

SOIL DEGRADATION AND ITS IMPACT ON THE FERTILITY OF LAND

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Abstract:- Agrarian practices significantly affect numerous environments throughout the world, and offer increment to a blend of natural issues. Soil degradation is one of the key areas in which farming effects upon nature. Soil erosion is an aftereffect of poor cultivating practices which cause the expulsion of vegetation covers from soils, the utilization of substantial fields without boundaries to moderate water movements and wrong furrowing procedures all increase soil erosion. The saltiness of the soil is another critical factor which limits the utilization of this natural resource. Present paper focus on the causes, and effects of soil erosion. Some techniques to control soil degradation have also been discussed.

Keywords: Agriculture, conservation, degradation, erosion, farming, soil, salinity.

Introduction

Soil erosion causes decrease in soil's productivity, crumbling in vegetative spread, subjective and quantitative decay of soil and water assets and contamination of air; is widespread in India. In ongoing decades, it is incredibly disturbed on account of nation's expanding populace, requiring negligible zones to be conveyed under the cultivation to fulfill the demand for food. Poverty and natural resource degradation force people to scan for more land for sustenance, grub and fiber creation. The fundamental driver of degradation because of direct human intercession are deforestation and evacuation of natural vegetation, overgrazing, changing over woods to ranches, developing steep slants and debasing peripheral grounds, other horticulture related exercises and over misuse of the vegetation for local reason.

Additionally, the evacuation or in-situ consuming of yield buildups, no or least the option of natural fertilizers, and escalated cultivation are the real purposes behind the exhaustion of soil natural carbon. Significant dangers to the preservation of soil assets are soil disintegration both by water and air, salinization/alkalinity, sharpness, natural carbon misfortunes, supplement unevenness, contamination/pollution by lethal substances, and soil fixing and topping. Urgent measures are required to capture the degradation procedure and to re-establish the efficiency of

degraded soils with the goal that more nourishment could be delivered to give work and ecological security to the expanding Indian populace. This requires the efficient information of the soil, portrayal of fundamental assets like soil, water, atmosphere and biodiversity issues and possibilities for streamlining land use.

Soil degradation is the decrease in soil feature started by its wrong use, ordinarily for agrarian, postural, mechanical or urban causes (Johnson and Lewis, 1995). It is a serious general biological crisis and might be bothered by climate change. Soil erosion is a standout amongst the most vital threat confronting humankind, which not just debilitates the productive ability of an environment, yet in addition influences overall atmosphere (Barrow, 1991). Having formally influenced in excess of two billion hectares of land all around, the normal rate of soil degradation is just about 8-9 m according to FAO/UNEP ongoing approximation. An extensive division of Indian land demonstrates a clear sign of cutting edge and relentless degradation, startling to destabilize our ability to expand food generation and improve pastoral poverty. The socioeconomic and ecological consequences are massive (Beinroth et al., 1994). Soil erosion is a natural happening process that influences all landforms. In agribusiness, soil disintegration alludes to the eroding of a field's topsoil by the natural physical powers of water and wind or through powers related with cultivating exercises, for example, tillage. Degradation, regardless of whether it is by water, wind or tillage, includes three distinct activities – soil separation, development and disposition. Topsoil, which is high in organic matter, ripeness and soil life, is migrated somewhere else "on location" where it develops after some time or is conveyed "off-site" where it fills in waste channels.

Soil degradation decreases cropland efficiency and adds to the contamination of contiguous waterways, wetlands and lakes. Soil erosion can be a moderate procedure that proceeds generally unnoticed or can happen at a alarming rate, causing genuine loss of topsoil. Soil compaction, low organic matter, loss of soil structure, poor inner drainage, salinisation and soil sharpness issues are different genuine soil degradation conditions that can quicken the soil erosion process. Soil is the upper layer of earth's surface which underpins all types of life. It is in the soil that all plants have their underlying foundations and from which they retain life-sustaining moisture and nutrients.

A few specialists trust that one of the reasons for the decline of the Roman Empire was the crumbling of soils. The loss of soil, either by regular procedures or by both, is unsafe for agricultural improvement, yet to the entire ecosystem, in this manner, its preservation has now turned into a matter of grave concern.

Types of soil erosion:

- Normal soil erosion,
- Soil erosion by water
- Wind soil erosion
- Accelerated soil erosion

Causes of soil degradation

It is a natural process which occurs when there is exclusion of the top layer of soil due to rain, wind, deforestation or any other human activity.

