

## Soil and Water Conservation Merit Badge at Mountain Way Common:

### Requirement 1

Tell what soil is. Tell how it is formed.

Soil is a combination of rock, sand, clay, minerals, organic material, air, moisture, organisms, crystals, plant roots, decayed leaves & other materials. As bits of crumbled material & moisture collect on a rock, simple plants begin to grow. After some time, water, decaying plants, and more minerals collect

- The soil at Mountain Way Common is Georgia Red Clay.

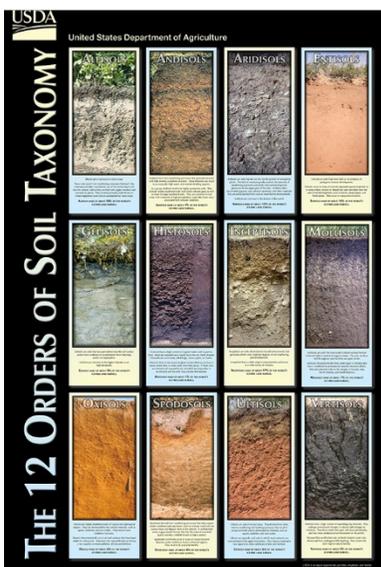


*Not all Georgia soils are red, but many of them are. The State is well known for its abundance of "Georgia Red Clay". People often ask why the soils are red. The red color that is so evident in Georgia soils is due primarily to iron oxides. Soils form from the interaction of climate, organisms, parent materials, relief and time. Red soils in Georgia result from the effect of a warm, humid climate weathering acid crystalline rocks on rolling hills over a long period of time.*

*Soils in much of Georgia, particularly the Southern Piedmont region of North Georgia, developed in materials weathered primarily from granite and gneiss. These rocks are black, white, and gray, and are relatively low in bases, or natural fertility. Georgia has a climate of warm (hot) temperatures and high rainfall, so there has been intense weathering of the rocks over the years. High rainfall has leached out most of the bases that were present. Materials that remain are composed mostly of iron, aluminum, and silica, and it is the iron that gives the soils the red color. The red color is not just from iron, but more specifically from unhydrated iron oxides. The red soils are generally on convex landforms that are well drained. Organic matter can mask soil colors in some areas. However, organic matter content*

*is low in most of Georgia's soils because of the warm climate, so the red color is not affected by it.*

[https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ga/soils/?cid=nrcs144p2\\_021871](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ga/soils/?cid=nrcs144p2_021871)



Describe three kinds of soil. Tell how they are different.

Sand - Coarse and gritty and you can just barely see individual particles.

Silt - Feels smooth like flour. You cannot see the individual particles without using a strong magnifying glass.

Clay - Fine granules bond together.

*12 soils taxonomy poster – USDA*

[https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/data/?cid=nrcs142p2\\_053588](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/data/?cid=nrcs142p2_053588)

Describe the three main plant nutrients in fertile soil. Tell how they can be put back when used up.

**Nitrogen (N)**- Main nutrient that contributes to the growth of the above ground plant. Makes grass greener. Returned to soil by: The natural process of nitrogen-fixing prokaryotes converting Nitrogen in the air into usable compounds, fertilizers artificially introducing Nitrogen compounds into the soil, organic matter being broken down, and lightning fixation (energy from lightning splits Nitrogen in the air and allows it to form compounds which enter the soil)

**Phosphorus (P)** - Helps plants germinate. Also helps plants absorb nutrients to produce more. Provides overall plant health and disease resistance. Returned to soil by: Decomposed plants and other organic matter being broken down by decomposers and the Phosphorus enters back into the soil, fertilizers artificially introducing Phosphorus, minerals weathering.

**Potassium (K)**: Mainly for strong roots. Returned to soil by: Decomposed plants return Potassium back into the soil, organic and inorganic fertilizers.



Mountain Way Common Soil: <https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

*UgE – Urban Land Grover Mountain Complex, 10-25% slopes, stony*

*Ub – Urban Land*

*CaA – Cartecay-Toccoa complex, 0-2% slopes, occasionally flooded*

*See Fulton County Soil Survey.pdf on website*

## **Requirement 2**

Define soil erosion.

Erosion is the displacement of solids (soil, mud, rock, and other particles) from the ground by forces such as wind, water, ice, movement in response to gravity, or living organisms.

Tell why it is important. Tell how it affects you.

Soil erosion is important to limit because it largely causes the removal of topsoil from the ground, which is the most nutrient-rich and important layer of soil. Without this soil present, native plants and crops will not grow as well. This limits the agriculture in an area and can cause invasive plants to spread and crowd out the remaining native plant species (invasive plants largely can grow and thrive off of less nutrients in the soil).

