Outreach
Warnell School of Forestry & Natural Resources
UNIVERSITY OF GEORGIA

Making Sense of Soil Series

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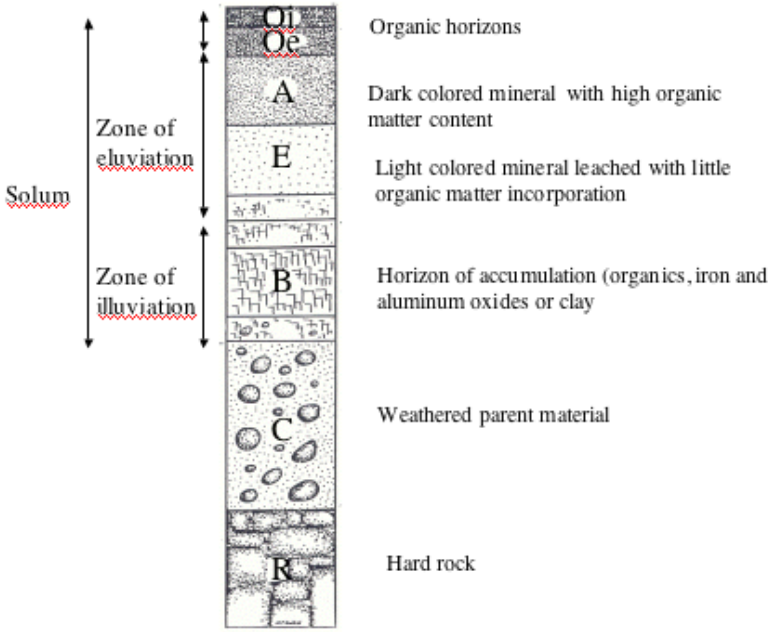
The type, organization, and degree of development of soil horizons (layers) we observe in a soil profile such as pictured below provide key information on the soil forming processes, productivity and potential uses of that soil.



Soil taxonomy is the system for organizing soil profile information into "scientific names" based on the characteristics features of the profile. A general understanding of the taxonomic hierarchy is described the guide that is part of this series.

Orders – 12 separated by the presence or absence of soil horizons which are indicative of differences in soil forming processes.

Suborders-subdivisions of orders which incorporate differences moisture regime, parent material and vegetation as they affect presence or absence of specific soil properties

Great group-degree of expression of individual soil horizons; base status; temperature and moisture ranges

Subgroup-separates great groups by intergradations to other groups

Family-properties important for root growth such as soil texture, mineralogical class; soil temperature classes

Series-arrangement of horizons, color texture, structure; chemistry and mineralogy

The taxonomic name to Great Group is constructed from formative elements of terms used to describe orders, moisture regimes, pedogenic processes, etc. The Subgroup and family name is developed by adding modifiers. Consider, for example, a soil in the following:

Order	Ultisols
Suborder	Udults
Great Group	Kandic
Subgroup	Typic Kandiudult
Family	Fine-loamy, siliceous, thermic
Series	Orangeburg

The taxonomic name to family is:

Fine-loamy, siliceous, thermic Typic Kandiudult

Each taxonomic family contains one or more soils series. Knowing the taxonomic name tells us much about the soil profile; however, soil series names have little to do with the rest of soil taxonomy and have no intrinsic value for understanding the characteristics of soils or what soils occur in association with other soils on a landscape. Yet, we use soil series in mapping. To do this, we have to make some sense out of the series we encounter, relate one to one another and understand how they occur on the landscape. How?

First, it is important to understand how each series is differentiated from others that occur nearby. The key to developing an understanding of soils on the landscape is to know what characteristics are considered important for distinguishing series in different physiographic areas and to identify important differences among series you will likely encounter. In the Coastal Plain of the Southeast, all soils are formed in unconsolidated sediments mostly of marine origin. Obviously, coarse fragment content, or depth to bedrock would be pretty useless for in differentiating among series. In the Coastal Plain, series are separated on the basis of: 1) B-horizon texture, 2) drainage (as indicated by color), 3) depth of the surface over the B horizon (A plus E horizons) and 4) mineralogy. Knowing this, it is possible to focus on characteristics that will be important in separating series and develop a local key for understanding soil series differences. For example, consider differences in the following Coastal Plain soils for which important differences are underlined.

