

SOIL POLLUTION SOIL POLLUTANTS TYPES SOURCES AND CONTROL

INTRODUCTION

Soil pollution is defined as the presence of toxic chemicals (pollutants or contaminants) in soil, in high enough concentrations to pose a risk to human health and/or the ecosystem. In the case of contaminants which occur naturally in soil, even when their levels are not high enough to pose a risk, soil pollution is still said to occur if the levels of the contaminants in soil exceed the levels that should naturally be present. The main reason why the soil becomes contaminated is due to the presence of manmade waste. The waste produced from nature itself such as dead plants, carcasses of animals and rotten fruits and vegetables only adds to the fertility of the soil. However, our waste products are full of chemicals that are not originally found in nature and lead to soil pollution.

SOIL POLLUTANTS TYPES AND SOURCES

1. Industrial Activity

Industrial activity has been the biggest contributor to the problem in the last century, especially since the amount of mining and manufacturing has increased. Most industries are dependent on extracting minerals from the Earth. Whether it is iron ore or coal, the by products are contaminated and they are not disposed off in a manner that can be considered safe. As a result, the industrial waste lingers in the soil surface for a long time and makes it unsuitable for use.

2. Agricultural Activities

Chemical utilization has gone up tremendously since technology provided us with modern pesticides and fertilizers. They are full of chemicals that are not produced in nature and cannot be broken down by it. As a result, they seep into the ground after they mix with water and slowly reduce the fertility of the soil. Other chemicals damage the composition of the soil and make it easier to erode by water and air. Plants absorb many

of these pesticides and when they decompose, they cause soil pollution since they become a part of the land.

3. Waste Disposal

Finally, a growing cause for concern is how we dispose of our waste. While industrial waste is sure to cause contamination, there is another way in which we are adding to the pollution. Every human produces a certain amount of personal waste products by way of urine and feces.

While much of it moves into the sewer the system, there is also a large amount that is dumped directly into landfills in the form of diapers. Even the sewer system ends at the landfill, where the biological waste pollutes the soil and water. This is because our bodies are full of toxins and chemicals which are now seeping into the land and causing pollution of soil.

4. Accidental Oil Spills

Oil leaks can happen during storage and transport of chemicals. This can be seen at most of the fuel stations. The chemicals present in the fuel deteriorate the quality of soil and make them unsuitable for cultivation. These chemicals can enter into the groundwater through soil and make the water undrinkable.

5. Acid Rain

Acid rain is caused when pollutants present in the air mixes up with the rain and fall back on the ground. The polluted water could dissolve away some of the important nutrients found in soil and change the structure of the soil.

EFFECTS OF SOIL POLLUTION

1. Effect on Health of Humans

Considering how soil is the reason we are able to sustain ourselves, the contamination of it has major consequences on our health. Crops and plants grown on polluted soil absorb much of the pollution and then pass these on to us. This could explain the sudden surge in small and terminal illnesses.

Long term exposure to such soil can affect the genetic make-up of the body, causing congenital illnesses and chronic health problems that cannot be cured easily. In

fact, it can sicken the livestock to a considerable extent and cause food poisoning over a long period of time. The soil pollution can even lead to widespread famines if the plants are unable to grow in it.

2. Effect on Growth of Plants

The ecological balance of any system gets affected due to the widespread contamination of the soil. Most plants are unable to adapt when the chemistry of the soil changes so radically in a short period of time. Fungi and bacteria found in the soil that bind it together begin to decline, which creates an additional problem of soil erosion. The fertility slowly diminishes, making land unsuitable for agriculture and any local vegetation to survive. The soil pollution causes large tracts of land to become hazardous to health. Unlike deserts, which are suitable for its native vegetation, such land cannot support most forms of life.

3. Decreased Soil Fertility

The toxic chemicals present in the soil can decrease soil fertility and therefore decrease in the soil yield. The contaminated soil is then used to produce fruits and vegetables which lacks quality nutrients and may contain some poisonous substance to cause serious health problems in people consuming them.

4. Toxic Dust

The emission of toxic and foul gases from landfills pollutes the environment and causes serious effects on health of some people. The unpleasant smell causes inconvenience to other people.

5. Changes in Soil Structure

The death of many soil organisms (e.g. earthworms) in the soil can lead to alteration in soil structure. Apart from that, it could also force other predators to move to other places in search of food.

A number of ways have been suggested to curb the current rate of pollution. Such attempts at cleaning up the environment require plenty of time and resources to be pitched in. Industries have been given regulations for the disposal of hazardous waste, which aims at minimizing the area that becomes polluted. Organic methods of farming

are being supported, which do not use chemical laden pesticides and fertilizers. Use of plants that can remove the pollutants from the soil is being encouraged. However, the road ahead is quite long and the prevention of soil pollution will take many more years.

CONTROL OF SOIL POLLUTION

A) Biological method

- (i) Crop related
- (ii) Forestry related.

(i) Crop related:

1. **Crop rotation** – It implies frequent succession of crop on the same portion of land in a given time-frame. Crop mixes such as wheat, mustard, Arhar, Groundnut, maize+ cowpea etc., can be grown. Thus, after a harvest of one crop there is another growing up or covering the soil so that the soil is never bare or exposed.
2. **Planting along the contours** – Leguminous plants, cowpea and cereal crops can be grown in a particular way to check soil erosion. This helps farmers get maximum profit with least investment and increases the fertility of the soil.
3. **Strip cropping** – This reduces the velocity of water flow and prevents erosion.
4. **Steep farming** – This prevents erosion by reducing sludge. This leads to the use of hilly land for cultivation.
5. **Crop Residues** – By laying a thin layer of 10-15 cm of crop residues in farming, erosion and vaporization can be prevented. With this method, Rabi crop can be increased up to 30 percent. After a crop we should leave the stubble in the field. Then untimely rains and wind don't destroy much.
6. **Protector Belt** – By planting trees and bush in the right angle, depending on the direction of wind along the fields, the erosion caused by wind can be stopped.
7. **Use of fertilizers** – Use of dung manure, vermicompost or compost, green manure and other organic composts reduce soil erosion.

(ii) Forest implantation method

Forests are very helpful in preventing soil erosion. There are two functions under this-

1. First, develop forests in new areas for increasing the soil fertility and formation. This reduces the erosion of rain water and air.
2. Second, new forestry should be adopted where there is excessive pollution of forests, excessive animal feed and surface degradation.

B) Mechanical method

This method is relatively expensive but effective too.

- 1. Contour holding system** – In this, the fields are planted in the right direction of the sloping direction, so that the water flowing through the slopes cannot erode the soil.
- 2. Making bunds** – Bunds across the slopes prevent erosion in excessive sloping place.
- 3. Gully control** – (i) By stopping the flooding water (ii) by increasing the vegetative cover and (iii) creating new pathways for runoff.