

Land Resources

Land comprises of a bundle of earth materials and vegetation covers. It is a non-renewable resource and it is part of lithosphere that sustains life as well as provides various existential resources to human beings. It is made up of 12 billion natural ecosystems of high biodiversity and 1.48 billion man-made ecosystems of crops designated as agro-ecosystems.

Land, a critically important national resource, supports every primary production system such as woods, industries but humans has used, overused and abused the land materials in such a way that the land use pattern is detrimental in the long run for the present and future generations.

So, each year, a greater area of rural and most cropland is converted to urban development, highways, industrial areas, residential colonies, etc. With these human activities and associated changes in abiotic factors, the landmass has experienced different types of degradation over the years.

The 'improper use leads to wastage and can lead to progressive deterioration and loss of productivity of this vital resource. It is the moral obligation of the present generation to pass this valuable resource on to the future generations as nearly unimpaired and over-exploited as possible, calligraphically.

Land degradation

Land degradation means a reduction in the quality or value of the land. When land is put to extensive use or over-exploitation, its quality degrades. It also happens when land is put to uses that are not suitable for it. Due to more and more intense utilization, every year, between 3 to 7 million hectares of land worldwide are added to the existing degraded farmland.

An extreme case of land degradation is desertification wherein semiarid regions of the world are losing their productive capacity to such an extent that they are becoming barren and desert-like due to anthropogenic activities and climate change issues.

Increasing misuse of land resources through short-sighted development policies with deforestation for timber, fuelwood, fodder and subsequent conversion of forestland to agricultural or urban areas, improper land-use practices, mining activities and shifting cultivation cause land degradation and hasten the process of wasteland formation.

Following are some practices for controlling this -

- (i) Strip farming \Rightarrow It is a practice in which cultivated crops are sown in alternative strips to prevent water movement.
- (ii) Crop rotation \Rightarrow In this, different crops are grown in the same area following a rotation system which helps in the replenishment of the soil.
- (iii) Ridge & Furrow Formation \Rightarrow Soil erosion is one of the factors responsible for land degradation.

- can be prevented by the formation of ridge and furrows during irrigation which lessens runoff.
- (iv) construction of dams \Rightarrow This usually checks or reduces the velocity of runoff so that soil support vegetation.

Man Induced Landslides

The human race has exploited land resources for its comfort by constructing roads, railway tracks, canals for irrigation, hydroelectric projects, large dams and reservoirs and mining in hilly areas. Moreover productive lands under crop production are decreasing because of development activities. These factors are affecting the stability of hill slopes and damaging the protective vegetation cover. These activities are also responsible to upset the balance of nature and making such areas prone to landslides.

A landslide is the movement of rock and soil down a slope. Landslides range in size from a single boulder in a rockfall to a debris avalanche, which may have huge volumes of rock and soil capable of covering many kilometres. Heavy rain, floods, or earthquake shaking can cause landslides. They can also be caused or made worse by human activity - such as the removal of trees and plants, steep roadside cuttings or leaking water pipes. Scientifically, landslides occur when gravitational and other types of shear stresses within a slope exceed the shear strength (resistance to shearing) of the materials that form the slope.

The landslide hazard causes severe loss of life, injury, damage to property, destruction of communication networks and loss of precious soil and land. Although the occurrence of landslides is declining all over the world due to greater scientific understanding and public awareness, in many areas the mounting pressure of population at the base of slopes, canyons and unstable borders of the plateau has led to an increase in dangers due to landslides. Landslides are universal phenomenon, but more than being 'natural hazards', they are induced by human activity.

Prevention ⇒

There are also various direct methods of preventing landslides; these include modifying slope geometry, using chemical agents to reinforce slope material, installing structures such as piles and retaining walls, grouting rock joints and fissures, diverting debris pathways, and rerouting surface and underwater drainage. Such direct methods are constrained by cost, landslide magnitude and frequency, and the size of human settlements at risk.

