

**ecoMentors Lesson Plan Template: Helping kids explore the planet! www.ecomentors.ca**

**Title: Rocks, minerals and erosion**

**Grade Level(s): 4**

**Time/Date:**

**School:**

**Teacher:**

**Directions to school, class:**

**Contact Info:**

**Ontario Curriculum Connection: Earth and space systems – Rocks, minerals and erosion**

Vocabulary: Words & Concepts your class may be learning, look these up yourself too!

**Erosion** – when the top layer of soil is washed away by wind or water, leaving infertile soil behind where no plants can grow

**Mineral** – A substance that is neither animal nor vegetable; inorganic matter. the building blocks of rocks

**Nutrient** – Organic matter; a source of nourishment

**Weathering** - Any of the processes by which rocks exposed to the weather undergo changes in character and break down.

Materials and Equipment: List these before and while you plan and revise so you're prepared.

Black board and chalk

Pen and paper for the students

Pictures of weathered rocks, erosion sites and other interesting stuff (optional)

What is your class accomplishing?: Learning & Activity Goals, Objectives

- **Describe the effects of wind, water and ice on the landscape and identify natural and man-induced phenomena that cause (rapid) changes in the landscape**
- **Formulate questions about and identify needs and problems related to objects and events in the environment, and explore possible answers and solutions**
- **Distinguish between natural and man-made features of landscapes**
- **Determine positive and negative effects of human alteration of the landscape**
- **Identify ways in which soil erosion can be minimized or controlled**

**PROCEDURE**

The Spark: Introductions, Demonstrations, Show and Tell, Topic Intro (Break the ice!) ~5-10min

*Hi everyone! Today we are going to talk about soil, and especially about the importance of it! What is soil? Can you all name 1 thing that you can find in the soil? As you have noticed good soil contains many things. Plants can only grow on specific types of soil. Can you think of soil where plants do not grow?*

Brainstorming, Getting ideas, Connecting ideas (assess their knowledge!) ~10-20min

1. Draw a circle on the black board. Tell the students that this circle represents the entire surface of our planet. *What percent of the Earth's surface do you think is land and what percent is water?* Let students guess.
2. Let a student color 3 quarters of the circle (pie chart). Tell the students that this is water. *What percent remains as land? 25. Do you think we can use this entire 25% of land as farmland to grow food? No! Why would some land not be suitable for farming? 1/5 is too cold, 1/5 is too high, 1/5 is too dry.*
3. Color 3/5 of the land (in the original circle) and explain that this land cannot be used. *What percent of the entire Earth's surface remains as land that we can use? Only 10% of the Earth's surface is useable land. And then, from this 10%; can we use everything as farmland?*
4. Subtract the land taken up by roads and buildings> land where plants can grow (farmland) is valuable!

*What makes soil good for plants? Write **Good soil** on the board and list the ingredients under it.*

**1. Minerals.** Ask: *Where do minerals come from? Minerals come from rocks.*

**2. Nutrients.** *Where do they come from? Nutrients come from compost and manure. What are nutrients?*

**Nutrients are 'food' for plants; the building blocks they need to grow.**

Write **land decrease** on the board, write **reasons, solutions, and effects** under it. Ask: *The amount of good soil decreases more and more; can anyone think of reasons why good soil decreases? Land is over used; all the nutrients in the soil are used up. Cities and roads expand. Pollution* (write this under reasons)

*How do farmers deal with decrease in useable land? They overuse the land even more or cut down forests to create more farmland. Extra fertilizing and spraying pesticides to get a higher yield* (write this under solutions). *What are the effects of these actions? Deforestation, animals lose their habitat, less trees to produce oxygen, less biodiversity, erosion, fertilizer, soil and pesticides in water* (write this under effects).

Activity, Game, Exercise, Debate, Puzzles, Problem Solving, Role Play ~10-30mins

### Recipe for soil<sup>1</sup>

Today we will be making a recipe for soil! Write down all the ingredients that we need to make soil and directions on how to make soil. Give the students 5 minutes to write their own recipe for soil on a piece of paper. Afterwards, discuss the recipes with the class. *What do you need to make soil?* **Rocks for minerals, organic matter for nutrients, decomposing organisms like worms to break down the organic matter, water, air.** *What is now still missing?* **Weather and time!** *Rock must be broken down; this process is called weathering (you might want to show the class a picture of weathered rocks!).*

Let the students guess how long it takes to form 1 cm of good soil. **It takes 100-400 years!**

Activity, Game, Exercise, Debate, Puzzles, Problem Solving, Role Play ~10-30mins

### Erosion Game

Split the class in half. One half becomes soil particles, the other half trees. The soil particles squat and hold a tree's leg (roots). Let every soil particle pick one tree to hold on to. Explain that every tree can hold maximum 2 soil particles. So when a tree is cut down, the soil particle must move to the neighbor tree. Start cutting down trees (the cut down students can pretend to be logs in the corner of the classroom) until every remaining tree has 2 soil particles. Explain that when you continue cutting down trees, the soil particles lose their support. Ask the teacher to be rain. Every time you say 'Rain!' the teacher walks through the forest and sweeps away the soil particles without roots to support them. All the way to the ocean! (other corner of the classroom) Keep cutting down trees until no trees are left and all soil particles are in the ocean.

*What just happened? What do we call the process of soil being washed away by rain? Can someone spell it?* Write **Erosion** on the board. *Erosion is when the top layer of soil is washed away by wind or water, leaving infertile soil behind where no plants can grow. Erosion can occur by wind or water.* Ask a student if he/she can draw the process of erosion on the black board, or illustrate it yourself. *Cycle of erosion; roots of plants hold the soil together. When plants are removed the soil washes away, and without soil no new plants can grow: erosion becomes worse and worse. How could we stop erosion?* **Erosion happens when there are no plants with roots to hold the soil. For example, when forests are cut down. We can all help to stop erosion by preventing deforestation and re-planting trees and plants on mountain slopes and farm lands.**

Activity, Game, Exercise, Debate, