Sunnyside

District of Columbia Representative Soil

Soil Science Society of America

Top: The process of making a soil monolith involves digging a pit and cutting out a slice approximately 4.5 ft deep and a few inches thick. Credit: David Verdone, USDA-NRCS, Fredrick , MD.

Above: Soil scientists pull the first soil monolith of a Sunnyside soil from the District of Columbia. Credit: Donald Hurlbert, Smithsonian Institution.

Introduction

Many states have designated an official state bird, flower, fish, tree, rock, etc. Similarly, each state has either a state soil or one that is representative of the state or in this case the District of Columbia, our Nation's Capital. The Sunnyside soil has significance and is important to the District of Columbia. Let's explore how important the Sunnyside soil is to the District of Columbia!

History

The Sunnyside soil was first recognized in the adjacent Prince George's County, Maryland in 1939. In later years, while making the soil survey of the District, Sunnyside soil was mapped and described in the 1973 publication of the Soil Survey of District of Columbia. Many of the natural soils in the District are either disturbed or filled in with soil material that has been transported from nearby locations. However, there still remains some areas where the soil is natural and undisturbed, as is in the case of some areas of Sunnyside. Sunnyside soil is very productive and supports the growth of many near specimen trees at the National Arboretum.

What is Sunnyside Soil?

Except for organic soils, nearly every soil can be separated into three separate mineral size fractions called *sand, silt,* and *clay*, which makes up the soil texture. They are present in nearly all soils in different proportions and say a lot about the character of the soil. The following paragraph describes a typical Sunnyside soil and the texture of each layer or horizon.

Sunnyside soil is a very deep well drained soil that formed in unconsolidated, very old *loamy fluviomarine* (from the ocean) sediments of the Coastal Plain physiographic province. Sunnyside soil consists of a dark brown loam topsoil, 7 inches thick (plow layer); a yellowish red *sandy clay loam subsoil* in the upper part, and reddish brown *sandy clay loam* in the lower part **(Figure 1)**. Sunnyside soil is found on upland landscapes on slopes ranging from 0 up to 40 percent.

Fig. 1. Soil profile of a Sunnyside soil formed in loamy fluviomarine sediments. Credit: USDA-NRCS

Fig. 2 Location of the Sunnyside Series in the District of Columbia. Credit: Smithsonian Institution's Forces of change. http://forces.si.edu/soils/interactive/statesoils/index.html

Where to Dig Sunnyside

Yes, you can dig a soil. It is called a soil pit and it shows you the *soil profile*. The different horizontal layers of the soil are called *soil horizons*.

Sunnyside soil can be found on the Coastal Plain of the District of Columbia **(Figure 2)**, and has been mapped on nearly 700 acres in the District, and other adjacent areas in Maryland. It is a soil that you would find at the National Arboretum, as well as urban gardens, parks and other open spaces. There are twenty six named soils (series) in the District of Columbia.

Importance

Many of the soils in the District have been altered, filled or disturbed in some way as a result of building in a very densely populated area. This is not true of the site location of Sunnyside soil because of its natural setting in the National Arboretum which is a sizeable area of protected U. S. government property. Additionally, Sunnyside is categorized as a prime farmland soil, which means it is one of the most productive soils in the District, and is well suited for urban gardens and parks.

Uses

In general, soils can be used for agriculture (growing foods, raising animals, stables); engineering (roads, buildings, tunnels); ecology (wildlife habitat, wetlands), recreation (ball fields, playground, camp areas) and more.

Because of the extensive urban development in the District, Sunnyside soil is being used for urban gardens, landscaping, parks and open spaces **(Figure 3)**. It has few limitations for usage.

Fig. 3 Sunnyside loam in a field at the National Arboretum in the District of Columbia.

Limitations

When a soil cannot be used for one or more of the described functions, it is referred to as a limitation. Soil experts, called *Soil Scientists,* studied Sunnyside soil and identified that it has a few limitations. Sunnyside soil is very limited for septic tank usage due to slower infiltration of the subsoil layer. Also, because of its sand content, caution should be taken in any kind of excavation, due to the potential of the soil caving in.

Management

Controlling a moderate hazard of erosion and soil blowing is the main management concern. The practice of keeping the soil covered with a good grass and the use of a cover crop where applicable will enhance soil health.

Soil Formation

Before there was soil there were rocks and in between, CLORPT. Without CLORPT, there would be no soil. So, what is CLORPT? It is the five major factors that are responsible for forming a soil like the Sunnyside soil. It stands for **CL**imate, **O**rganisms, **R**elief, **P**arent material, and **T**ime. CLORPT is responsible for the development of soil profiles and chemical properties that differential soils. So, the characteristics of Sunnyside (and all other soils) are determined by the influence of CLORPT. Weathering takes place when environmental processes such as rainfall, freezing and thawing act on rocks causing them to dissolve or fracture and break into pieces. CLORPT then acts on rock pieces, marine sediments and vegetative materials to form soils.

