

Caring for Soil



Focus: Students will investigate why it's important to protect the health of soil. They will listen, research, discuss, and discover ways in which they can take action to keep soil clean.

Specific Curriculum Outcomes

Students will be expected to:

- 12.0 use a variety of sources of science information and ideas [GCO 2]
- 13.0 investigate and describe how living things affect and are affected by soils [GCO 1/3]
- 18.0 demonstrate and describe ways humans use soils to make useful objects [GCO 1/3]

Performance Indicators

Students who achieve these outcomes will be able to:

- describe ways in which people can take steps to improve and protect the health of soil

NOTES:

Attitude Outcome Statements

Encourage students to:

- recognize the role and contribution of science in their understanding of the world [GCO 4]
- be sensitive to the needs of other people, other living things, and the local environment [GCO 4]

Cross-Curricular Connections

English Language Arts

Students will be expected to:

- select, read, and view with understanding a range of literature, information, media, and visual text [GCO 4]
- create texts collaboratively and independently, using a variety of forms for a range of audiences and purposes [GCO 9]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Student Magazine, pages 30–31 • IWB Activity 7 • IWB Activity 8 • BLM <i>Soil Footprint</i> • IWB Activity 9	• sample or photo of contaminated soil • students' Science Journals • materials for bulletin board display (e.g., construction paper, coloured pencils, markers, and pictures from old magazines or the Internet—optional)	• Invite a geologist, soil scientist, farmer, ecologist, naturalist, wetland advocate, or conservationist to your classroom to speak to students about their work with soil and the importance of keeping soil clean. • Invite an Elder or Indigenous Knowledge Keeper to speak about the need to protect soil.	• compost • composter • contamination

Science Background

- Soil is an important part of a healthy ecosystem and environment. People benefit enormously from products made from soil. For example, food is essential for our survival and we couldn't survive without eating foods grown in soil or animals raised from grasses, grains, and vegetables grown in soil.
- Human activities such as mining, gravel pitting, road construction, forestry, industry, and landfills can disturb and harm the soil. The extraction of gravel from parts of the limestone barrens in the 1970s, for example, had a negative impact on the fragile habitat—as did the construction of a new highway on the Northern Peninsula. When soil becomes toxic due to hazardous waste, fuel spills, heavy metals, etc., it can have long-lasting effects. For example, a sports field in Botwood, central Newfoundland, contains carcinogens in the soil. Poisonous runoff from contaminated land can, in turn, pollute ponds, rivers, lakes, and oceans.
- World Soil Day is an annual celebration held on December 5 that began in 2002. Its aim is to educate and increase awareness about soil and soil issues in order to protect soil and keep it healthy for future generations.

- Actions that people can take to protect soil include planting trees and plants to prevent soil from washing or blowing away. Putting organic waste in a backyard compost container and making nutrient-rich humus to spread on gardens help to keep soil healthy—it also reduces the amount of garbage sent to landfills. Another good idea is to reduce the number of paved surfaces that prevent rainwater from penetrating. A gravel driveway, or an interlocking brick driveway, is preferable to an asphalt driveway. Another plan is to create a “rain garden”—a shallow depression in which rainwater can collect. This feature prevents soil from washing away after heavy rainfalls, keeping it intact in the yard or garden.

Possible Misconceptions

- Some students and many adults think that if they add nutrients and fertilizers to soil, it will be healthy. But even if the soil contains lots of nitrogen, for example, it doesn’t mean it is the optimal soil for growing crops. How well it absorbs water is very important, as is its ability to allow water to flow through it and seep down into plant roots below. The amount of organic matter in the soil is also vital. The presence of organic matter means there is a high level of carbon, which, in turn, means the soil contains living things, like earthworms, that are mixing and aerating the soil. Well-mixed soil will contain many pores and the pores provide space for water, air, and organisms. When soil has a high capacity to hold water, the plants growing in it are better protected from drought. Well-mixed, porous soil also offers protection against soil loss from runoff caused by heavy rains and flooding.

ACTIVATE

World Soil Day

As a class, look at the Website for World Soil Day. (See <https://www.daysoftheyear.com/days/world-soil-day/>.) Discuss why such a day exists and why it is important. You might take some time to talk about caring for our Earth and explain that this includes caring for our soil, as well as our air and water, which might be more obvious.

Share pages 30–31 of the Student Magazine with the class. Give students time to examine this spread and look at the visuals. Share-read the text with the students, clarifying any concepts as necessary. Have students discuss the question: *Why should we protect our soil?* with a partner. Ask volunteers to share their thinking with the group. Then challenge students to think of some suggestions for how to take care of our soil.

If possible, show students a sample or photo of contaminated soil. Point out that the poisons in soil are often invisible. Toxic soil must be tested to reveal that it isn’t healthy. Explain that St. John’s is one of many areas that has a serious problem with lead in the soil. Ask students what visible signs might be clues that soil is not healthy. (soapy scum on soil; litter and garbage on surface of soil; near a pipe that is emitting toxic water; oil, gasoline, paint, or hazardous chemicals spilled on soil; batteries, refrigerators, motors, computers, and electronics leaking chemicals into soil)





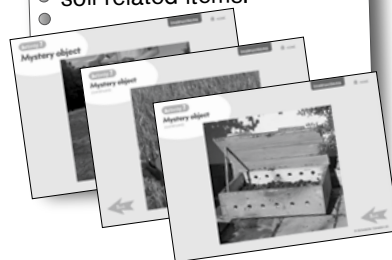
Soil Experts—Visitor Talk

Invite a geologist, soil scientist, farmer, ecologist, naturalist, wetland advocate, or conservationist to your classroom to speak to students about their work with soil and the importance of keeping soil clean. Before the talk, encourage students to write down one or two questions each in their Science Journals.

