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The Problem Of Soil Erosion In India: A Study Of Causes And Effects

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Abstract : Actually, the problem of soil erosion in India occurs since a long time. However, it is a natural process which is associated with geomorphic processes or agents such as running water, winds, coastal waves and glaciers. Today, with the passage of time, it has become a serious problem due to increased anthropogenic interferences over the period of time. Moreover, it represents the process of detachment and transportation of soil particles by geomorphic agents. Therefore, detachment isthe dislodging of soil particles from the soil mass and transportation is movement of detached sedimentsfrom their original site.According to a Report of the Indian Institute of Remote Sensing (IIRS)2015, the estimated amount of soil erosion that occurred in India was 147 million hectares. Under this broad figure, 94 million hectares were claimed by water erosion, 16 million hectares by acidification, and 14 Million hectares by flooding and 9 million hectares from wind erosion. 29 percent of the soil that is eroded is lost in the sea while 61 percent is just relocated. The present research paper makes a modest effort to review the causes and effects of soil erosion with some effective suggestions to tackle the problem.

Keywords: Soil Erosion, Winds, Running Water, Detachment, Sediment, Acidification.

Introduction: The fact is thatsoil is a dynamic complex of minerals and organic matter supporting plants or having capacity to support plant growth. Soil formation is slow process and it is result of interaction of parent material, climate, biotic, slope and time factors. Soil is the most significant resource and provides base for life on earth. Soil erosion, on the other hand, is a very fast process. Soil erosion results into depletion and degradation of fertile productive base. Soil conservation and management is required to achieve the goal of sustainable development. Soil erosion is defined as the wearing away of topsoil. Topsoil is the top layer of soil and is the most fertile because it contains the most

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organic, nutrient-rich materials. Therefore, this is the layer that farmers want to protect for growing their crops and ranchers want to protect for growing grasses for their cattle to graze on.

Agents of Soil Erosion: Most of the scholars have identified its two agents as water and wind. However, soil erosion in India is widespread and a serious threat to survival and well-being. Itoccurs in forest lands, arid and semi-arid lands, agricultural lands, construction sites, roadways, disturbed lands, surface mines, glaciated and coastal areas and in areas where natural or geologic disturbances take place.In extreme case, itmay lead to total loss of soil and exposure of the bed rock. Since soil formation is an extremely slow process, once removed completely, soil will take thousands or millions of years to form again and in the meantime land will be unproductive.

Erosion by Water: It is estimated that in India about 90 per cent role in soil erosion is played by water. In the case oferosionby water, soil particles are either detached by impacting raindrops or run-off water moving over soil surface. The high striking velocities (up to 9 m/sec) and large number of drops generate intense hydro-dynamic force to detach huge amount of soil particles. Overland flow detaches soil particles by erosive hydro-dynamic forces. The detachment by raindrops is widespread and by run-off generally confined to small definable channels. The rate of detachment varies due to variations in rainfall, run-off, soil characteristics, topography, and cover conditions. Therefore, climate, hydrology, structure, topography, soil surface conditions and interactions of all these major factors together determine the rates of erosion.

Actually, it comes to know that water during heavy rains removes a lot of top soil. When rain drops strike the surface, sands and silts are detached from the soil body and it is called splash erosion. As rainfall continues, a large amount of water flows in the form of surface run-off which removes the top soil from a large area. This process is called sheet erosion. Due to higher velocity of the run off along areas of higher gradientand soft parent material, numerous finger-shaped grooves may develop all over the area. Such grooves or channels are formed on the surface where water flows rapidly, for example the water

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flowing down the edges of roads and embankments. This form of erosionis called rill erosion. These rills may deepen and enlarge into gullies if the erosion continues further. Extensive areas may be affected by gully formation and the whole area it turned into badlands. Gully erosion is result of lateral and vertical erosion of rills. Sandy soils are more prone to formation of gullies. Ravines of Yamuna and Chambal have been formed in this manner.

Most of the scholars agree with the fact that the rate of soil erosion by running water depends on intensity of rainfallor in coastal areas waves, velocity and volume of water, gradient, sediment load, nature of rocks and extent of vegetative cover.The water erosion occurs through the processes of –solution or corrosion, abrasion, attrition and hydrolic pressure. In the coastal areas sea waves, tidal waves and tsunamis dash along the coast and cause heavy damage to soil. This is called littoral erosion and it is most intense along the Kerala coast. In the high altitude areas of the Himalayan region, glacial action causes soil erosion on a large scale.

However, water erosion is more active in wet areas receiving more rainfall. Steep slope, swift flow of rivers and scarce vegetation cover lead to water erosion. According to estimates by the Indian Council of Agricultural Research (ICAR), the loss due to water erosion is 53.34 million hectares annually. A working group set up by the Ministry of Home Affairs in 1971 estimated that there are 39.75 lakh hectare ravines spread in 18 states, out of which 27.65 lakh hectares (or 69.55 per cent) are in the states of Uttar Pradesh, Madhya Pradesh, Rajasthan and Gujarat.