- **Soil Texture:** Small grain and open structure, soil erodes more than the larger grain and closed structure soil
- **Land Slope:** Steep slope of the ground erodes more than the ground having a mild slope.
- **The intensity and amount of rainfall:** More the intensity of rainfall more will be the soil erosion.
- **Mismanaged utilization of soil resources:** The soil erosion is enhanced by improper surface drainage, removal of forest litter, overgrazing etc.
- **Deforestation:** It is one of the major factors responsible for Soil erosion. Removal of forest cover which function as a binder of the top layer of the soil with increasing land demand have resulted in enhancing the extent of soil erosion.
- **Rainfall and Flooding:** Rainfall and Flooding: Greater length and intensity of rainstorm implies more potential for soil degradation. Rainstorm produces four major sorts of soil erosion, including rill erosion, gorge disintegration, sheet erosion, and splash disintegration. These sorts of disintegrations are brought about by the effects of raindrops on the soil surface that break and scatter the soil particles, which are then washed away by the tempest water overflow.
- **Rivers and Streams:** The flow of rivers and streams causes valley erosion. The water flowing in the rivers and streams tends to eat away the soils along the water systems leading to a V-shaped erosive activity. When the rivers and streams are full of soil deposits due to sedimentation and the valley levels up with the surface, the waterways

begin to wash away the soils at the banks. This erosive activity is termed as lateral erosion, which extends the valley floor and brings about a narrow floodplain. This erosive activity is evident in most rivers or streams, especially during heavy rainfall and rapid river channel movement.

- **High Winds:** High winds can contribute to soil erosion, particularly in dry weather periods or in the arid and semi-arid (ASAL) regions. The wind picks up the loose soil particles with its natural force and carries them away to far lands, leaving the soil sculptured and denudated. It is severe during the times of drought in the ASAL regions. Hence, wind erosion is a major source of soil degradation and desertification.
- **Overgrazing, Overstocking and Tillage Practices:** The transformation of natural ecosystems to pasture lands has largely contributed to increased rates of soil erosion and the loss of soil nutrients and the top soil. Overstocking and overgrazing has led to reduced ground cover and break down of the soil particles, giving room for erosion and accelerating the erosive effects by wind and rain. This reduces soil quality and agricultural productivity. Agricultural tillage depending on the machinery used also breaks down the soil particles, making the soils vulnerable to erosion by water. Up and down field tillage practices as well create pathways for surface water runoff and can speed up the soil erosion process.
- **Deforestation, Reduced Vegetation Cover, and Urbanization:** Deforestation and urbanization destroy the vegetation land cover. Agricultural practices such as burning and clearing of vegetation also reduce the overall vegetation cover. As a result, the lack of land cover causes increased rates of soil erosion. Trees and vegetation cover help to hold the soil particles together thereby reduces the erosive effects of erosion caused by rainfall and flooding. Deforestation and urbanization are some of the human actions that have continued the cycle of soil loss.
- **Mass Movements and Soil Structure/Composition:** The outward and downward movements of sediments and rocks on slanting or slope surfaces due to gravitational pull qualify as an important aspect of the erosion process. This is because mass movements aids in the breakdown of the soil particles that makes them venerable to water and wind erosion. Soil structure and composition is another factor that determines erosive of wind or rainfall.

Effects of Soil Erosion

The consequences of soil erosion are primarily centered on reduced agricultural productivity as well as soil quality. Water ways may also be blocked, and it may affect water quality. This means most of the environmental problems the world face today arises from soil erosion. The effects of soil erosion include:

- **Loss of Arable Land:** Lands utilized for harvest generation have been generously influenced by soil degradation. Soil degradation destroys the best soil which is the fruitful layer of the land and furthermore the part that supports the soil's basic microorganisms and organic matter. In this view, soil disintegration has extremely compromised the productivity of fertile cropping regions as they are persistently eroded. Due to soil erosion, the majority of the soil qualities that help agribusiness have been lost, causing ecological breakdown and mass starvation. All things considered, the majority of the developed regions around the world are vulnerable to soil erosion
- **Water Pollution and Clogging of Waterways:** Soils dissolved from rural grounds convey pesticides, substantial metals, and composts which are washed into streams and significant waterways. This prompts water contamination and harm to marine and freshwater territories. Aggregated sediments can likewise cause stopping up of water level and raises the water level prompting flooding. The water quality of different waterways degradation, in the long run influencing the strength of the nearby networks.
- **Sedimentation and Threat to Aquatic Systems:** Apart from polluting the water frameworks, high soil sedimentation can be calamitous to the survival of amphibian living things. Silt can cover the breeding grounds of fish and similarly diminishes their food supply since the siltation lessens the biodiversity of algal life and gainful sea-going plants. Silt may likewise enter the fish gills, influencing their respiratory capacities.
- **Air Pollution:** Wind erosion gets dust particles of the soil and tosses them into the air, causing air contamination. A portion of the dust particles may contain unsafe and poisonous particles, for example, petroleum and pesticides that can represent an extreme risk when breathed in or ingested. Dust plumes from the deserts or dry zones can cause

substantial and broad air contamination as the wind move. Such a case is obvious in North America where dust twists from the Gobi desert have intermittently been a significant issue.

