

# Soil pollution



**ASSIGN  
BUSTER**

## **Introduction**

Soil pollution is caused by the presence of chemicals made by man or alteration in the natural soil environment. This type of contamination typically grows from the rupture of pesticides, underground storage tanks, percolation of contaminated surface water to subsurface strata, oil and fuel dumping, leaching of wastes from landfills or direct discharge of industrial wastes to the soil. The chemicals which are involved mainly are petroleum hydrocarbons, solvents, pesticides, lead and other heavy metals. Occurrence of this development is correlated with the degree of industrializations and intensities of usage of chemicals.

## **Objective of the study**

This study has the following objectives

1. To study the process of soil contamination.
2. To study the cause, effects and control measures of soil contamination.
3. To study various remediation technology available for soil contamination.
4. To test soil specimen for shear strength using Direct Shear Test.

Depending upon the contaminant of the soil specimen, to provide a remedial solution for the soil contamination

## **Soil Contamination**

Soil contamination must be decimated to check that the best develop is grown for intake, (most important for organic farmers) it has to be proved first that the soil and land are of good quality, Many things are there making up the soil. In the area that soil made of basic organic parts basic such as

granite or limestone, then there are organisms that break down like leaves, critter muck etc, the land's location and altitude bottom of the vale or on a mountain inclination, climate is also an crucial factor (ILO. 1992).

### **Effects on plants**

It counts on what type of soil, the type of toxins present and the rigor of the soil pollution, as to how much or what comes in the plant, essentially sandy soil is less likely to grab on to chemicals, whereas soil carrying more organic matter like as peat moss will keep to contaminants more readily this has the impression of altering the metabolic stage of the microorganisms soil is held of, thus the pollutes enter the chain of food. Soil pollution can also affect those who touch it, depending on the pollutes, when small animals take over and polluted dust particles inhaled by them, occasionally some serve contaminations in dust form, are absorbed by the skin.

### **Causes of soil contamination**

Well there's oil falls, pipe line leaks, toxic spills land that has been used before for things like as mining, gas stations, factories, airports all of these have polluted soil below them, the unnatural stuff's heaps in the landfills percolating into the ground, use of over fertilizers in some countries crops are still spray very toxic pesticides, all these things are reason of soil pollution around the world. When natural disasters happens like as earthquakes, tsunamis and hurricanes then facilities that have oil, toxins and chemicals become damaged or destroyed, their spills and leaks cause soil pollution, roughly 10 mi.<sup>2</sup> of land in southeast of New Orleans became polluted, when over one million gallons of oil dowsed into the earth after a hurricane, demolished some holding facilities (Jewell, R. A., 1996).

- Storage of products and/or waste is Incorrect in industrial activities
- Uncontrollable waste disposal
- Waste of Industrial construction and demolition
- Drums which are underground
- Goods transport's accidents
- Faulty operations or leaks from tanks
- Waste of water disposal
- Wrong use of pesticides and/or manures
- Bad or open sewers in a poor state
- Air pollutant's deposition

### **Concerns and health problems**

China has little lawmaking in place for the security of land to protect against soil pollution, unfortunately it looks like that over a 10% of the land has soil pollution, land is being watered by contaminated water. Since the 1970's there have been oozing from toxic tar island dam in the soil, and more lately a scallion of toxic polluters was discovering into the Athabasca River, a supply of water for Alberta.

### **Effects**

- Contamination of surface water
- Contamination of ground water
- Contamination of river sediment
- Volatile compounds Evaporation
- Inside houses air contamination
- Supply of contaminated water
- Ingestion of contaminated soil

- Using of contaminated surface waters
- Digging danger
- Contamination of animals and farm vegetables through the use of ground waters

### **Control measures for soil contamination**

- Controlled waste landfill
- Industries with adequate prevention and protection measures
- New sewer networks
- Waste water purifier
- Liquid manure storage basin

### **Remedial Solutions to soil erosion**

#### **Physical – Rainfall and Runoff**

1. Rainfall and water runoff are the two biggest culprits when it comes to soil erosion from water.

The impact of physical raindrops on the soil surface can eventually break down the its structure and disseminate essential nutrients. The more usurious the slope of a field, the greater the runoff will be. That is the reason it is important to only plant on flat, horizontal land. As the slope length increases, so does the intensity of the runoff the water. If you must plant on a sloped surface, avoid very large stretches of land.

It is mandatory to be a proper drainage whenever trying to combat water erosion. Water can't be absorbed by soil whenever it is collected on a slope, runoff will occur. Ensure that the land you want to farm on has enough drainage (Jewell, R. A. 1996).

## **Soil Health**

2. High level of organic matter in soil, structure in proper form and fast water infiltration rate is considered healthy and repellent to water erosion. Soil containing toxins, high levels of sand, or coarse-textured soil is considered unhealthy and prostrate to erosion by water. Growing crops that are autochthonal to the region will greatly help in maintaining a healthy soil base resistant to erosion. Rotation of Crop is another way of keeping your soil healthy and resistant to water erosion. Harvesting the same crops continually in the same location can lead to the collection of toxins and a natality imbalance in the soil. There are many forms of vegetation that can be grown to help protect against erosion of water. Ground will thickly covered by vegetation and form a network that will absorb water, which in turn reduces runoff. Vegetation provides extra roots from channels that help with drainage, as they allow surface water to permeate the soil. Vegetation will also provide cover for the soil, which reduces damage and runoff from raindrop impact.