Erosion by Wind: This type of erosion is active in arid and semi-arid areas which are devoid of vegetative cover. Removal of soil particles by winds is called wind erosion. The wind erosion occurs through the processes of deflation and attrition. The rate of wind erosion is a function of wind velocity, dryness of soil, extent of vegetative cover and the particles size of surface soil. Higher the wind velocity, higher will be the rate of removal of soil. Dry soils and soils having no plant cover are also more prone to soil erosion. Also the finer textured soils are more prone to erosion than coarser materials. Soil erosion by wind erosion is common

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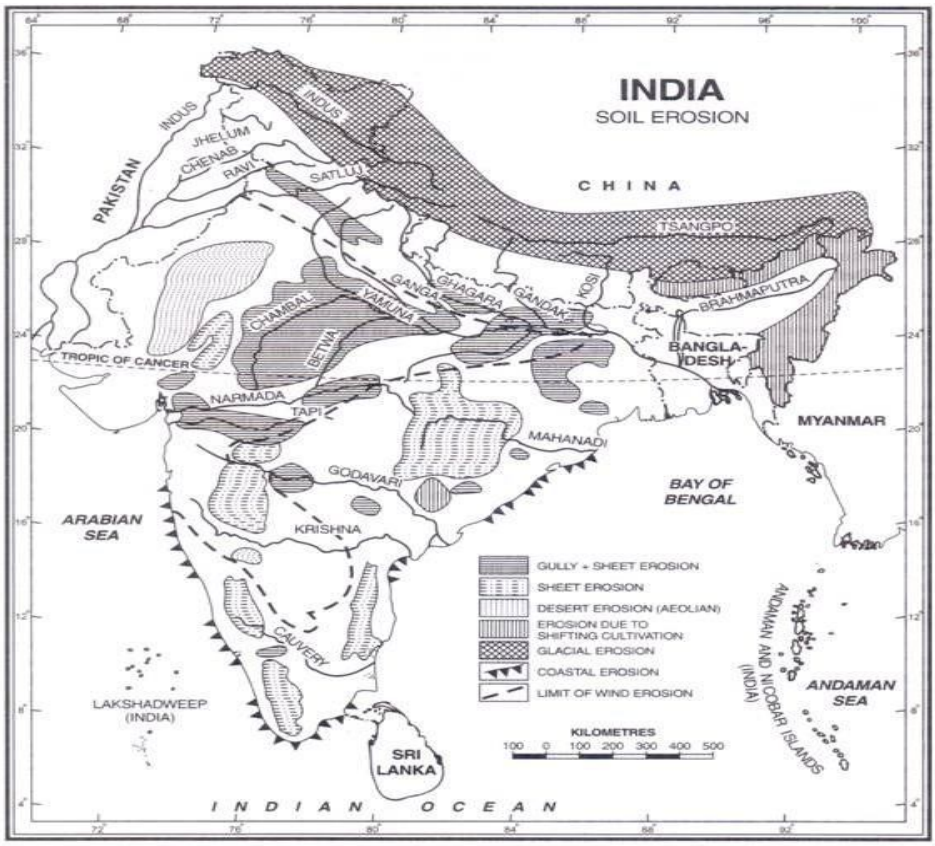
in Rajasthan and the adjoining areas of Haryana, Punjab and Gujarat. In addition to action of water, winds and glaciers, human and animal interferences also lead to soil erosion in a variety of ways.

If we keenly study about the role of wind in soil erosion it comes to know that deforestation, overgrazing and faulty methods of agriculture contribute significantly to soil erosion. Trees and plants protect soil from erosion by binding the structure directly and by constantly adding moisture to it. Vegetation and litter from trees also acts as a cushion against splash erosion during rains. Therefore, deforestation invariably leads to soil erosion and floods. The large scale rill and gully erosion in the Siwalik foothills in Punjab leading for formation of chosand the ravines in Madhya Pradesh, Rajasthan and Uttar Pradesh formed through gullyerosion are largely the resultof reckless deforestation.

Figure- Soil Erosion in India



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According to the estimates, around 34 lakh tones of fertile soils is eroded by wind every year in Rajasthan alone. The prominent districts which experience this drastic soil erosion in Rajasthan are Jodhpur, Bikaner, Kota, Jaipur, Bharatpur, Kishangarh etc. The main cause is thatthese areas receive scanty rainfall. As a lack of rainfall,these regions are devoid of vegetation cover and have sandy soil. This makes the soil loose and promotes soil erosion.