- **Destruction of Infrastructure:** Soil degradation can influence infrastructural tasks, for example, dams, seepages, and embankment. The accumulation of soil dregs in dams/seepages and along embankments can decrease their operational lifetime and proficiency. Likewise, the silt up can support vegetation that can, cause breaks and debilitate the structures. Soil erosion from surface water spillover regularly makes genuine harm streets and tracks, particularly if balancing out procedures are not utilized.
- **Desertification:** Soil degradation is a noteworthy driver of desertification. It bit by bit changes a livable land and the ASAL locales into deserts. The changes are declined by the ruinous utilization of the land and deforestation that leaves the soil bare and open to disintegration. This generally prompts loss of biodiversity, change of biological communities, land degradation, and huge monetary losses.

Strategies to control soil degradation

Soil erosion can be controlled by adopting land management practices and also by changing the pattern of some human activities which accelerate soil erosion.

- **Contour Farming:** Contour cultivating might be characterized as furrowing, seeding, cultivating and gathering over the incline, as opposed to with it.
- **Strip Cropping:** On land with a decided slope, planting crops on contour strips will be an effective erosion deterrent. For effective control the width of the contour strip should vary inversely with the length of the slope. Strip cropping should be combined with crop rotation, so that a strip planted to a soil depleting, erosion-facilitating corn crop one year will be sown to a soil enriching and protecting strip of legumes the next.
- **Terracing:** The practice of terracing has been common in ancient China. The flat, step-like bench terraces are now not useful. The modern terrace is an embankment of earth constructed across a slope in such a way as to control water runoff and minimise erosion. To be effective, terrace must check water flow before it attains a sufficient velocity to loosen and transport soil.

- **Gully Reclamation:** Gullies are danger signals that indicate land is eroding rapidly and may become a wasteland as in the case of vast areas along the rivers Chambal and Yamuna. If a gully is small it may be ploughed in and then seeded to quick-growing crops like barley, maize, jawar, wheat in order to check erosion. In case of severe gullying, small check dams of manure and straw constructed at 5 meter intervals may be effective, because silt will collect behind the dams and gradually fill in the channel. Earthen, stone and even concrete dams may be built at intervals along the gully. Once dams have been constructed and water runoff has been restrained, soil may be stabilised.
- **Shelter Belts:** These are the 'green belts' of trees which help to break the force of strong winds and thus, prevent or cut to a minimum the blowing away of the loose top-soil. In areas where wind erosion is more, rows of trees may be helpful to check the flow of winds. Apart from these, trees will also add colour to the landscape and help to control the desert spread. Soil blowing away can also be controlled if local shrubs and small trees are planted in a systematic way. Even useful trees can be planted and harvested after a regular interval of two to three years.

Other measures of soil conservation are:

- Expansion of vegetative cover and protective a forestation
- controlled grazing
- Flood control
- Prohibition of shifting cultivation
- Proper land utilization
- Maintenance of soil fertility
- Land reforms, reclamation of wasteland
- Establishment of soil research institute and training of soil scientists, and
- Effective agencies for soil management

Conclusion

It has been known for quite a while that various techniques can be locked in to reduce soil erosion. By ploughing a field at right points to the slope, furrows pursue the forms of land instead of the slope. By utilizing this contour furrowing framework, water erosion is diminished. Planting crops on territories of uncovered field counteracts soil degradation. If leguminous plants are utilized as cover yields, nitrogen will be fixed and the nitrogen substance of the soil increased. Cultivating is a framework that comprises of planting a tight slit channel without furrowing the soil. By decreasing soil disturbance, soil degradation is diminished (Ruppenthal, 1995). These frameworks, along with yield rotation would all be able to be utilized to diminish soil loss and fertility. In any case, despite the fact that these methods are generally known, progress has been moderate in building up these practices. Likewise, no tilling cultivating regularly utilizes herbicides, evokes different issues. Hence a worldwide effort is required to face this expanding issue for sustainable agriculture.(UNCED, 1992). Association like ICARDA is one such effort which is doing genuine work toward this path through its country organizations with agrarian services and research offices in Central Asia, Iraq, Iran and Egypt by giving research based enduring strategies to ranchers and water administrators managing salinization. Their experience, the practices created with partners, and research is also useful for different territories of the world undermined where agricultural production is by expanding dimensions of saltiness, including India, Pakistan, China and different countries.

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