Soil Erosion

Soil erosion refers to the loss or removal of the superficial layer of soil due to the action of wind, water and human factors. In other words, it can be defined as the movement of soil components, especially surface litter and topsoil from one place to another. It results in the loss of fertility.

Soil erosion is a harmful process, which not only affects the soil anatomy but as a consequence, the whole

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ern of livelihood of the concerning region, because agriculture suffers badly due to loss of soil through erosion.

Various factors which affect soil erosion include soil type, vegetation cover, the slope of the ground, soil mismanagement and intensity and amount of rainfall. The wind is also responsible for soil erosion through saltation, suspension and surface creep.

Soil particles can move by three processes: they may be blown away, they may be washed away, or the whole soil may slide or slump down a hillside.

In most cases, water is the transporting agent, while in some countries wind also plays this part. Running water, wind, waves of the sea and moving ice or glacier cause natural soil erosion.

The effects of soil erosion are -

(i) Surface runoff \Rightarrow

Topsoil is removed, bedrock exposed and the land entrenched by gullies.

(ii) Deposition and clogging \Rightarrow

The ground is covered with sand and silt deposits; ditches and canals are clogged with sediment and reservoirs silt up.

(iii) Reduction in productivity \Rightarrow

As a result of erosion, there is deterioration in the quality of cropping and grazing land which brings about reduced productivity and increased expenditure on fertilizers to maintain fertility.

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(iv) Barren land \Rightarrow

In extreme cases, yield become so poor that land to be taken out of cultivation.

(v) Pollutant \Rightarrow

Siltation of rivers reduces their capacity, creating flood hazards, and the sediment is a major pollutant, lowering water quality.

Prevention of Soil Erosion

The prevention of soil erosion, which means reducing the rate of soil loss to approximately that which would occur under natural conditions, relies on selecting appropriate strategies for soil conservation and this, in turn, requires a thorough understanding of the processes of erosion.

(i) Energy Group \Rightarrow

This includes the potential ability of rainfall, runoff and wind to cause erosion. This ability is called erodibility. In this, those factors are included which directly affect the power of the erosive agents such as the reduction in the length of runoff or wind blow through the construction of terraces and wind brakes respectively.

(ii) Resistance Group \Rightarrow

The resistance group includes the erodibility of the soil which depends upon its mechanical and chemical properties. Factors that encourage the infiltration of water into the soil and thereby reduce runoff and decrease erodibility whilst any activity that pulverizes the soil, increases it. Thus, cultivation may decrease the erodibility of clay soils but increase that of many soils.

Protection Group =>

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by interacting rainfall and reducing the velocity of runoff and wind, a plant cover protects the soil from erosion. Different plant covers afford different degrees of protection so, to a considerable degree, we can control the rate of erosion.

Desertification

The process of expansion of deserts or desert-like conditions on the earth is called desertification. It is the conversion of productive land into the unproductive arid region and is happening much faster worldwide. It results in a reduction in agricultural productivity of the land.

Desertification is characterized by a loss of vegetation cover. There are various natural causes of desertification such as climate but generally, it is induced or enhanced by anthropogenic activities. Some of the human causes of desertification are -

- Deforestation practices.
- Abusive agricultural practices
- Overgrazing
- Overexploitation of underground water resources
- Mining and quarrying
- Increased population
- Irrigation projects in areas with no drainage facility
- Shifting of sand dunes by wind storms
- Increased food production from marginal lands in arid or semi-arid areas.

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Effects

The major impact of desertification is biodiversity loss, and loss of productive capacity, such as the transition from grassland dominated by perennial grasses to one dominated by perennial shrubs. In extreme cases, it leads to the destruction of land's ability to support life.

Control

- (i) Afforestation and planting of soil binding grasses can check soil erosion, floods and waterlog.
- (ii) Desertification can be checked by artificial bunds or by covering the area with the proper type of vegetation.
- (iii) Shifting of sand can be controlled by mulching (use of artificial protective covering)
- (iv) Crop rotation and mixed cropping improve the fertility of the soil. It would increase production which can sustain a large population.