Causes of Soil Erosion: The phenomenon of soil erosion occurs as a result ofremoval of soil faster than the formation of soil. The causes of soil erosion largely vary from region to region however, lack of vegetation in every region is the prime cause. A few other reasons for soil erosion are:

1. **Topography of the Region:** Topography and sloping of the land are major contributing factors in soil erosion. The different slopes causing soil erosion are:
    - **Plains:**Here the erosion is comparatively less than on slopes. But in regions where the rivers overflow onto the plains, the erosion is severe. For example, the entire basin of the Kosi River is threatened by the over-flowing of river.
    - **Hilly Region:**Rainfall occurs in torrents and washes away the top layer of the soil. Also, the steep slopes stimulate the eroding power of the rainwater.
2. **Amount of Rainfall:**The fact is that all thefloods and torrential rains cause more damage than light or moderate showers spread over many days.The action of heavy rain is stronger when there are no trees and the plains are bare. For example, when a prolonged dry spell is followed by sudden heavy rain, sheet erosion takes place. This is because the ground gets baked hard and the soil is unable to absorb the water easily.
3. **Type of Soil:** It also depends on the type of soil how much amount of soil is eroded.Porous soils with good water-absorbing capacity are least subject to erosion, while the impervious soils are gradually eroded by the action of water.
4. **Human Activities:**Nobody can deny the fact that human activities are also responsible for soil erosion to a great extent. As the human population increases, the

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demand on the land also increases. Forest and other natural vegetation are removed for human settlement, for cultivation, for grazing animals and for various other needs. Improper use of land leads to soil erosion. These activities may be as under:

- **Process of Deforestation:**Actually it is the removal of trees and other vegetation which hold the soil together. When vegetation is removed, the soil surface is loose and more easily removed by running water and wind. Rain water that could have been absorbed by the soil, rapidly runs off the surface carrying soil with it.
- **Overgrazing of Land:**This activity also may be responsible for soil erosion up to some extent. Some of the scholars have argued that grazing of animals results in removal of grass over a large area making it easy for wind and running water to remove the soil. In many parts of India, hill sides have become barren because of overgrazing by goats.
- **Unscientific Farming Techniques:** Ploughing fields in the traditional up and down manner along the slopes makes it easier for running water and wind to cause erosion.

Effects of Soil Erosion: There have been many studies on the causes and effects of soil erosion in India in different parts. Therefore, the studies have pointed out some adverse effects of soil erosion as under:

- Erosion of the topmost fertile layer of the soil can lead to a lack of soil fertility. This results in a decline in the agricultural productivity of the soil.
- Soil erosion makes the soil loose. Thereby making the soil prone to the damaging power of landslides.
- Silting takes place in the canals, rivers etc. due to soil erosion. This decrease their water holding capacity and hence hampers their functioning.
- It is difficult to plant vegetation in the eroded soil. Therefore, soil erosion also expands arid land.

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- There is a decrease in moisture retention capacity of soil due to erosion. This lead to a decline in the ground water level of the area.
- Arid soil created due to soil erosion increases thefrequency and intensity of droughts.
- When flooding and leaching takes place on the eroded soil, the minerals are washed away thereby creating more arid land.
- A decline in agricultural productivity and increase in arid land due to soil erosion is a great setback to the whole economy.

Suggestions:A number of measures can be taken to avoid the devastating effects of soil erosion. These are as following:

- Planting vegetation on the soil can increase the hold of plants on the topmost layer of soil. This can prevent soil erosion of the topmost fertile layer.
- Mulching and rocks should be used at places where shrubs cannot be planted to avoid erosion.
- Water should be used judiciously on the soil for irrigation. Techniques like drop irrigation method can help in conserving water while preventing soil erosion at the same time.
- Construction of bunds on the fields can protect the soil from erosion.
- Usage of Geotextiles like woven, nonwoven, and coir can help in stabilizing the soil.
- Crop rotation is helpful in conserving the fertile layer of soil.

References:

- Das, D.C. (1977), "Soil Conservation Practices and Erosion Control in India –A Case Study",**FAO Soils Bulletin**, Vol. 33, pp.22-28.
- Bansil, P.C., (1990),**Agricultural Statistical Compendium**, Vol.1, Techno-economic Research Institute, New Delhi.
- Singh, Gurmel,et. al., (1990), "Soil Erosion Rates in India",**Journal of Soil and Water Conservation**, Vol. 47(1), pp. 97–99.

ISSN: 2235-767X
Volume 06 Issue 11
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- Narayan, V.V.D. (1993),**Soil and Water Conservation Research in India**, ICAR Publication, New Delhi.
- Deb, D.L., (1994), (ed.), N**atural Resource Management for Sustainable Agriculture and Environment**, Angkor Publishers, New Delhi.
- Pachauri, R.K &Sridharan, P.V. (1998),**Looking Back to Think Ahead: Growth with Resource Enhancement of Environment and Nature**, Tata Energy Research Institute, New Delhi.
- Reddy, V. R., (2003),"Land degradation in India: Extent, Costs and Determinants",**Economic and Political Weekly**, Vol. 38(44), pp. 4700–4713.
- Singh, S. and Saroha, J. (2014),**Geography of India**, Access Publishing, New Delhi.
- https://www.geographyandyou.com/climate-change/environment/soil-erosion-and-conservation-in-india.
- https://www.indiatoday.in/education-today/gk-current-affairs/story/india-loses-one-third-of-coastline-about-soil-erosion-soil-accretion-html.
- https://www.researchgate.net/figure/Extent-of-soil-erosion-in-India.