

Environmental Science — What's Soil Worth?

Project Area:
Environmental Science

Skill Level:
Intermediate

Learner Outcomes:

-Understand that soil is a limited and valuable resource, and soil conservation is important.

TN Science Curriculum Standards:

Interdependence
GLE0407.2.1
GLE0507.2.3

Materials Needed:

-Apple
-Knife and cutting board

Time Needed:

30 minutes

Success Indicator:

Students understand that soil for crop production is a small part of the planet and must be conserved.

Life Skills: Observing, Reasoning, Communicating

Tags:

Soil value

Related Lessons:

- "A Recipe for Soil"
- "Dig In"
- "Life Beneath Your Feet"
- "The Soil Web"
- "The Color of Soil"

In this activity, students will see a demonstration of just how little of the earth can actually be used for food production and will discuss how important it is to care for our soil resources.

Set Up

You will need an apple (or some other sliceable sphere) and a cutting board and knife for the demonstration.

Introduce the Activity

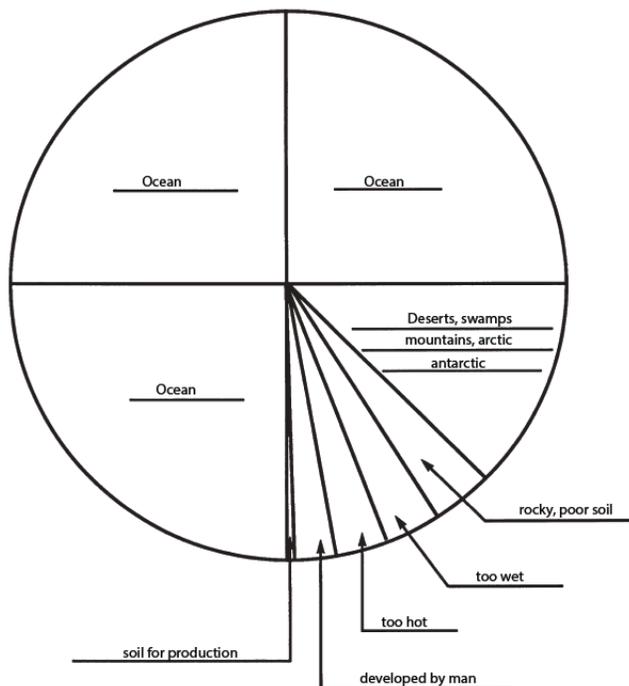
Explain: This apple represents the earth.

Ask: How much of the earth do you think we can use to grow food?

Demonstration: Earth's Soil Resources

As you go through this demonstration, have students fill in the pie chart on the student handout (answers below). For older students, let them work out the math (e.g., $1/4$ of $1/8 = 1/32$ or 3.1%).

1. Cut the apple into 4 equal wedges. 75% (3 wedges) represents the ocean. Set these aside.
2. The remaining 25% ($1/4$) represents land. Cut this quarter in half into two $1/8$ sections. One of these is deserts, swamps, mountains, polar regions where people do not live. Set it aside.
3. The second 12.5% ($1/8$) represents land where people live. Slice this into 4 sections (3.1% or $1/32$ each). These are:
 - $1/32$ is rocky, poor soils that can't be used for production
 - $1/32$ is too hot for food production
 - $1/32$ is too wet for food production
 - $1/32$ is *cultivable land*, good for food production, but is also the best place for homes and towns. Slice the peel off the last section — this is the amount of land used to grow food to feed everyone on the earth.



Variations:

Oranges: Hand out to students and let them peel and section the orange as you talk through the demonstration. (The challenge with this is that most oranges do not have an easily divisible number of sections.)

Play-Doh: Create Play-Doh spheres to represent the earth and have the students slice them up with plastic knives.



Discuss and Apply: Losing Soil

Have students brainstorm ways that soil resources can be lost or degraded. Record their answers on the board. If students need some inspiration, show pictures of various activities.

For each answer, discuss what effects it has on the soil and possible solutions.

For example:

Problem: Erosion

Effect: Loss of soil

Solution: Reduce tilling, planting cover crops, tree buffers to reduce wind erosion

Problem: Pollution

Effect: Soil has harmful or toxic products that can get into the food

Solution: Reduce pollution, dump in appropriate places

Problem: Over-fertilization

Effect: Nutrient water pollution, chemical effects on soil life

Solution: Use soil tests and only use as much fertilizer as needed

Problem: Intensive agriculture

Effect: Nutrients and organic matter is lost from soil, increased erosion/soil loss

Solution: Crop rotation, cover crops, organic inputs (compost, manure)

Problem: Urban sprawl

Effect: Loss of land for food production, pollution

Solution: More efficient, smaller homes and apartments, building on less valuable land

Problem: Strip mining

Effect: Erosion, loss of topsoil, loss of biodiversity

Solutions: Replacing topsoil, more efficient use of resources so we don't need to mine as many

What does it cost? Answers:

1. You have 1 acre of land and 6 inches of topsoil. If each inch is worth \$100 per acre, how much is your soil worth?
6 x \$100 = \$600
2. If you lose 1/2 inch of topsoil this year because of erosion, how much money have you lost? **1/2 x \$100 = \$50**
3. How much is your soil worth now? **\$600 - \$50 = \$550**
4. If you keep losing 1/2 inch of topsoil each year, how many years will it take to lose all your topsoil? **6 inches / 1/2 inch per year = 12 years**
5. Besides the money, what else would you lose without your topsoil? **Crop productivity, habitat for soil organisms, less food produced, more soil erosion into lakes and streams**

Adapted from:

"How much is dirt worth?" *Agriculture in the Classroom*, Utah State University Cooperative Extension. (utah.agclassroom.org)

"Caring for the land." *Agriculture in the Classroom*, Utah State University Cooperative Extension. (utah.agclassroom.org)

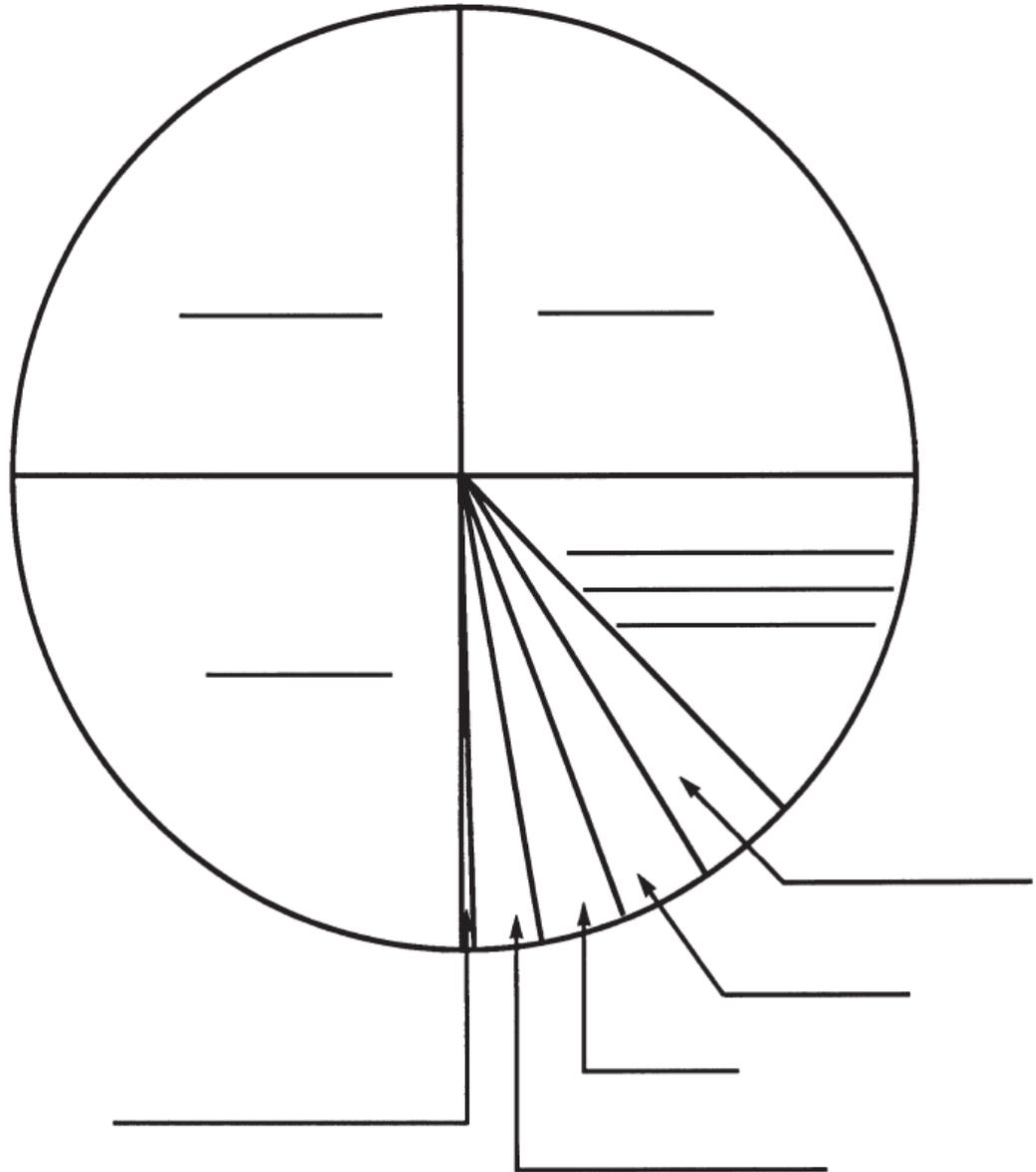
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Soil is a valuable resource. How much is it worth?

Earth's Soil Resources



Words to Explore

Cultivable land

Erosion

Pollution

Productivity

Did You Know?

It takes at least 100 years to produce 1 inch of topsoil! (Check out nrcs.usda.gov to learn more.)



Losing Soil

Think about some ways that soils can be lost or ruined for food production. Now, can you think of some solutions to conserve the soil?

Problem: _____

What is the effect on the soil? _____

What are some solutions? _____

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