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Soil Degradation and Its Causes

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Abstract

In India, soil degradation is common, resulting in decreased soil productivity, deterioration of vegetative cover, qualitative and quantitative decline of soil and water resources, and air pollution. It has become significantly worse in recent decades as a result of the country's growing population, which necessitates the cultivation of marginal lands in order to fulfil the growing food demand. Poverty and natural resource depletion force people to look for more land to grow food, fodder, and fibre. Deforestation and removal of natural vegetation, overgrazing, converting forests to farms, cultivating steep slopes and degrading marginal lands, other agriculture-related activities, and overexploitation of vegetation for domestic purposes are the main causes of degradation caused by direct/indirect human intervention. Similarly, agricultural residue removal or in-situ burning is prohibited.

Keywords: Soil Erosion, Organic Carbon Losses, Nutrient Imbalance, Degraded Soil Management, Socioeconomic Impacts

Introduction:

Land degradation is defined as a loss or drop in land productivity caused by a variety of natural processes, which are frequently enhanced by an anthropogenic perturbation (Lal 1993). Land usage, climate change, overcrowding, and urbanisation are the most prominent causes of land degradation. Land degradation reduces soil quality and thus the future potential for the survival of living creatures (Fitzpatrick 2002). It is a global threat divided into three categories: natural degradation, man-made degradation, and desertification. Induced degradation is caused by improper land use and management and happens faster than natural degradation (Fitzpatrick 2002). Desertification is the most severe kind of degradation, occurring in drylands that encompass around 40% of the world's geographical surface (UNEP 1992).

Causes of Soil Degradation

Many factors contribute to soil deterioration, the most well-known of which are deforestation, shifting farming, and overgrazing. Monocropping and the use of agrochemicals are both prohibited.

Deforestation:

The main natural causes are fires and floods, while human activities include logging, timber production, forest conversion to agricultural land, and urbanisation. Deforestation has a wide range of consequences, including species extinction, increased carbon emissions or increases in the greenhouse effect, flooding, and soil erosion.

Shifting cultivation:

It is an old farming practise in which the "slash-and-burn" approach is used to clear land, followed by a protracted fallow period necessary for soil fertility restoration. Many studies show that crop burning has negative consequences on soil, such as increased susceptibility to soil erosion and nutrient depletion. A better option is "chop-and-mulch," which is the cutting of plants (crops) that is then used as mulch. This dramatically enhances nutritional concentration and organic matter content (FAO and UN 2015).

Overgrazing:

Intensive grazing has a substantial impact on the growth, quality, and composition of plants. Grasslands under heavy livestock pressure lose vegetation cover and, as a result, soil fertility, making the soil prone to erosion. Numerous studies have found that overgrazing alters soil moisture, organic matter, nitrogen concentration, and microbial activity. Overgrazing has permanently reduced the total carbon in the soil by 12% during a 40-year period (Li et al. 1997). This also contributes to soil erosion and desertification.

Monocropping and use of agrochemicals:

Many crops grown all over the world (wheat, corn, rice) have been grown as monocultures on the same soil for many years in the absence of crop rotation. A soil loses nutrients and its resilience to insects and pests over time under the same culture, forcing farmers to employ pesticides in order to give the required output. The use of artificial fertilisers, insecticides, and other chemicals exposes heavy metals and, in certain cases, extremely dangerous compounds into the environment. Their nonselective and excessive usage has a long-term negative impact on soil quality and is one of the most severe forms of deterioration (Osman 2014). Mismanagement of irrigation, for example, is another source of soil degradation.

Effect of land degradation on agriculture:

Land degradation is a major global issue because of due to its anti-agricultural efficiency. It also has a negative impact on the environment and nutritional safety. Deterioration affects the ecosystem as well, because continuous degradation has now far-reaching categorizations: it represents challenging situations for ecological growth, it divides negative impacts on socioeconomic circumstances, and it also affects agricultural [2001]. Land degradation is the result of regular or atrophic factors that might lead to a drop in productivity. Land degradation results from a disparity between land excellence and land utilisation [1994]. Globally, land degradation affects more than 20% of agricultural zones, 30% of plantations, and 10% of savannas, with this degradation induced by human actions such as unsustainable land management and environmental aberrations.

Effect of land degradation on environment:

Land degradation is an ecological phenomenon that disturbs dry regions and has an impact on the economic and nature of agricultural lands. Land degradation has a direct impact on agriculture, ecosystems, production, the environment, nutritional value, and biodiversity. It also has an impact on the biophysical environment by disturbing the land through anthropological or natural processes. Natural sources include earthquakes, tidal waves, erosion, overflow of water, and cyclones. Anthropogenic degradation has the greatest impact on the environment. Global estimates of land degradation revealed that Asia has been severely damaged, whereas Africa and Europe have been little affected. Early historical

studies revealed that the continuous effect of volcanic activity causes land degradation and has a significant impact on the environment.

Management of land degradation

Land deterioration can be handled via conservation tillage because it requires fewer employees and is less expensive. ISFM (integrated soil fertility management) is concerned with the rehabilitation of unproductive soils. We can improve land efficiency and productivity by increasing nutrient intake, soil fertility, and inorganic nourishment through IFSM initiatives. IFSM services not only boosted crop productivity but also helped to restore degraded areas. established that arid land for the improvement and reclamation of degraded lands, the domestic structure must be integrated in all relevant areas, which gives direction for asset in sustainable land management (SLM) and inspiring community response to SLM. Fencing, fertiliser application, salt and supplement placement, burning, and other management approaches.

Conclusion:

Land degradation has numerous detrimental effects on agriculture and the environment. Land degradation may be induced by i.e., Water erosion, deforestation, soil compaction, desertification, salinization, and waterlogging are only a few examples. It has become more dangerous since it directly or indirectly affects food security and the environment. As a result, it is critical to reduce the losses generated by land degradation. The current analysis concludes that land degradation can be addressed through the integrated application of organic and inorganic fertiliser, the use of drip irrigation, and the reduction of heavy tillage implements. Furthermore, new policies are needed to mitigate the effects of land degradation.

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