Climate – Temperature and precipitation influence the rate at which parent materials weather and dead plants and animals decompose. They affect the chemical, physical and biological relationships in the soil. The Sunnyside soil developed under a warm humid climate with mild temperatures and abundant rainfall. The influence of the two resulted in leaching of *soluble base*s.

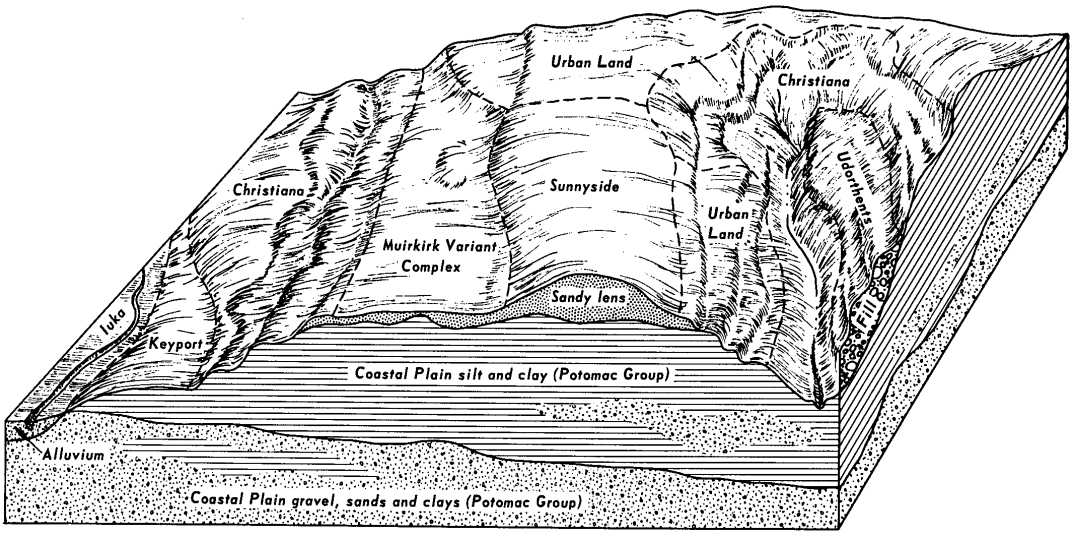

Fig. 4. Sunnyside soil is formed on the stable higher position of the landscape which makes it well drained. Credit: USDA-NRCS.

Organisms – This refers to plants and animal life. In the soil, plant roots spread through, animals burrow in and bacteria eat plant and animal tissue. These and other soil organisms speed up the breakdown of large soil particles into smaller ones. Plants and animals also influence the formation and differentiation of *soil horizons*. Plants determine the kinds and amounts of organic matter that are added to a soil under normal conditions. Animals breakdown complex compounds into small ones and in so doing add organic matter to soil. Sunnyside developed under hardwood or pine forests which deposit leaves, twigs, roots and other plant remains on the surface but these readily degrade and leach through the soil.

Relief – Landform position or relief describes the shape of the land (hills and valleys), and the direction it faces makes a difference in how much sunlight the soil gets and how much water it keeps. Deeper soils form at the bottom of the hill rather than at the top because gravity and water move soil particles downhill. Sunnyside soil is well drained because it is formed on the higher position of the landscape **(Figure 4)**.

Parent material (C horizon) – Just like people inherit characteristics from their parents, every soil inherited some traits from the material from which it forms. Some parent materials are transported and deposited by glaciers, wind, water, or gravity. Sunnyside soils formed in very old, dominantly sandy sediments of the Coastal Plain *physiographic province*.

Time – All the factors act together over a very long time to produce soils. As a result, soils vary in age. The length of time that soil material has been exposed to the soil-forming processes makes older soils different from younger soils. Generally, older soils have better defined horizons than younger soils. Less time is needed for a soil profile to develop in a humid and warm area with dense vegetative cover where the Sunnyside soil is than in a cold dry area with sparse plant cover. More time is required for the formation of a well-defined soil profile in soils with fine-textured material than in soils with coarse-textured soil material.

