

## Soil Pollution: Causes and Remedies

Soil pollution is the addition of chemicals to the soil in quantities that are toxic to the environment and its residents. This addition is mostly by human activities such as mining, modern practices in agriculture, deforestation, indiscriminate dumping of human generated trash and unregulated disposal of untreated wastes of various industries

Pollution by agricultural practices has come up ever since the demand for food has increased, proportional to the increase in population. To increase the yield of farms and fields the farmers have had to resort to additional chemical fertilizers, pesticides, weedicides, hormonal treatments for the animals, nutrient laden feed and many such practices which changed the way farming was done traditionally.

### Causes of Soil Pollution

#### Indiscriminate Use of Chemical fertilizers

These are mostly nitrogen and phosphorus based chemicals like ammonia and nitrates that are most often than not, used in larger than required quantities and tend to accumulate in the soil.

#### Chemical pesticides

Controlling pests are a farmer's need if a good crop is to be reaped. Pesticides and insecticides like organochlorines, organophosphates and carbonates are used regularly. These also contaminate the ground not only in the fields, but also in the places of manufacture, storage and disposal. They also tend to **bio accumulate** i.e. they collect in the body of the insects and then enter the food chain and lead to chronic poisoning of the higher level animals. Some pesticides also are absorbed naturally by the plants themselves and stored their different parts.

## **Heavy metals**

Cadmium, fluoride, radioactive elements like uranium are regularly found in the parent minerals from which the fertilisers are obtained. Dangerous metals such as Mercury, Lead, Arsenic, Chromium, and Nickel are seen in traces in Zinc rich wastes from the steel industries which are used as fertilizers. These are often not removed from the because of the high cost involved.

## **Excessive tillage of the land**

Overturning, digging or stirring leads to release of greenhouse gases produced in the ground such as nitrous oxide

## **Soil erosion**

Loss of soil material due to poor management causes soil to become infertile. Soil erosion is followed by deforestation, storm water runoff, overgrazing and excess of agriculture practices, constructions, mining. The soil sediments settling elsewhere on land or in water cause differences to occur in the environments there. In water it causes murkiness reducing visibility for fish and other animals sourcing their food. It leads to reduced penetration of sunlight and affects the process of photosynthesis causing reduction in oxygen levels of the water. Heavy pollutants and nutrients are bound to the sediment particles and carried into the water contaminating it. Faster rate of soil erosion changes the topography of a place.

## **Animal management**

The disposal of manure and other associated waste material from animal farms are also a reason for soil pollution. They cause pollution of the air as well as the water. 18 per cent of Greenhouse gases are said to be generated by farm animals. The large amounts of manure created, carry pathogens that are harmful for humans too.

## **Landfills and other waste dumping issues.**

Human generated sewage is a major cause for soil pollution. At the same time waste products such as plastics, glass, metals, Batteries, paper, fibers and rubber etc. add to the contamination as most of these are non-biodegradable. Much of the trash can be recycled such as paper, metal and glass, etc. Leaching of toxic materials occur at landfills. The more dangerous substances found in landfills are oils, battery metals, heavy metals from smelting industries and organic solvents.

## **Acid rain**

Air pollutants, sulphur dioxides, nitrous oxide and others combine with rain water, form acids and reach the soil. This is called acid rain. It reduces the pH of the soil ie it makes it acidic. It changes the nutrient content of the soil. These changes have adverse effects on the plants growing here, the insects and the other animal's dependant on the land.

## **Remedies of Soil Pollution**

- Managing and regulating the chemical waste disposal by industries is vital to soil health. Treatment of the wastes before disposal to remove chemicals and heavy metals at any cost must be done
- Prevention can never be a solo effort. The state governments, farmers' organisations, collectives and cooperatives, educational institutions and conservation groups need to work together for regulating and reducing farming related soil pollution.
- Planning the application of fertilizer at the right time, in the right quantity with the correct methods can reduce the accumulation of chemicals.
- Planting certain grasses and clovers that can absorb and recycle the additional nutrients and prevent soil erosion. Planting rows of trees and shrubs around fields and along the borders of the stream or lake also help in the same way.
- Over tilling of the soil must be avoided to prevent soil erosion and soil compaction.

- Managing the correct disposal of human and animal wastes and treating the sewage before release makes a big difference in the magnitude of soil and water pollution
- Composting, solid liquid separation, anaerobic digestion and lagoons are different ways of managing animal manure. Of these anaerobic digestion is the most effective. It involves the use of anaerobic bacteria and heat. The products of this process are nutrient rich liquid used as fertilizer and methane gas that can be burned to produce electricity and heat. Anaerobic digestion is a best method for controlling odour associated with manure management.
- A forestation or planting of more trees is always good for binding the soil.