions to natural flow of rainwater cause water logging in highly productive areas. Canal irrigation is responsible for a rapid rise in water table expansion. Canal irrigation is also directly concerned with widespread water logging and salinity problems in arid and semi-arid areas. Disturbances in the



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hydrologic cycle due to inefficient use of surface irrigation water pool and development seepage and poor drainage have resulted in higher water tables. Most of the canal areas in arid and semi-arid regions are rich in soluble salts in irrigation, ditch salts are reserve in soil water and rise to the surface through capillary action. When the water dries up the salts are left on the upper surface as a cast or layer. According to National Commission on Agriculture 1976, about 6 million hectare area is underwater locked condition. Data of world Bank Survey 1995, reveal that India loses 1.2 to 6 million tons of food grains production every year due to water logging. The water logging and salinity causes a loss of rupees 12 billion to 27 billion annually.

Salinity : saline and alkaline soils

Salinity directly affects the productivity by making the soil unsuitable for crop growth. Indirectly it lowers productivity through its adverse effects on the availability of nutrients the adverse effect of alkalinity or availability of nutrient is due to the flocculation effect of sodium ions An area of about 1.7 million hectares of soil is rendered unproductive due to salinity and water logging .The saline degradation is due to natural causes and the irrigation practices which disturb the soil cycle in areas. Most of the crops in India affected due to salinity.

Erosion

Soil erosion is the major cause of soil degradation. In the soil erosion, upper most fertile layer of soil which contains essential mineral element is lost. The soil becomes deficient in essential minerals and this results in productivity loss. Deforestation or destruction of forests accompanied by reduced frequency of rainfall leads to soil erosion and causes damage to agricultural property. Deforestation causes fast degradation. When the soil is steep slope or easily erodible, destruction of natural vegetation cover is a major factor responsible for erosion of soils by water and wind. According to global assessment of soil degradation, deforestation is the main cause of soil erosion by wind in about 98% of the area. Overgrazing ,cutting of timber trees ,collection of fuel wood, shifting cultivation of forest areas are some of the important factors responsible for the loss of vegetation cover on the soil, which ultimately causes soil erosion. The latest data provided by Signal and Abrol 1994, shows that the total degraded land in India is 187.8 million hectare of which 162.4 million hectare is degraded due to erosion alone. These factors reduce the yield. It is well known that monocropping, that is growing the same crop on the same land year after year often lead to increasing attacked of pest and diseases. The fatal nematodes threaten and potato cultivation in the Nilgiris and if not controlled , they may pose a threat to potato cultivation in that area .Excess use of pesticides reduces microbial activity and biomass. Applications of some pesticides chemicals inhibit nitrification. The nodulation and growth of some leguminous crops and nitrogen fixation are inhibited by the different pesticides. Disposal of oil shales ,heavy metal contamination of soil and spillage of crude oil adversely affect soil micro flora which ultimately affect soil productivity and cause soil degradation.

Extension of cultivation on marginal land

Due to tremendous population increase, the use of land is increasing day by day . Marginal lands though sustainable for farming are less fertile and more prone to degradation .Examples of marginal lands are



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steep slope lands, shallow or Sandy soils and the lands in dry and semi dry areas.

Improper crop rotation

Due to shortage of land, increase of population and economic pressure the farmers have adopted intensive cropping patterns of commercial crops in place of more balanced serial legume rotations. During last two decades, the area under food crops decreased and that under non food crops increased. Intensive cultivation leads to removal of large quantities of nutrients from the soil which results to in loss of soil fertility.

Fertilizer misuse

Soil fertility is reduced due to prolonged intensive cultivation. The farmers maintain productivity of soil by applying chemical fertilizers but make less use of organic manure. Although the yield can be maintained by using fertilizers that provide deficient minerals ,yet their use often results in deficiencies of other nutrients.

Overgrazing

In India, pasture land area is decreasing day by day due to expansion of agricultural land. Recent satellite data show that the area under pressure land is severely degraded. This poor condition of pasture land is due to excessive grazing. The unchecked and indiscriminate grazing on forest land also leads to degradation of forest soils. Overgrazing directly leads to disappearance of vegetation which is one of the important causes of wind and water erosion in dry lands.

Mining

Mining disturb the physical, chemical and biological features of the soil .The impact of mining on soil depends on the physical, chemical properties of the waste generated. The soil profile is verted, the top soil is burnt deep inside the dumps. The erodible material is almost devoid of organic matter and lacks in mineral plant nutrients. According to an estimate about 0.8 million hectares soil is degraded to mining activity.

Impact of soil degradation

The following are the impacts of soil degradation:

1. Degradation leads to reduction in crop yield in the affected lands and a possible decline in cropping intensity.
2. In extreme cases soil becomes unfit for cultivation.
3. Siltation of drainage, canals, rivers and reservoirs result in increased floods and droughts.
4. In some cases, farmers use more fertilizer inputs to compensate reduce soil productivity while in other cases they use excess fertilizers.
5. Soil degradation has several adverse impacts on the environment It affect global climate through alternation in water cycle and energy balances and disruptions of carbon, nitrogen and sulphur cycles.

Management of soil degradation

The management of soil degradation can be done by practicing the healthy methods and utilizing the soil in a healthy way.

For waste land and its management a separate board was established in 1985 which deals with the land



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degradation, reclamation of ravines, usar lands and arid tracks and deforestation which is called the National Wasteland Development Board. The main objective of the board is to check Land degradation, to convert wasteland for sustainable use, to increase the biomass and restore ecological balance.

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