



ENGINEERS &
GEOSCIENTISTS
BRITISH COLUMBIA

CHANGING LANDFORMS

Grade 3 Lesson Plan

OVERVIEW

Students embark on “Playground Science” using water to explore erosion and weathering. This provokes a discussion on how water affects landforms. If there is no suitable outdoor space, then a primary water or sand table can be set-up in the classroom.

Testing is guided in this lesson, with a more open-ended inquiry or ADST design challenge suggested as an extension (i.e., students design a strategy to help prevent weathering). Landform names and origins are incorporated as are locally relevant.

Students participate in a place-based activity; learning about erosion and landform features by creating small streams. Water flowing down a slope prompts discussions about what engineers and geoscientists have to consider when designing roads and structures. Indigenous place names can be a springboard for how names are chosen for local places.

CURRICULUM TIES

AREA	CURRICULUM LINKS
Science (General)	Wind, water, and ice change the shape of the land.
	Local Indigenous Peoples knowledge of local landforms and ecosystems.
	Observable changes in the local environment caused by erosion and deposition by wind, water, and ice.

MATERIALS LIST

- Small containers (for pouring water)
- Large containers (for carrying water to the site)
- Gardening spades

- Yogurt containers (to reconstruct land after the activity / to rebuild the slope)
- Outdoor location (This activity works best on exposed soil)
- Video or photo device and computer projector
- *Changing Landforms* PowerPoint
- Science Journal or *Observing Erosion and Deposition* Printable Template
- (Optional) *Erosion and Deposition Educator Assessment*

ACTIVITY TIMELINE

SECTION	APPROXIMATE TIME
Introduction	10 min
Outdoor / Indoor Activity	30 min
Reflections	15 min
Wrap Up	5 min

***Please note:** Educators can modify the time in each section to best suit their students' needs.

INTRODUCTION

1. **Show the *Changing Landforms* PowerPoint**

Check out the PowerPoint Slide notes for talking points to share with students and encourage discussion. The slides begin by highlighting how water interacts with the land. Responses from the discussion could be added to a chart or web so that ideas can be expanded in later lessons.

OUTDOOR / INDOOR ACTIVITY

1. Outline the expectations for the erosion activity:

- 1.1. Students work in groups of 2/3 and are assigned to a pre-determined testing area. If there are no sloped areas, students can build small hills using a mixture of small rocks and soil.
- 1.2. They should explore/observe the effects of water on the surface of the Earth.
- 1.3. They should generate questions based on their observations of what happens to the land as water moves down the slope; at varying speeds.
- 1.4. Students use small containers to pour the water in small amounts and observe even little changes in the surface as water trickles down.
- 1.5. Make sure to start pouring in the same location each time.

2. Start the Erosion Activity: Outdoor Option

Give students at least 15 minutes to test/observe and then discuss their observations. If time allows, retest and make further observations. Have students create names for their streams, waterfalls, rivers and landforms. Clarify the differences between erosion and deposition.

OR

Start the Erosion Activity: Indoor Option

Use a water or sand table to hold soil; a mixture of gravel and fine dirt. Create a slope and transplant a few local plants. Have students take turns pouring the water as everyone observes the changes to surface. Students create names for the streams, waterfalls, rivers and landforms. Clarify the differences between erosion and deposition.

3. Once testing is finished, have students put the soil back in place by compacting the surface. This small stewardship action imparts an important message to students.

REFLECTIONS

1. Back at their workstations, have students list their observations in point form. Have them share their work with other groups, then add more detail. Get students to add in their questions at the bottom of the page. Students can also add in the names they created for their streams, waterfalls, rivers, and landforms to their drawing and colour them.

WRAP UP

1. Acknowledge and celebrate the diversity of thinking and creativity demonstrated in students Changing Landforms challenge.

EDUCATOR EVALUATION

- The Curricular Competencies in this activity could be used as evidence for a Core Competency self-assessment; refer to Curricular Competencies Assessment.
- The students' illustrations/observation notes should clearly show how the surface was affected by the water. The questions generated could be collated then explored through an ADST inquiry.
- The photos/video of the students-in-action could be imported to an electronic reporting platform.

***Please note:** If you are a Career Awareness Volunteer, the evaluation section above doesn't apply.

EDUCATOR INSTRUCTIONS

Look around your school ground to see if there are some plants growing in a "waterway area" that students can observe to see the importance of root structures in preventing soil erosion.

