Conservation Information Sheet
August 2001

Soils Why Are They Important?

What are Soils?

Soil can be defined as a mixture of mineral and organic materials which is capable of supporting plant life. Soils are formed from weathered rock and biological materials as modified by the actions of climate, living organisms, and position on the landscape over a period of time.

Why Are Soils Important?

Soil as defined by scientists extends only a few inches to approximately 6 feet below the Earth's surface. This thin layer of material, however, supports all plant life on the planet and ultimately animals and ourselves.

Soils provide the basic nutrients and water for plant growth. The amount of water that a soil can hold will determine when you can put your animals out in the field in the Spring and affects grass yields in the Summer.

Soils also influence:

- the filtering of animal and human wastes and preventing them from reaching surface and groundwaters
- the amount of fertilizers and/or composted manure which you should apply
- the placement and durability of structures
- if your land has a wetland

SOIL HORIZONS: For Typical King County Glacial Soil (i.e., Alderwood)

Horizons are distinct layers found within the soil. They vary from each other in color, texture, etc.

'A' Horizon:
Dark color. Accumulated organic matter from plant residues and deceased animals. Most exposed to weathering from climate so that soluble minerals (i.e. Calcium) have been removed, resulting in higher acidity. Typically lower in clay content.

'B' Horizon:
Lighter color. Accumulations of minerals removed from 'A' horizon and higher in clay content.

'C' Horizon:
The parent material from which the soil formed. Typically little affected by soil forming processes.

POROSITY

Between the solid particles within a soil are spaces called Pore Space. Air and water fill the pores. This water is what the plants take up. Roots need the oxygen found in the pores to properly take up both water and nutrients. Some plants will actually wilt if their roots are

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growing in a soil saturated with water for long periods of time. About ½ of the 'A' horizon and somewhat less of the 'B' and 'C' horizons are taken up by Pore Space.

Soils high in clay content typically hold more water and are poorly aerated. Soils high in sand content typically allow their water to quickly drain away. These types of situations may have management implications for your property.

TEXTURE

The amount of sand, silt, and clay found in the soil.

Sand = particles easily seen by the eye, give the soil a gritty feel. Better aeration, tend to be drier soils.

Silt = particles with feel like flour or talcum powder, only larger silt particles are visible,.

Clay = particles feel gritty and hard when dry but sticky and plastic when wet. Hold more water, dry out slower, making them more prone to damage in wet seasons and delaying using them in spring.

TEXTURE BY FEEL: (Best performed on saturated or nearly saturated soil):

Clay Test: Try to squeeze soil into a thin ribbon between thumb and forefinger. A Clay soil readily forms a long, durable ribbon. A Clay Loam Soil will form a ribbon but not a durable one of any appreciable length. A Loam or Sandy Loam soil will not ribbon at all.

Sand & Silt Test: Sand feels gritty while silt feels smooth and floury. A moderately good ribbon with a smooth feel would be a Silty Clay Loam, a Sandy Clay Loam if it has a gritty feel, and a Clay Loam if the smooth and gritty materials feel equal.

ORGANIC MATERIALS

Usually makes up 1 to 6% by weight of topsoil. Organic soils have more than 20 to 30% OM; wetland soils may have up to 90% OM.

Supplies nutrients to plants. Contains some of every nutrient needed for plant growth. Slowly released over time as material decomposes. Very important contributor of Nitrogen, Phosphorus, and Sulfur to plants.

Also important for effect on structure of soil, improving porosity (air and water relations) with additions of OM to soil.

TOPOGRAPHY

Position of soil on the landscape. Soils on slopes usually drier and shallower. Water runs off more than infiltrates, soils develop shallower profiles. Generally more well-drained and aerated. These effects more pronounced as slope gets steeper. Soils in level areas typically

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have poorer drainage and infiltration of water, poor aeration, more OM accumulations, darker colors; may have growths of water-loving plants.

COLOR

Can tell you about soil OM content, drainage properties, minerals in soil.

Black = high OM content

White = soil typically leached of most mineral content, low OM content

Red & Yellow = from Iron content, typically shows that soil has good drainage and is well aerated, low OM content

Blue, Grey, Green = typically shows that soil is waterlogged, poor drainage and aeration, soil development slowed down by extreme wetness

MINERAL ELEMENTS REQUIRED IN PLANT NUTRITION AND SUPPLIED BY THE SOIL

Not all plants require all of the following but these have been show as essential to the growth of some plant.

Nitrogen, Phosphorus, Potassium = N, P, K, the "Big 3"

Calcium, Magnesium, Sulfur = Secondary nutrients

Iron, Molybdenum, Copper, Boron, Zinc, Chorine, Cobalt, Vanadium, Manganese = Micronutrients

Carbon, Hydrogen, Oxygen, and Silicon = Abundant in the environment, supplements not needed

FACTORS AFFECTING NUTRIENT AVAILABILITY

Nutrients become available through the decomposition of organic matter. Most of the nutrients, however, must first be converted to a mineral (or inorganic) form before the plant can absorb them.

Factors affecting these conversions include:
- **Soil Acidity.** Each element has a range of soil acidity at which it is available and unavailable to the plant. This is one reason that liming your pastures to control soil acidity is important.

- **Moisture.** Excess water will slow down or stop the breakdown of OM to mineral forms
- **Other elements.** An over- or under abundance of certain elements will affect the availability of others.

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SOIL AND WATER RELATED PROBLEMS

Soil and water problems on the farm are tied together in many ways. These include:

• **Erosion:** the accelerated removal of soil by water. May be concentrated flow (i.e. a gully) or removal in a sheet-like process. Erosion degrades the quality of soil and lessens productivity. Transported soil particles often end up in creeks, lessening water quality and harming aquatic life. Solutions include: always keeping a cover of plants growing on the soil, practice proper timbering and grazing, protect areas of high livestock traffic with footing materials, working or driving parallel to slopes instead of up and down so channels don't form; don't divert water from natural drainages into others; don't concentrate water draining from structures onto bare areas or areas with improper vegetation

• **Compaction:** the destruction of the soil's structure and removal of pore space. Reduces the soil's ability to supply air and water to plants. Solutions include: keeping livestock and equipment off of soils during wet periods, typically during the winter but also possible during other times of the year

• **Mud:** Forms in pastures and around buildings. Can contribute to reduced use of fields and facilities, health problems in livestock. Solutions include: building confinement areas with appropriate footing to keep animals above mud; install gutters, downspouts, and outlet lines to keep roof runoff from contributing to mud

• **Wetlands:** inappropriate for most uses except for wildlife habitat, easily degraded by improper use such as grazing, timbering, building structures. Solutions include installing a buffer fence and only conducting low-impact recreational activities inside buffer.

The KCD has numerous fact sheets describing management practices to minimize these problems.

HOW TO TELL WHAT SOILS ARE ARE ON YOUR PROPERTY

The Natural Resources Conservation Service (formerly the Soil Conservation Service) published the Soil Survey for King County in 1973. The Survey contains maps showing the distribution of soils within most of the county. It also provides lots of information about each type of soil and uses and limitations on each soil.

You can see a soil survey in King County libraries and the local offices of the NRCS and KCD. You can order copies of the maps from the NRCS and KCD; the text is out-of-print. Call or e-mail the KCD if you have any questions about the soils on your property and how to manage them.