

The Forest Foundation (Part I)

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A Riddle: *What am I?*

I withstand an amazing amount of abuse. Sometimes it's just too much and I'm lost. The dirty names I've been called... yet people can't live without me. So many dump their problems on me. I was here before you, and I will be here after you, and I am all over the world. What am I?

I am soil.... the stuff of dirt-balls, mud-slides and plant growth!

The first thing I learned in my Purdue soils class was the difference between soil and dirt. Dirt is the stuff under fingernails and stuck on the bottom of boots. Soil is a living system necessary for life. Since dirt often carries a negative connotation, I think this is a valuable distinction. Soil is, quite literally, the foundation of our lives. Even though it is such a thin layer of our earth's surface, like the peel of an apple, we depend on it for our daily food and fiber.

Soil is a complex system of living and non-living things. The shortest definition of soil, published by the Soil Science Glossary by the Soil Science Society of America, is: *"The unconsolidated mineral or organic material on the immediate surface of the Earth that serves as a natural medium for the growth of land plants."*



Soils are complex, living systems. Here, Don Flegel, a scientist with the Natural Resources Conservation Service, examines soil in a recently excavated pit in Page County. Photo by: Jennifer Gagnon, Virginia Tech.

The mineral and organic components of soil are variable and depend on many factors. These factors include the geologic history of an area (e.g., glaciated or not), past use of the soil (e.g., forest, crops, pasture), and management (e.g., drained, fertilized, limed).

The basic mineral components of soil result from the type of parent material (i.e., the rock and such beneath the soil) from which it came. These mineral components give soil its pH and texture (sand, clay, loam) which are relatively stable properties and difficult to modify. Gardeners and lawn care enthusiasts know this. Where native soils are more acidic than what is optimal for most vegetable crops and turf, lime can be applied to modify pH. However, this needs to be repeated on a regular basis to keep the soil from reverting to its native pH.

The organic components of soil, however, are readily modified. This lesson was learned the hard way during the dust bowl when the Great Plains were plowed under to grow wheat. This worked well until the organic matter was depleted and the soil lost its structure (ability to hold together) and became dust in the wind. Organic matter is living material such as woody plants and grasses. While alive, organic matter holds the soil in place with its roots. Once dead, as it decomposes organic matter acts as a glue, holding soil particles together in various aggregate sizes.

In general, soils in forested areas are the healthiest soils in the world. This is due in large part to the nutrient cycle. The forest is nearly a closed system with the ability to cycle nutrients from the soil, into the tree, and back again to the soil. This cycle retains and may even increase soil nutrient and organic matter content, critical for soil fertility.

In addition to a healthy nutrient cycle, forest soils also have good physical properties that allow roots to grow freely and water to penetrate. The forest floor, with a healthy covering of leaf litter, protects the soil from direct impact with rain drops that can result in compaction and erosion. Leaf litter also moderates soil temperature and moisture, allowing important microorganisms and roots to thrive.

Farmers in developing countries often lack knowledge of and access to soil fertility management tools. This is the basic reason for slash and burn agriculture in some parts of the world. Recently cleared forest soils offer excellent fertility, at least for a while, allowing the farmer to feed his family, quite literally, from the land. But without proper management, these soils soon lose their fertility, causing the farmer to move on and clear more forest land.

Here in the U.S., we too are just as much connected to the land for our food and fiber, though we might not get as much dirt under our fingernails in the process. We'll talk more next time about applying our knowledge of soils to planting things, like trees.

Visit the Web soil Survey to create a map of the soils under your forest:

<http://websoilsurvey.org>.

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