# K-12 IYS Activity

**S il Science**
Society of America

## Summary

Soils sustain life. They provide the water and nutrients needed for the growth of plants that are the source of the food, fiber, and wood needed by an ever expanding world population. They are the habitat of a diverse range of organisms ranging from microscopic bacteria to fungi to worms to moles. Soils store more carbon than the atmosphere and thus play a key role in carbon cycling. Soils filter and purify water. They are an engineering material that supports roads and buildings. Soils are a complex assemblage of minerals, air, water, and organic matter whose appearance is determined by five interacting factors: climate, organisms, relief, parent material, and time. As you dig down, each soil has a unique series of layers, called horizons, that form the profile. Soil horizons have different textures and colors that makes them different from the layers above and below. It is possible to examine the soil profile and, like a detective, read the signs present in the soil layers and determine what is in a specific soil. Black colors indicate accumulations of organic matter. White colors tell us the soil is sandy. Reds and yellows indicate clay that contains iron compounds that are exposed to oxygen. Grays indicate clays that contain iron where no oxygen is present in the soil. Minecraft is a computer video game that allows students to use blocks with different properties to build three-dimensional constructions that represent real or imaginary physical worlds....Like the Soil!

*Celebrating the*
2015
International
Year of Soils

**soils.org/IYS**

# Creating Virtual Soil Profiles using Minecraft

## Ages
K-12

## Where could you offer this?
local school or at student's home

## Recommended Group Size
Individual or small group of 1 to 3. The discussion of soil properties can be done by the teacher in class.

## Type of Lesson
Hands-on computer exercise.

The review of soils information can be done as a lecture if desired.

## Time Needed
30 minutes to 1 hour prep time to review background material.

30 minutes to 1 hour to complete exercise.

## Learning Objective
- Learn the soil horizons that are used to describe the layers that occur in the soil.
- Understand the soil properties that affect the appearance of the soil horizons.
- Learn how soil profiles are made up of different horizons and how this affects the suitability of soils for different uses.
- Use the computer video game Minecraft to create a three-dimensional soil profil

## Materials Needed
— Access to a computer and the internet.
— Discussion material on soil horizons and soil profiles at http://www.soils4teachers.org/files/s4t/mini-monolith.pdf including the Soils Overview (https://www.soils.org/files/about-soils/soils-overview.pdf).
— Descriptions of state soils in each state, available at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=stelprdb1236841
— Access to the Minecraft video game on any device that supports it.

## Method
1. Use the Soils Overview (https://www.soils.org/files/about-soils/soils-overview.pdf) to learn the general properties of soils and how soil horizons combine to create soil profiles.
2. Use the Natural Resource Conservation Service website to identify the state soil in the state where you live (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=stelprdb1236841)
3. Examine the soil profile for the state soil and discuss the profile. What causes the different colors and textures evident in the soil?
4. Select a state in another part of the country and determine the state soil in that state. Examine the soil profile and discuss the profile. What causes the different colors and textures evident in this soil?

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5. Compare the two soil profiles and discuss how the soil forming factors (climate, organisms, relief, parent material, and time) differ between the two states.

6. Use Minecraft to create a virtual three-dimensional soil profile that is as close to the picture of the state soil as possible. Use different blocks to achieve the different colors and textures in the soil. Use your imagination and creativity to make blocks that represent the features in the soil. A column that is at least 20 blocks wide and 20 blocks high will allow sufficient detail to accurately depict most soil horizons. A column that uses more blocks will be able to depict more detail in the soil profile.

7. Save a copy of the soil profile you created in Minecraft so that you can compare it with the soil profile for your state soil. This can be easily done using the "print screen" command in Microsoft Windows operating systems as follows:

   a. Center the Minecraft soil profile on the computer screen.

   b. Press the Print Screen (Prnt Scrn) button on the computer keyboard. You may need to press the Function Key (Fn) simultaneously. Pressing this key will copy a picture of the screen to the buffer in the computer.

   c. Open Microsoft Word or Microsoft PowerPoint (or comparable programs).

   d. Using the mouse or touch pad, right click and use the "Paste" command, which will copy the image of the screen to the open document. You can then crop and resize the picture in the document using drawing commands.

## Discussion Questions

1. What are the texture and color of the horizons in your state soil?

2. Where is this soil located in the state? How many acres does it cover? What are the primary uses for land with this soil?

3. What causes the different colors that are present in the soils?

4. What are the differences in the soil-forming factors between the two states that cause the soil profiles to be different?

5. What would happen to the soil profile if there was substantial erosion?

6. How were you able to depict the correct colors and textures in the soil profile using Minecraft blocks?

Below are pictures of soil profiles for several state soils in the United States.
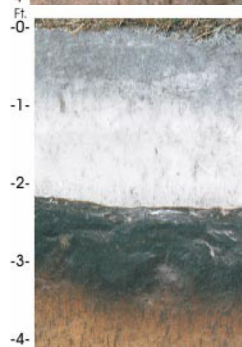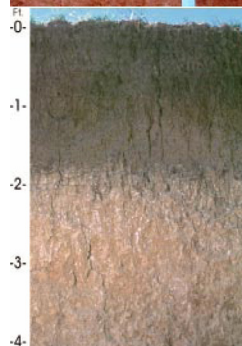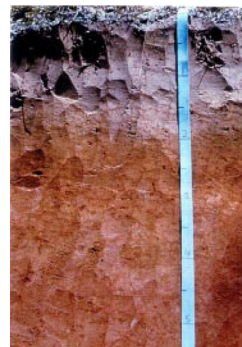
## Additional Resources

www.soils4teachers.org

Soil Science Society of America
www.soils.org