



25min Soil Erosion Grade 8 Facilitator Notes

Objective: Students will make connections between soil erosion, root systems and the nutritional quality of their food through a cooperative group activity.



Recipe Category: Soil & Composting



Cooking Time: 25 mins



Level of Difficulty: Grade 8



Recipe Ingredients:

- Brown rope to represent the top soil (about 10ft)
- Blue rope to represent the water table (about 10ft)
- Strips of fabric to represent roots added to the soil (can be a bed sheet cut into 4 inch strips)
- Tennis balls with mineral names written on them (at least one for each)
 - Copper, Nitrogen, Zinc, Iron, Calcium, Magnesium, Potassium, Manganese, Phosphorus
- Photo of compacted soil to show as an example
- A diagram of a soil profile to show the layers as an example



Curriculum Links:

Grade	Subject Area	Ontario Curriculum Links
8	Science and Technology	<p><i>Understanding Earth and Space Systems – Water Systems</i></p> <p>Assess the impact of human activities and technologies on the sustainability of water resources. (O)</p> <ul style="list-style-type: none"> ▪ 1.3. Assess the impact on local and global water systems of a scientific discovery or technological innovation. (S) <p>Demonstrate an understanding of the characteristics of the earth’s water systems and the influence of water systems on a specific region.</p> <ul style="list-style-type: none"> ▪ 3.3. Explain how human and natural factors cause changes in the water table. (S)
	Health and Physical Education	<p><i>Active Living</i></p> <p>Participate actively and regularly in a wide variety of physical activities, and demonstrate an understanding of how personal motivational factors can be used to encourage participation in physical activity. (O)</p> <ul style="list-style-type: none"> ▪ A1.1 Actively participate according to their capabilities in a wide variety of program activities. (S)

Overview of Workshop: (1-2 mins)

- Introductions (who you are and what you’re all about)
- Give a brief outline of the subject matter for this workshop (e.g. “*Today we will be looking at the effect that soil erosion has on our food*”) and what it means to you.
- Give an idea of what to expect from today’s workshop.
 - We will explore the role that water plays in the issue of soil erosion in an interactive activity.
 - We will understand how soil erosion caused by water impacts the quality of the foods we eat.

Introduction to Erosion: (5mins)

Begin by asking students for some examples of healthy, nutritious foods, focusing on fruits and vegetables. Why do they think fruits and vegetables are nutritious in the first place?

- Answer: *Fruits and vegetables get their nutrients from the soils that they grow in! Without healthy soils, we wouldn't have healthy foods!*

Tell students that nutrients in the soils come from *mineral material* and from *decomposed plant matter* – both return nutrients directly into the soil so that they can be available for plant roots to take up.

Some nutrients are attracted to plant roots like a magnet. Plant roots also act like a straw and drink up nutrients that are dissolved in the water in the soil.

Without nutrient-dense soil, we wouldn't have nutrient-dense plants.

A common problem, that heavily influences the quality of our soils, is ***erosion***.

- *Erosion is when strong winds, or water, pick up soil particles and move them to another location.*

We are going to learn more about erosion in the following game, and see what we can do to prevent erosion from happening in our own farms and gardens.

The Game: (10-15mins)

For this activity, students will be pretending to be water droplets

The Goal: Get all of the water (the students) through the topsoil (the brown rope) and over to the water table (the blue rope) in 2 minutes – with as few “wash aways” as possible.

The Layout: See diagram under “*Serving Suggestions*” for game layout.

The Rules:

1. Students are to use the plant roots as a balancing beam to cross over to the water table. If they step off, they go back to the start (the topsoil).
2. Each round is 2 minutes in length and restarted with all players.
3. Those students that don't make it to the water table in 2 minutes become eroded soil and are “washed away” – taking soil minerals with them (tennis balls).
4. No one should be lifted off of the ground.
5. Students are to be mindful of others if they lose their balance.

- Line the students up along the brown rope, shoulder to shoulder. They should be facing the blue rope, which is 6-10 feet away, lined up parallel to the brown rope.
- Tell students that the brown rope represents the topsoil, for example:
 - “Here we are, about to rain down onto this nutrient dense top soil, your goal is to cross over the soil and make it to the water table below before being washed away. The water table below will filter you and make you clean to continue your journey in the water cycle.”

****Show students the image of the soil horizons below the topsoil and where the water table is located.** Note the layers in the diagram and point out how it looks similar to the ropes on the ground.