Throughout the Science Curriculum there is a strong emphasis on place-based learning. The following is extracted from the grade 3 Ministry of Education website:

“Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity. The connection between people and place is foundational to First Peoples perspectives of the world. How does what you know about place affect your observations, questions, and predictions? How does understanding place help you analyze information and recognize connections and relationships in your local environment?”

This activity connects students to their local environment as they model geological processes. They will observe how water can change the shape of the land and this opens up the conversations about how people can shape the land, mitigate effects of natural forces that affect our communities, and respond to the challenges of changing environmental conditions due to climate change.

As part of a broader unit, explore local Indigenous peoples place and landform names and historical records through your district’s Indigenous education team and/or local elders. You may wish to begin the activity with a focus on Indigenous knowledge about why local landforms have a particular shape and how they might have been formed; then complete the erosion activity. On the Okanagan Alliance website the significance of naming is explained in the context of an innovative Syilx mapping project:

“Place names are more than just names for a particular location; they provide teachings in the nsyilxcən language and speak to the relationship of the Syilx people and their land.”:

<https://www.syilx.org/projects/place-names/>

Visit the [First Nations Education Steering Committee website](#) for additional resources in this area.

LANDFORM ESSENTIALS

Below are some key terms relating to this Lesson Plan.

Erosion: This is movement of weathered rock materials from one place to another. Erosion can occur quickly, such as when a landslide occurs. It may occur slowly, over many years. Erosion includes the movement of grains of sand and the movement of gigantic boulders. Erosion can drop materials at any distance from their source—from a few centimetres to hundreds of kilometres away.

Deposition: When eroded rock materials stop moving, they settle on Earth’s surface. This “laying down” of sediments is called deposition. Gravity, wind, water, and ice can all move weathered rock materials to new places; creating new landforms.

Weathering: Weathering is process that slowly breaks down natural materials, such as rocks and boulders, into smaller pieces. Weather includes changing temperature, wind, rainfall, and snowfall. Human-made structures, such as roads and buildings are also weathered. Weathering can be caused by physical forces or by chemical reactions (i.e., acid rain).

AT WORK IN YOUR COMMUNITY

This section contains useful information for educators to communicate about engineering careers, relating to this activity. Both engineers and geoscientists play key roles when it comes to erosion.

GEOSCIENTISTS

Geoscientists are earth scientists. They help us to understand the planet and manage the resources that it gives us. They work hard to find things under the earth's surface, like minerals and ground water. They also study fossils and investigate the ocean floor!

Environmental geologists study flooding, erosion, earthquakes, and other natural hazards. These processes can lead to environmental degradation which means that the ecosystem is destroyed or the natural resources in the area, like air, water, and soil, are damaged or decreased. They also study how people interact with the environment and the effects of that interaction.

ENGINEERS

Engineers make a difference. They use their imagination, creativity, and expertise every day to solve problems and improve the world we live in. They work with people like architects and doctors to make the world better and help people live healthier and safer lives. There are many different types of engineers at work in our community.

Engineers work to protect communities from different types of environmental hazards.

Geotechnical Engineers: Analyze how soil interacts with water. They then design ways to make the soil more stable and suitable for people to use for lots of purposes.

MODIFY/EXTEND THIS ACTIVITY

- Demonstrate how glaciers carrying rocks cause mechanical weathering. This will require some preparation in advance. Fill an ice-cube tray with water. Sprinkle a little sand in half of the sections. Freeze the water. Take out a regular ice cube and rub it along on a piece of foil. Then do the same with a sand cube. As you rub the sand cube along the foil, have students observe what happens. They will notice striations on the foil. This models the process of rocks trapped in ice, weathering the soil as the weight of the glaciers slowly moves across the land.
- Use local landforms to help distinguish between weathering and erosion. For example, close to Williams Lake the Fraser River carries (erosion) the weathered soil materials down to the Fraser Valley, where they are deposited creating very productive farmland.
- Focus on a local, seasonal event (such as a flood) to examine local impacts of weathering and erosion.

RESOURCES

Interested in learning more? Check out these resources.

- [Engineers and Geoscientists BC Website](#)
- [Engineers and Geoscientists BC YouTube Channel](#)