Name three kinds of soil erosion. Describe each.

Water Erosion: Beating rain and moving water carry soil particles, organic material, and plant nutrients to a new location.

Wind Erosion: A problem in windy areas when the soil is not protected by residue cover; wind erosion removes topsoil and blows it away.

Mass Movement: A large erosion event caused by gravity (ex. mudslides).

Take pictures or draw two kinds of soil erosion.

### **Requirement 3**

Tell what is meant by conservation practices.

Conservation practices are any specific action or process to care for natural resources so that they are protected from damage and improved for certain uses.

Describe the effect of three kinds of erosion-control practices.

Erosion Control Matting- mats that are laid on loose soil and secured in place until native vegetation can return to an area; this is useful after a sudden removal of plants or crops

Cover Crops: Crops such as rye that grow in late fall and provide soil cover during winter. By providing a cover to the soil, winter soil erosion from both air and water can be greatly reduced.

Strip - Cropping: Is the practice of planting along the slope instead of up and down slopes, and planting strips of grass between row crops.

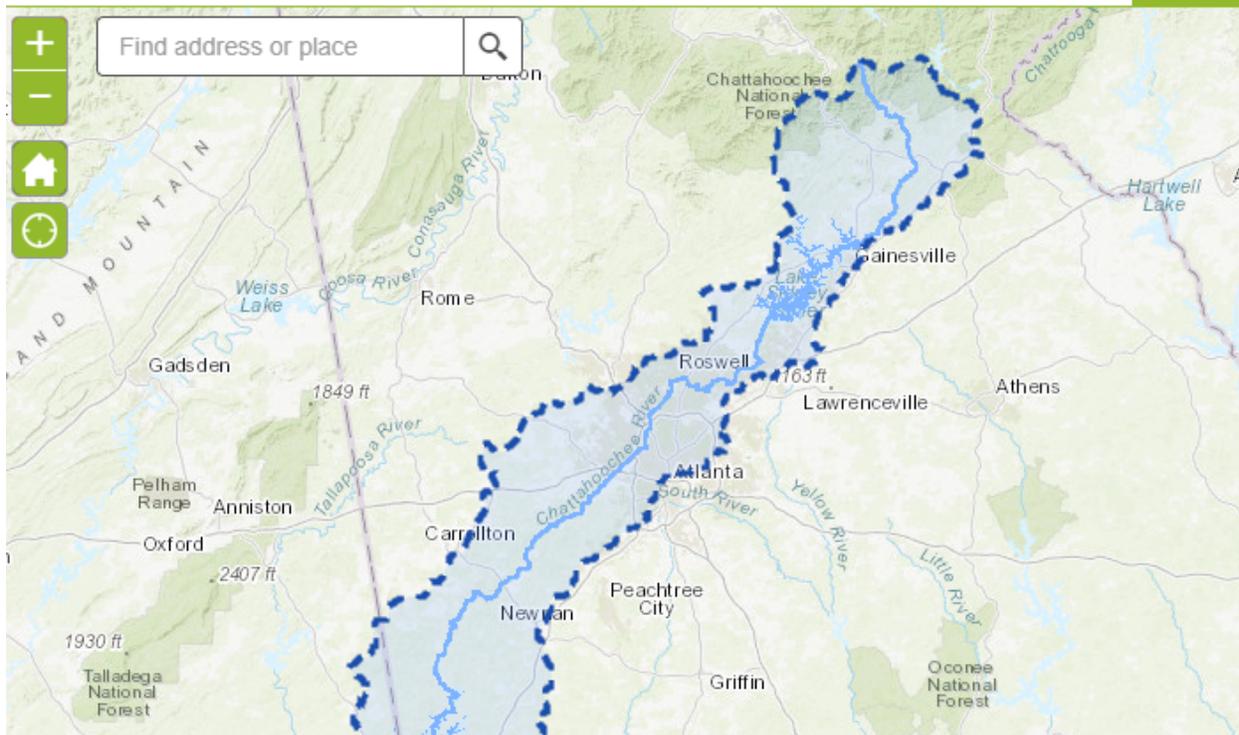
Take pictures or draw three kinds of erosion-control practices.

### **Requirement 4**

Explain what a watershed is.

It's the area of land that catches precipitation and drains or seeps into a marsh, stream, river, lake or groundwater.

Mountain Way Common is in the Upper Chattahoochee Watershed.