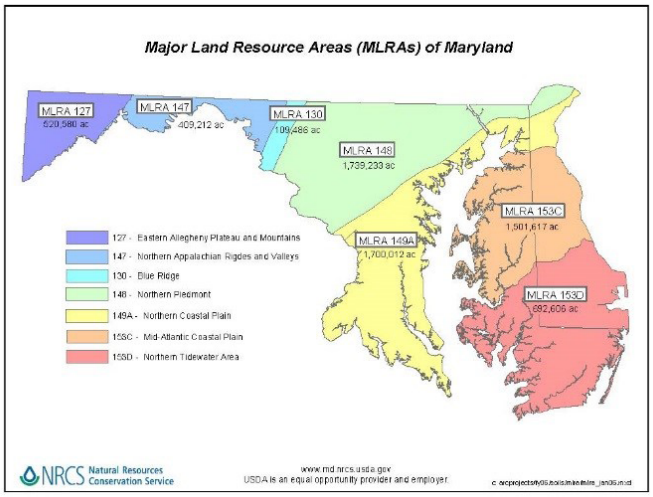

Fig. 5. Sunnyside soil occurs in MLRA 149A, as seen in the yellow hatched area under the "M" in the label "MLRA 149A".

MLRAs, Soils and Land Use in the District of Columbia

The District of Columbia can be divided into two well defined physiographic provinces called the Coastal Plain and Piedmont. Sunnyside soil occurs in the Coastal Plain province which makes up about two thirds of the District. These provinces can be broken down further into Major Land Resource Areas (MLRAs) **(Figure 5**). Sunnyside soil occurs in MLRA 149A, Northern Coastal Plain. Each MLRA has similar soils, water supply, physiography, geology, climate and biological resources.

The Coastal Plain province consists of relatively unconsolidated layers of sand, silt, clay and some gravel which forms a sedimentary layer over the underlying crystalline rocks. However, most of the soils in the District have been disturbed due to urbanization, leaving only relatively small areas of natural soil.

Glossary

Clay: A soil particle that is less than 0.002 mm in diameter. Clay particles are so fine they have more surface area for reaction. They hold a lot of nutrients and water in the soil. A clay soil is a soil that has 40% or more clay, less than 45% sand and less than 40% or less silt.

Fluviomarine deposits: Of or pertaining to material deposited by oceans and reworked and deposited by streams after exposure.

Horizon: see Soil Horizon

Leaching: The removal of soluble material from soil or other material by percolating water.

Loam: Soil material that contains 7-27% clay, 28-50% silt, and less than 52% sand.

Major land resource areas (MLRAs): Geographically associated land resource units. Identification of these large areas is important in statewide agricultural planning and has value in interstate, regional, and national planning. Each MLRA has similar soils, water use, physiography, geology, climate and biological resources. They influence the type of land cover that can exist and the range of land use practices that are possible.

Organic matter: Material derived from the decay of plants and animals. It always contains compounds of carbon and hydrogen.

Physiographic province: Broad-scale subdivisions based on terrain texture, rock type, and geologic structure and history.

Sand: A soil particle between 0.05 and 2.0 mm in diameter. Soil material that is 85% or more sand and the percent silt plus 1.5 times the percent clay is less than 15%.

Sandy Loam: Soil material that contains 43% sand, 0-50% silt and less than 7% clay.

Sandy clay loam: Soil material that contains 20-35% clay, less than 28% silt, and 45% or more sand.

Silt: A soil particle between 0.002 and 0.05 mm diameter. As a soil textural class, soil that is 80% or more silt, and less than 12% clay.

Soil Horizon: A layer of soil with properties that differ from the layers above or below it.

Soil Management: The sum total of how we prepare and nurture soil, select type of crops suitable for a type of soil, tend the crop and the soil together, select type of fertilizer and other materials added to the soil so as to maintain productivity and preserve the soil.

Soil Profile: The sequence of natural layers, or horizons, in a soil. It extends from the surface downward to unconsolidated material. Most soils have three major horizons, called the surface horizon, the subsoil, and the substratum.

Soluble bases: Elements (calcium, magnesium, sodium and potassium) that are present in soil as ions and form what is called cation exchange capacity. The amount in the soil can be reduced through leaching.

Subsoil (B horizon): The soil horizon rich in minerals that eluviated, or leached down, from the horizons above it. Not present in all soils.

Topsoil (A horizon): The horizon that formed at the land surface made up mostly of weathered minerals from parent material with usually the highest percent of organic matter

Additional Resources

Soil! Get the Inside Scoop. David Lindbo and others. Soil Science Society of America, Madison, WI.

Know Soil, Know Life. David L. Lindbo, Deb A. Kozlowski, and Clay Robinson, editors. Soil Science Society of America, Madison, WI.

Web Resources

Soils for Teachers—www.soils4teachers.org

Soils for Kids—http://www.soils4kids.org/

Have Questions? Ask a Soil Scientist—https://www.soils.org/ask

Soil Science Society of America—https://www.soils.org/

Natural Resources Conservation Service, Soils—http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/soils/

Natural Resources Conservation Service, K through 6 Educational Resources—http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/edu/kthru6/

References

District of Columbia Representative Soil,Sunnyside. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=stelprdb1236841

Soil Survey of District of Columbia. http://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=DC

Web Soil Survey. http://websoilsurvey.nrcs.usda.gov

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