First Challenge:

- The topsoil in this activity is *compacted* – making erosion a common problem. Explain the difficulty of compaction to the students, for example:
 - “This may seem easy, all you have to do is cross over the rope and walk to the blue rope. Simple. But, the topsoil here is very compacted, meaning all of the soil particles are close

together, really really really tightly, and there isn't even enough space between them for water to flow. So no matter how hard your try, you can't cross it. Gravity can't even pull you across this brown line!"

****Show students the photos of compacted soils.**

Second Challenge:

- The students will be completely dependant on the roots for this activity. Explain how students can use the roots systems of a plant to their advantage, for example:
 - *"The only way you can cross over the line is to walk along a plant root! The roots of plants act almost as water slides for water! They let the water sneak in close to the stem and then slide down the root into the soil where it is less compact! So, to make it across, you can **only** step on a root! If you lose your balance or step off the root you have to go back up to the topsoil!"*

Round One:

- Add one *short* root coming from the topsoil; make sure it doesn't come close to reaching the water table. This should be set up so that it is impossible for them to get their whole group across in the time limit with only one short root to walk on.
- When two minutes are up, tell all of the water droplets that didn't make it through that they are now *washed away*. They weren't able to cross through the compacted soil to be able to be cleaned and sent to the water table.
- Ask the "wash aways" to take a valuable soil mineral with them (a tennis ball). Ask each student to read the mineral they're going to take with them. *What's left? What effect with that have?*

Round Two:

Begin by asking what would make it easier to get down to the water table at a faster rate... More roots!

- Bring the "wash aways" back into the group. Lay the lost minerals back along the topsoil.

- Add more roots coming from the topsoil and almost reaching the water table.
- Have students try the same activity again, trying to make it through the topsoil by walking on the roots and crossing over to the water table.
- See how many water droplets can cross over in 2 minutes. It should be more than the first round.

Round Three:

- If time permits (depending on how long it took to say the instructions and explanations) you can add more roots and try the activity one more time, with it getting easier for the water to infiltrate the soil and flow down to the water table.
- Note that each time, less nutrient-rich soil particles are being washed away!

Recapping key concepts: (2mins)

1. What was the role of the roots in helping to fight soil erosion?
 - *Roots are water slides, and roots help to keep the top soil stabilized and make it harder to move*
2. What happened when the water just ran off of the topsoil? What did it take with it?
 - *We lost valuable nutrients for our soil*
3. What would happen if this occurred over and over, over the course of several days, weeks, seasons, or years?
 - *We would eventually lose our best soils along with important nutrients that we need for our good health – KEY TAKE AWAY: If we lose these nutrients from our soil, they are not available for our foods – unhealthy soils = unhealthy foods!*
4. How can we prevent soil erosion?
 - *Plant more! Have more trees, crops and plants in our gardens, fields and forests!*

Personal positive changes: (any time leftover)

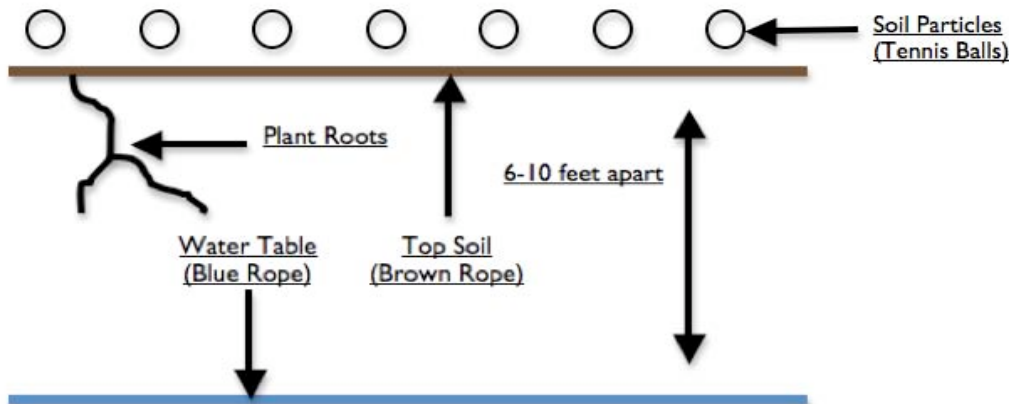
Discuss the different ways we can prevent soil erosion at different scales:

- Individuals can plant gardens in their backyards or neighboring fields.
- We can encourage farmers to till (turn over the plants to mix them in with the soil below, often exposing the soil) their fields less and allow fields to fallow (grow grasses naturally) to encourage root development and stabilize the soil.
- We can compost to add nutrients back to the soil to make up for the loss of nutrients through run off and erosion.



Serving Suggestions:

How to set up the ropes before they arrive:



When you add more roots to try again:

