

Title of Lesson/Unit: Fun Getting your Hands Dirty

Intermediate Lesson Plan adapted from FORED BC Society "The Living Forest".

Curricular References: From the [Earth and Water Science curriculum grade 3, 4, 5](#) and [BC Curriculum Science K-9](#).

Big Ideas: All living things sense and respond to their environment. Earth materials change as they move through the rock cycle and can be used as natural resources.

Curricular Competencies - Students are expected to be able to do the following:

- Identify questions about familiar objects and events that can be investigated scientifically
- Safely use appropriate tools to make observations and measurements, using formal measurements and digital technology as appropriate
- Compare data with predictions and develop explanations for results
- Demonstrate an understanding and appreciation of evidence
- Identify some of the social, ethical, and environmental implications of the findings from their own and others' investigations
- Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information

Concepts & Content - Students are expected to know the following:

- local types of earth materials
- the nature of sustainable practices around BC's resources
- local First Peoples knowledge of separation and extraction methods
- climate change - change in climate affects:
 - the interconnectedness of plants and animals, and their local environment
 - e.g., changes to harvesting dates, changes to schedules due to early/late ripening and runs, lowered water levels in creeks, rivers and lakes, change in humidity impacts the ability to preserve salmon, etc.
 - impacts of humans:
 - humans are capable of changing Earth's landscape, climate, and systems
 - efficacy of sustainable practices
- local First Peoples knowledge of climate change: oral history, change in traditional practice (e.g., the timing of harvest has been impacted by climate change), etc.

Materials & Technologies - Students will use the following materials, tools, equipment:

- metal pie plates, a watering can, water, potting soil, grass seed, buckets to catch runoff water, a sheet of plastic, a measuring cup, paper and pencil (pen)

Pre-Class Preparation - The teacher will need to make the following preparations prior to class:

- Ensure students have the materials required for their in-class experiment. Obtain background material on [soil erosion](#) and at this [National Geographic](#) site. The BC government [website](#) has soil management plans for different areas of the province. Ask students why you can't plant the same type of tree or grass everywhere to prevent soil erosion? Could we grow a bunch of palm trees throughout BC to help our soil stay in place?
- Consider asking an expert from the [Erosion and Sediment Control Association of British Columbia](#) to visit your class (virtually or in-person when COVID permits) to share more about the topic in an age-appropriate way. Another [study on erosion and other issues](#) impacting BC's marine communities from 2001-2016 is here at the US National Library of Medicine [National Institutes of Health](#). One of the report authors may be able to Zoom into your class for an age-appropriate chat.
- Invite a local elder or Indigenous person to visit the class and describe how they managed the impacts and prevention of soil erosion in their communities. If they also are involved in any sustainable natural resources extraction, how do they manage this while trying to ensure minimal impact to the landscape? What are some measures [taken by government](#) (Indigenous Services Canada) working with First Nations to help prevent flooding? I.e.: Projects include dikes, sea walls and erosion-control measures, among others. [BC-specific projects](#) are listed. Ask staff from the City of Richmond to do a Zoom presentation or class visit (when safe) about their [flood risk and soil protection measures](#).

- Invite some experts from the [Association of BC Forest Professionals](#) or the [Mining Association of BC](#), to talk about how natural resources extraction methods in mining or forestry have evolved from early days to factor in soil erosion impacts. Hear first-hand from [a treeplanter](#) about how he ensures forests are renewed. How do forests help keep soil in place? The [BC Government](#) reports: “Each year, less than one-third of one per cent of public forests are logged.” Did you know [that 200 million trees](#) are planted in BC each year?
- “Countries that have both the highest erosion rates as well as a large proportion of agricultural land are especially vulnerable. The majority of Caribbean countries, Brazil, Central African countries, and parts of Southeast Asia are experiencing severe erosion on more than 70% of their arable land. In contrast, Australia, Canada, Saharan countries, Russia, and most of the European Union are only losing 3% of their arable land to severe erosion. To put this in perspective, on average, 24% of arable land globally is undergoing severe erosion.” - [Forbes Magazine](#).

LESSON PLAN

Advise students that one of the important roles that plants and trees have is to hold onto the soil with their roots. In dry weather, their roots hold the soil and keep it from blowing away with the wind. In wet weather, forests act like giant sponges. The tree roots hold the soil, which traps the rainwater and allows the water to run off slowly and evenly. If the trees are gone, the water can wash across the land too quickly, causing flooding and carrying away the soil. The wearing away of the soil by wind and water is called **erosion**.

Ask the students to watch a short video on the [natural and human causes of soil erosion](#) and a [demonstration of soil erosion](#). One more [here](#).

Ask students what happens if farmland growing our food we need to eat is flooded by rains that overflow from a nearby river? Ask students to share stories about whether they have ever experienced flooding? Heavy rainfall could cause water to flood your home or a sewer pipe or water pipe could rupture and flood basements and food freezers for example (local context).

Students' experiment below.

Instructions:

- fill the pie plates with potting soil
- sprinkle grass seed on the soil in one of the pie plates
- press the seeds into the soil and water the soil
- put the pie plates in a sunny spot and water them twice a day or as required
- observe and record any changes that may occur
- after a period of time (3-4 weeks), set the two pie plates side by side on the edge of an elevated, slanted surface. The slant should be enough so that water will trickle down the pie plates, but not so much that the soil will tip out
- Set both pie plates on the same slant, if you are doing this activity inside, spread a plastic sheet on the floor to catch any spilled water. Put a bucket or other container below each pie plate to catch water, measure out 1/2 cup of water, and pour it into the watering can.
- gently pour water onto the pie plate with just soil in it.
- gently pour the same amount of water on the pie plate with grass growing in it (repeat if necessary to get results), record how much water trickles into the bucket under each pie plate. Was any soil carried away with the water?
- what does this tell us about soil erosion?
- how does soil erosion affect the land's ability to grow our food or support the stability of our homes?



- How does the [ocean's surf](#) or a [waterfall](#) for example impact soil and habitat?
- discuss how human activities might affect soil erosion



Resources & References

- Here are some [interactive maps of BC's recreational areas](#) near water bodies that can offer some interesting insights on what might happen to a campground that's flooded if a river swells.
- "Water plays an important role in the transformation of the Canadian landscape by moving large amounts of soil, in the form of sediment. Sediment is eroded from the landscape, transported by river systems, and eventually deposited in a lake or the sea. For example, the Fraser River carries an average of 20 million tons of sediment a year into the marine environment." - [Federal Government](#)

Assessment/Evaluation

- Make simple inferences based on their results and prior knowledge
- Identify some simple environmental implications of their & others' actions
- Compare observations with those of others
- Ask questions about familiar objects and events
- Make simple predictions about familiar objects and events
- Earth materials change as they move through the rock cycle and can be used as natural resources.
- How do we interact with water, rocks, minerals, soils, and plants?
- How can we act as stewards of our environment?

Adaptations/Modifications

- How might soil erosion affect your drinking water? Does anyone remember ever [turning on their tap and seeing cloudy drinking water](#) (often happening right after a [big rain storm?](#)) Did you know some [communities and schools in BC](#), including First Nations, have "boil water" advisories because the water is unsafe to drink? You can view a [real-time map](#) of those impacted communities and the reasons behind the boil water warnings.
- As a class, pick an area in BC that has a soil erosion challenge. Ask students to suggest ways that the soil erosion could be minimized. Can human beings have ultimate control over nature? Discuss.



Extensions/Possible Cross-Curricular Connections

Big Ideas [Career Life Education](#):

- [Career-life choices](#) are made in a recurring cycle of planning, reflecting, adapting, and deciding.
- [Career-life decisions](#) are influenced by [internal and external](#) factors, including local and global trends.
- [Cultivating networks](#) and [reciprocal relationships](#) can support & broaden career-life awareness and options.
- Collaborate with [supportive community](#) members to explore the [reciprocal influences](#) of career-life choices

Personal and Social: Career exploration: brainstorm what kinds of careers/jobs are associated with the rigorous environmental protection standards and new technology/research or knowledge in the area of soil erosion?

Various career links, resources, activities below.

- [Indigenous people share their thoughts on natural resources and traditional knowledge](#)

- <https://www.eco.ca/training/career-profiles/>
- <https://work.chron.com/career-ideas-kids-like-animals-nature-16611.html>
- https://www.youtube.com/watch?v=dsTgyb_ITk
- <https://www.voitraining.com>
- <http://www.terraerosion.com/company.htm>
- <https://abcfp.ca/WEB/ABCFP/Become a Member/NRP/Natural Resource Professionals NRP.aspx>
- <http://escab.ca>
- <https://www.123test.com/career-test/>
- <http://careered.sd73.bc.ca/course/view.php?id=5>
- <http://careered.sd73.bc.ca/mod/url/view.php?id=245>
- <https://www.cofi.org/forest-education/fun-activities-resources/>
- <https://www.youtube.com/watch?v=b8uJQPo8yq0>
- <https://www.careeronestop.org/Videos/CareerVideos/career-videos.aspx>
- <https://www.pexels.com/video/heavy-equipment-hauling-logs-2711305/>
- <https://www.pexels.com/video/a-modern-combine-harvester-doing-harvest-in-the-field-2761657/>
- <https://www.pexels.com/video/herd-of-chicken-855971/>

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