## **SOLUTIONS**

1. To avoid erosion of bare soil, it is essential to assert a cover to vegetation, mainly in the areas which are most dangerous e. g. those with infuse slopes, a periods of very heavy rainfall or season infuse. To do it may intend only partially gleaning forests and using seasonally wet or dry areas for pastoral rather than agriculture which is arable.
2. Where polish which is intensive takes place, the farmers also use a crop rotation in order to avoid the soil becoming consumed. Where soils are covered in harmful areas, shape sloughing should be used. Careful management of irrigation, to prevent the application of too

much or too little water, should help cut down the problem of salivation.

3. Livestock skimming rates must be carefully managed to keep overgrazing.
4. Perhaps we must attempt to limit highway construction and urbanization to areas of lower agricultural potential. With extractive industries, a pledge must be assured to restore the land to its former condition before planning permit for quarries or mines is granted.

**The principal approaches these strategies take are**

Sheep pasture with macroscale erosion.

- choice of vegetative cover
- erosion prevention
- salinity management: specific state-wide salinity control objectives are:
- With good quality groundwater stabilize water tables at harmless levels in irrigation areas
- Significantly retard rising groundwater by control of groundwater recharge, and where necessary to adapt to higher saline conditions in irrigation areas with saline groundwater
- Significantly reduce additions to the groundwater organizations and to substantially improve business problems associated with localized water in ground systems
- Where appropriate and protect and rehabilitate high in value wetlands and other features which are significant environmental.

**Mineralization:**

To allow plant's phytonutrient potential, active mineralization of the soil is sometimes undertaken. It can be in the form of natural or adding squeezed rock or can bring the form of soil of chemical supplement. The purpose is to combat mineral depletion in either case depletion of the soil. Wide range of minerals can be added including common substances like P (phosphorus) and more exotic substances such as Zn (zinc) and Se (selenium). Extensive researches are there on the phase transitions of stuffs in soil with aqueous contact. The flooding process can bring significant bed load sediment to an alluvial plain. While its effect may not be considerable if floods threaten life or if the eroded deposit originates from productive land, this natural process that can regenerate soil chemistry through mineralization and macronutrient addition (Netterberg, 1971).

**No till farming:**

It is a way of growing crops from one year to next to next year without breaking the soil through tillage. It is a latest agricultural technique which can increase the water amount in the soil and decrease the erosion. No till farming may also increase the amount and variety of life in and on the soil but requires increased herbicide usage.

**Contour plowing:**

Contour farming and contour plowing is the farming practice of plowing across an incline following its elevation contour lines and rows formed slows water dispel during rainstorms to protect soil erosion and allows the water time to get settle into the soil.



**Crop rotation:**

This is a practice (Crop rotation or Crop sequencing) to growing dissimilar types of crops in the same region in back-to-back seasons for various profits such as to keep off the buildup of pathogens and cusses that generally occurs when one type of crop is continuously cropped. Crop rotation also seeks to balance the fertility demands of various crops to avoid excessive depletion of soil nutrients. A traditional component of crop rotation is the replenishment of nitrogen through the use of green manure in sequence with cereals and other crops. It is one component of poly culture. Rotation of crop can also improve soil structure and fertility by alternating deep-rooted and shallow-rooted plants.

**Resting the land:**

To grow the crops properly they need nutrient rich soil. If we don't land rest between crops than the first crop will use nutrients all present in the soil and the crop which will grow later will grow poorly as a result. Resting the land allows put a little more organic material into the soil by our nature, so it is necessary replenishing it before you plant crop after another.

**Direct Shear Test:-**

Objective: To determine the shearing strength of the soil using the direct shear apparatus.

**Apparatus**

1. Direct shear box apparatus
2. Loading frame (motor attached).
3. Dial gauge.
4. Proving ring.

5. Tamper.
6. Straight edge.
7. Balance to weigh upto 200 mg.
8. Aluminum container.
9. Spatula.

**Procedure:-**

1. Measure the inner dimension of the soil container.
2. The parts of the soil container are put together.
3. The volume of the container is calculated and it is weighed.
4. The soil is placed in smooth layers (approximately 10 mm thick). Tamp the soil if a dense sample is desired.
5. The soil container is weighed, the difference of these two gives the weight of the soil. The density of the soil is calculated.
6. The surface of the soil is made plane.
7. The upper grating are put on stone and block loaded on top of soil.
8. The thickness of soil specimen is measured.
9. The desired normal load is applied.
10. The shear pin is removed.
11. The dial gauge is attached which measures the change of volume.
12. The initial reading of the dial gauge is recorded and values calibrated.
13. Check all adjustments to see that there is no connection between two parts except sand/soil before proceeding to test.
14. Start the motor. The reading of the shear force is taken and recorded.

15. Volume change readings are taken till failure.
16. 5 kg normal stress  $0.5 \text{ kg/cm}^2$  is added and the experiment is continued till failure
17. All the readings are recorded carefully. Before starting the experiment set the dial gauges zero,.

Two soil specimens were chosen for the test.

Sample one: Clean and not contaminated with weight of 16 kg

Sample two: Contaminated with fuel ash with weight of 8 kg

As explained in the procedure above, two soil samples were tested. After the test, following results were obtained:

1. Load at failure for sample one = 87.5 N
2. Load at failure for sample two = 29.1 N
3. The contaminated sample will be used for the design project to assess its commercial viability.

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