

Human Impact on Soil | sample answer

Q: Discuss how human activities can accelerate soil erosion. (2012 Q17)

(3 aspects will be discussed)

- 1) Overgrazing: Overgrazing is major cause of desertification and soil erosion. The rising population is increasing this problem.

Soils are composed of grains which occur in small clumps called peds. Peds hold the soil together. Water also holds soil together. Changes to the conditions that formed soil can cause soil erosion to occur.

The pore spaces between peds hold air and water which is important for plant growth. Over-grazing damage the structure of soil, reducing its ability to support plant growth.

Overgrazing is caused by an excessive number of livestock feeding for too long in a particular area.

Consequently, the land is left bare making it prone to soil erosion.

The conservation of traditional rangelands to cash crops, cities and road surfaces reduce the amount of land available for grazing and therefore adding to overgrazing the land that remains.

Because of the rapidly growing population in places like the Sahel, the need for more food is constantly present, this also encourages overgrazing,

Plant roots stabilize the soil and thus reducing the amount of soil washed away in the rain . Overgrazing results in the removal of natural vegetation and therefore increase soil being washed away (eroded).

Removal of natural vegetation can also cause sheet erosion. Sheet erosion is the movement of soil from raindrop splash, the splash damages the structure of the soils surface and increases surface runoff. All the topsoil is washed away.

Soil erosion occurs when water collects in areas and form undefined channels, these can grow into gullies and hinder capital intensive farming, this would not occur if the grazing was managed and soil was held together by grass roots etc.

- 2) Over cropping: is the growing of too many crops on a certain portion of land, it causes loss of nutrients and consequently soil erosion.

Over cropping/ overcultivation is the growing of too many crops per hectare. The soil becomes dry and dusty, resulting in a loss in soil fertility.

Over Cropping occurs if farmers do not practice crop rotations or farmers do not leave the land fallow or farmers can't afford fertilizers.

The Sahel region in Africa is being overcropped, causing desertification. In the past 50 years the Sahara has advances into the Sahel at 2km to 5km per year.

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Over cropping is increasing with the population (like overgrazing). The population growth of 3% per year is greater than the ability of the Sahel to produce food. It is only increasing its productivity by 2% per year.

These increased food demands were met by the introduction of intensive agriculture. Huge areas were cleared. This removed the roots and heavy seasonal rainfall washed away topsoil.

Natural vegetation provided shade for soil. When removed, increased evaporation occurs. This causes an increase amount of salt to rise to the surface and this imbalance inhibits growth.

Salinisation forms a hard white crust which acts as a barrier to nutrients entering soil. The removal of plants also reduces the amount of moisture in the area.

The less moisture means there is less water being evaporated into the atmosphere and therefore forming fewer rain bearing clouds. Consequently, rainfall amounts decline, soil erosion increases and desertification occurs.

In poor African countries cash crops are encouraged to pay off international debts. The repetitive growing of the same crop on the same place reduces soil's fertility and nutrients, causing soil erosion.

3) Deforestation: Deforestation occurs for logging timber, cattle ranching, road building and agriculture. It causes climate change and soil erosion.

Deforestation refers the destruction of a forest habitat due to either natural (landslide) or human related causes (logging).

Humans by far are the greatest cause of deforestation. In Brazil, 10000 square miles of rainforest was cleared in 2003.

According to the U.N. Food and Agriculture Organisation (FAO) 7.3 million hectares of natural forest are lost annually (20,000 hectares per day).

Deforestation can occur to convert forest land into arable or pastoral farmland. This is happening in the Sahel region in Africa and Amazon Basin in South America.

When forest is removed so are the microorganisms and consequently the nutrient humus. Without humus and shade the soil can develop a hard brick like surface.

This is most commonly found with Latosols in the Amazon. Iron and aluminium rich soil is exposed to intense heat and becomes a laterite, this impossible to cultivate.

Deforestation prevents the water table from replenishing. Trees hold rainfall in their roots. This rainfall, overtime, sinks into the ground back into the water table.

Without roots, because of deforestation, rainwater runs off and is evaporated into the air and as a result does not enter the water table.

Furthermore, the absence of vegetation cover results in the soil being eroded more quickly. Plants are unable to grow in the less nutritious soil left behind.

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At local level the slash and burn method is used to clear land. The farmer burns the trees and vegetation creating a fertilising layer of ash. Following slash and burn the soil quickly loses a lot of nutrients, increasing soil erosion.