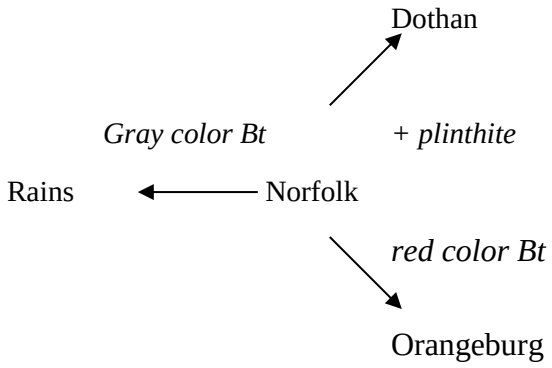
Norfolk (fine-loamy, kaolinitic, thermic, Typic Kandiudults) series consist of deep, well drained soils formed in loamy sediments with a yellowish brown Bt horizon of sandy clay loam texture. Gray colors do not occur within 60 inches of the soil surface.

Dothan (fine loamy, kaolinitic, thermic, Plinthic Kandiudult) deep well drained soils formed in loamy sediments with a yellowish brown Bt horizon of sandy clay loam texture like Norfolk but with >5% plinthite below 45 inches.

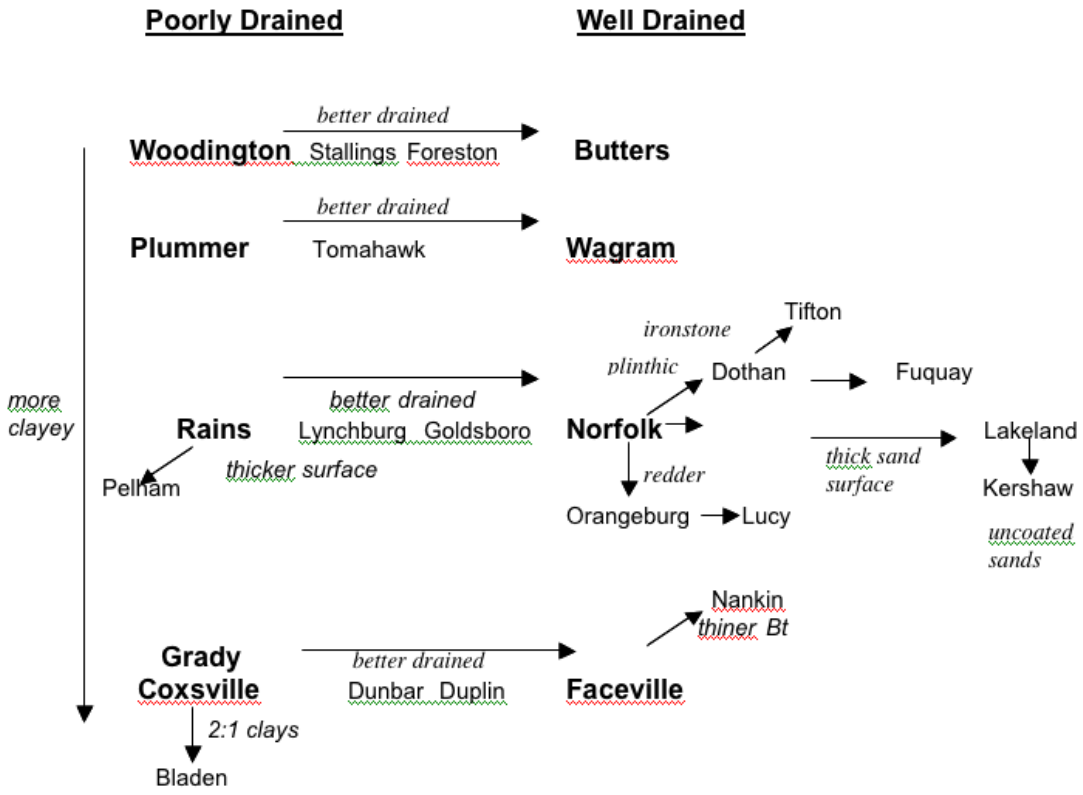
Orangeburg (fine-loamy, kaolinitic, thermic, Typic Kandiudults), in the same taxonomic class, are deep well drained soils formed in loamy and clayey sediments with a red Bt horizon. Gray colors do not occur closer than 60 inches to the soil surface.

