

## ENVIRONMENT

# Environmental problems of soil

## PART 1

JO-ANNE NINA SEWLAL

Dept of Life Sciences,  
University of the West Indies



**I**N MY opinion, the soil and its importance to our environment are overlooked although it is an important component of our environment.

After all, without soil there would be no plants and in turn no herbivores and carnivores, and no means to absorb the carbon dioxide and give off oxygen which many organisms need to survive.

Therefore I think it is important that we look at some of the environmental problems facing soil and how we can conserve this valuable component of our ecosystems. There are three main problems facing soil; namely erosion, contamination and salinity.

However, all of this information cannot fit into a single article so I have divided it into two parts. This week I will look at soil erosion and contamination including the causes and how it can be remedied. Next week I will deal with soil salinity and conservation.

One of the major environmental problems facing soil is erosion. Before I go any further let me distinguish between the processes of weathering and erosion. Weathering occurs when rocks that are exposed to heat during the day expand and contract at night when it becomes cooler. This constant expansion and contraction weakens the rocks and over time it will crumble into smaller particles, and is actually how soil is formed.

Erosion on the other hand occurs when soil that is not held together is transported



to another area by wind, water, ice or gravity if erosion occurs on a slope.

There are many factors at play when it comes to erosion. For instance, the type of soil in an area is very important, as soils with high sand and silt content or weathered rock erode quite easily. The spaces between the particles and permeability of the soil are other factors that need to be considered, as they affect the amount of water that leaches underground. This is important in that the more water that goes underground means the less surface run off from rainfall there is, and in turn less surface erosion. The gradient of the area is also important as steeper gradients mean a faster rate of surface run off and more erosion of the area.

Now on to some factors of erosion that are influenced by human activities, for instance, the removal of vegetation; the roots of the plants hold the soil together. Severe bush fires like the ones that have ravaged our hillsides not only kill much of the vegetation holding the soil together, but

also remove the organic layer. It is a common mistake to believe that removal of the forest canopy is the cause of erosion. Actually it is the removal of the layer of leaf litter and organic matter on the forest floor that is detrimental. This is because as raindrops collect and fall from leaf to leaf on their way to the forest floor they get bigger and end up striking the floor with greater velocity than if they were in the open. Therefore, this layer of leaves and organic matter acts as a cushion to these large raindrops.

The construction of roads changes the drainage pattern of the area and increases surface run off. Livestock farming can also make an area prone to erosion. If it is heavily grazed rather than rotating the areas the animals feed without allowing the grass to grow back. Another scenario would be putting too many animals to graze in a limited area so that there is no space to rotate the feeding areas of the animals.

Like other components of our environment, soil can also become polluted or con-

taminated by the presence of man-made chemicals. Contaminants usually enter the soil and either attach themselves to the soil particles or occupy the spaces between the soil particles. These chemicals usually enter the soil by the rupture of storage tanks, the leaching of pesticides and herbicides as well as contaminated surface water or from chemicals in landfills.

These contaminants can be passed along to humans if they eat crops grown in this polluted soil.

The type of contaminant determines how they are transmitted to other organisms, for instance, some particles may be so small that they attach to small soil particles and become airborne and are thus breathed in.

One can also come in contact with contaminated soil according to one's job, for instance digging soil, ploughing a field in preparation for planting of crops. Animals also become affected by ingesting or burrowing in contaminated soil.

But, this problem can be remedied in three main ways.

Firstly, the contaminated soil can be excavated and removed from the area. Secondly, the soil can be left in place and treated by flushing with water, air or chemical solvents or by incineration. Additional treatments include biological containment using microbes which break down the contaminant in the soil or by chemicals which encapsulate the particles to prevent it from spreading.

So we can see that soil is prone to both erosion and contamination. The former can occur both due to natural and human activities while the latter is solely due to human activities.

Although both of these environmental problems can be remedied, it is quite costly in terms of time and money.