<https://chattahoochee.org/watershed-map/>

<https://watersgeo.epa.gov/mywaterway/map.html> - Nancy Creek

Outline the smallest watershed that you can find on a contour map.

Then outline on your map, as far as possible, the next larger watershed which also has the smallest in it.

Explain what a river basin is. Tell why all people living in it should be concerned about land and water use in it.

An area of land drained by a river and all its large and small tributaries. All river basins are large watersheds. The way that land and water are used and managed affects the quality and quantity of water people in cities downstream will have.

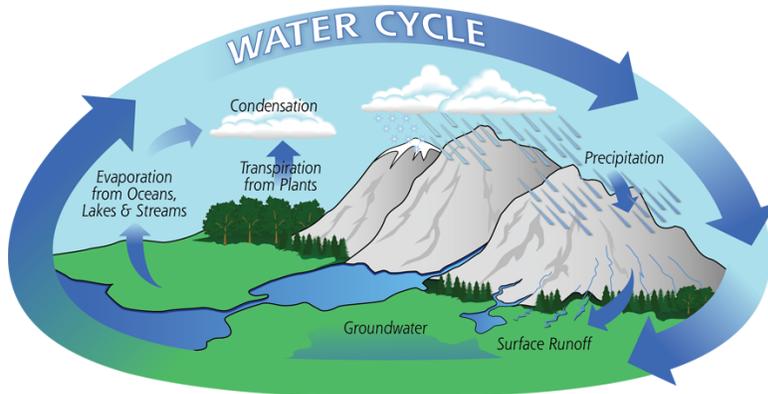
USGS site for Upper Chattahoochee:

<https://water.usgs.gov/lookup/getwatershed?03130001/www/cgi-bin/lookup/getwatershed>

### Requirement 5

Make a drawing to show the water cycle.

Show by demonstration at least two of the following actions of water in relation to soil: percolation, capillary action, precipitation, evaporation, transpiration.



<https://pmm.nasa.gov/education/water-cycle>

Explain how removal of vegetation will affect the way water runs off a watershed.

It will make the water run off faster, because nothing is holding it back.

Tell how uses of forest, range, and farmland affect usable water supply.

It helps slow down the run-off into the watershed and prevents flooding in other areas. The root systems of the plants also help to limit soil erosion, creating a cleaner water supply.

Explain how industrial use affects water supply.

Industrial use causes water pollution through point-source pollution (ex. dumping chemicals into the rivers or the ground which gets into the groundwater supply) and non-point-source pollution (ex. Runoff from rain carrying trash or chemicals into the watersheds).

### Requirement 6

Tell what is meant by water pollution.

Water pollution is the contamination of water by foreign matter. It impacts our oceans, our surface water, and our underground water. Pollution comes in many forms--some conventional and others toxic.

<https://www.nationalgeographic.com/environment/freshwater/pollution/>

Describe common sources of water pollution and explain the effects.

Sources of water pollution are people, factories, septic tanks, road salt, fertilizer. The effects of water pollution are eutrophication (when too many nutrients are in an area; causes a boom of algae and other simple plant species that deplete the dissolved oxygen in an area, which results in a massive kill-off of aquatic life) and a decrease in the biodiversity of an area (ex. Dead fish, sick birds).

Tell what is meant by "primary water treatment," "secondary waste treatment," and "biochemical oxygen demand."

Primary water treatment: Allows the un-dissolved solids in raw sewage to settle out of suspension forming sludge. This only removes 1/3 of the BOD (Biochemical Oxygen Demand) and none of the dissolved minerals.

Secondary waste treatment: The effluent from the primary water treatment is brought in contact with oxygen and aerobic microorganisms. They break down much of the organic matter to harmless substances such as carbon dioxide. After chlorination to remove its content of bacteria, the effluent from the secondary treatment is returned to the local surface water.

Biochemical oxygen demand: The BOD is a measure of the amount of oxygen needed (in milligrams per liter or parts per million) by bacteria and other microorganisms to oxidize the organic matter present in a water sample over a period of 5 days.

Make a drawing showing the principles of a complete waste treatment.

<https://www.elsinga.net/downloads/merit/Soil%20and%20Water%20Conservation%20Merit%20Badge%20Pamphlet%2035952.pdf>

[https://en.wikibooks.org/wiki/Scouting/BSA/Soil\\_and\\_Water\\_Conservation\\_Merit\\_Badge#External\\_Links](https://en.wikibooks.org/wiki/Scouting/BSA/Soil_and_Water_Conservation_Merit_Badge#External_Links)