Rains (fine-loamy, siliceous, thermic, Typic Paleaquult) are deep poorly drained soils with sandy clay loam and clay loam argillic horizons.

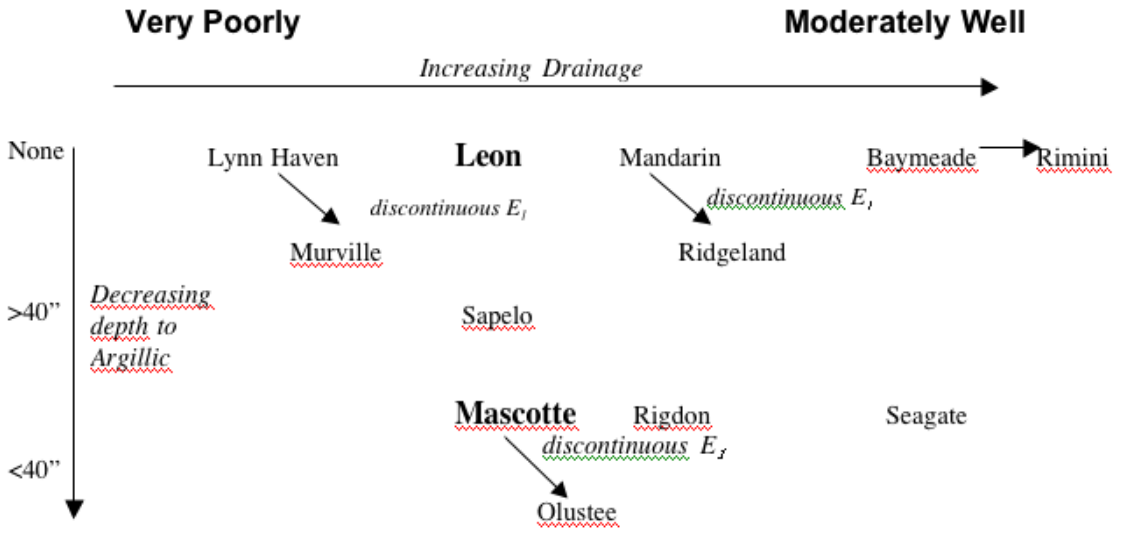
Second, organize these soils into a chart with the one or two major differences among them identified. This type of chart is easy to remember and can be developed so as to highlight differences that are important to management.



For major soils that occur within the Coastal Plain of Georgia with argillic B horizons a more complete chart looks like the following:



For soils with a spodic horizon a charge would look like this:



These types of organizational charts are very helpful in placing soil series names on profiles.

The procedure for developing a local soil key is as follows:

1. Collect available information on soils in the area. This will often include a County Soil Survey. These are filed by the first name of the County in the Science Library (Government Documents on floor). Note that you must check nearby counties since if more than one county was included in the survey, they may be filed by the other counties names. If no survey exists for the county of interest, look at surveys for nearby counties in the same physiographic region. Contact local NRCS office for unpublished maps and information.
2. Determine what soil series are being mapped in the area.
3. Get copies of OSD's (Official Series Descriptions often referred to as Blue Sheets for the color paper they are printed on) from the NRCS web site (look under "Quick Access").
   http://soils.usda.gov/technical/classification/osd/index.html
4. Pick one of the most common series to become your "key soil". You need to develop a mental picture of this soil (horizon characteristics).
5. Read the Competing Series and Geographically Associated Soils to determine what specific profile characteristics differentiate this soil from the other soils you find mapped in the area and how the soils differ in landscape position. In this step, focus on using characteristics that are important to management decisions when separating soils.
6. Using this information, develop a diagram based on your key soils.

The second part making sense out of soil series is to develop conceptual models of where soils will occur within a landscape. Two sources of information can be helpful in developing such a model: the county soil survey (if available) and the Official Soils Series Descriptions. The publication by Daniels et al. 1999 "Soil Systems in North Carolina is recommended reading.

References:

Daniels, R.B., Buol, S.W., Kleiss, H.J., Ditzler, C.A. 1999. Soil Systems in North Carolina. Technical Bulletin 314, Soil Science Dept., North Carolina State University, Raleigh, NC.

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