Alternatively, or in addition, you might invite an Elder or Indigenous Knowledge Keeper to speak about the traditional belief of protecting that which provides life and health, including healthy soil, clean air, and safe water.

IWB Activity:

- Students can use Activity 7: *Mystery object* (see the Teacher's Website) to identify and learn about soil-related items.



CONNECT

IWB Activity:

- Challenge students to identify which activities are harmful or helpful to soil using Activity 8: *Harmful or helpful?* (see the Teacher's Website).



Soil Keepers

Have students research careers for people who care about and protect soil. They can use a graphic organizer of their choice to present the information they gather. For example, they may include people who clean up small or large oil or gas leaks from snow machines, lawn mowers, or ATVs. (Useful Internet search terms may include “chemical cleanup,” “hazardous chemical cleanup services,” or “hazardous waste management.”) They might research people who preserve vegetation and tree growth on steep slopes and actively plant more trees in vulnerable areas to hold soil in place and reduce the effects of erosion. (Internet search terms may include “erosion prevention volunteers,” “hillside protection,” “cliff face protection,” “wetland protection volunteers,” “habitat protection,” “environmentalists,” “ecologists.”) Students might also gather information about farmers who install windbreaks (i.e., trees, hedges, shrubs) to prevent soil from blowing away from their fields.

Soil Footprint

Talk about the fact that when we walk in soil we often leave behind a footprint. Connect this to the impact humans have upon the soil and Earth. Ask students what it means to “leave no footprint.” Have students examine how their own actions affect soil. Ask:

- Do you compost food scraps?
- What do you recycle?
- Do you let soapy or toxic water drain into soil?
- Do you put used batteries in the garbage (landfill) or take them to a recycling location?
- Do you pick up rocks from hillsides and throw them in the river, leaving the hillside more exposed and vulnerable to erosion?

Soil Footprint

Name: _____

1. Answer each of the questions below by circling “Yes” or “No”.

2. Score 1 point for each “Yes” answer and 0 points for each “No” answer.

3. Total your score and find your Soil Footprint!

Question	Yes	No
1. Do you compost food scraps?	☐	☐
2. Do you recycle?	☐	☐
3. Do you let soapy or toxic water drain into soil?	☐	☐
4. Do you put used batteries in the garbage (landfill) or take them to a recycling location?	☐	☐
5. Do you pick up rocks from hillsides and throw them in the river, leaving the hillside more exposed and vulnerable to erosion?	☐	☐

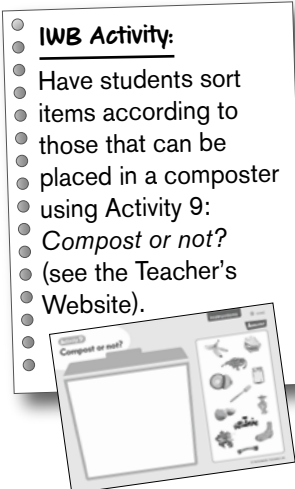
My Soil Footprint is: _____

4. Draw a picture of your Soil Footprint in the box below.

5. Write a sentence about your Soil Footprint in the box below.

6. Share your Soil Footprint with a partner.

7. Discuss how you can reduce your Soil Footprint.



Have students use copies of BLM *Soil Footprint* to create a questionnaire to determine how the actions of people affect soil. Hand out copies of the BLM and have students choose three questions to record on their questionnaire. Once the questionnaire is complete, students can record their answers to the questions and find their soil footprint. Then they can have a partner try their questionnaire and compare the results. Ask:

- **Is there room for improvement?**
- **What changes could you make at school to improve the health of soil.**

Students can work together to create a class questionnaire and share it with other classes in the school or in the province to encourage more people to lessen their soil footprint.

CONSOLIDATE

Inform Others

Have students create a bulletin board display or decorate a hallway display case with information about World Soil Day or simply to share information about soil. They may wish to use construction paper, coloured pencils, markers, and pictures from old magazines or printed from the Internet.

EXPLORE MORE

National Soil Concerns

Have students investigate soil issues in other regions of Canada. Students might conduct research and interview students or other people who live in other provinces. Have students find out what others are doing to protect soil. Students might consider how farmers prevent soil from blowing away in Saskatchewan where it is very flat. Others might explore ways in which mining companies in Alberta can prevent toxic chemicals from seeping into the soil. Still others might look at how forestry companies in B.C., Quebec, and/or New Brunswick need to take action to prevent erosion after cutting down many trees in a large area.

WRAPPING UP THE UNIT



Revisit any remaining questions posted on the I Wonder Wall and have students discuss answers in small groups or with a partner. If there are questions that cannot be answered, these can remain on the wall to be discussed and researched further. Discuss what students have learned about the properties and uses of soil, how water changes soil, the ways that soil affects and is affected by living things, and actions to protect soil.

Soil Footprint

Name: _____

1. Answer each of the questions below by circling “Yes” or “No.”
2. Score 1 point for each answer that promotes healthy soil and 10 points for each answer that doesn’t promote healthy soil.
3. Total your results and find your soil footprint.

Question: _____	
Yes	No

↓

Question: _____	
Yes	No

↓

Question: _____	
Yes	No

What’s your soil footprint?



3 Congratulations! You are doing good work to keep soil healthy.

12 Good job. You are making an effort. Look for more ways to help soil.

21–30 Yikes! Find ways to be kind to soil. You can do it!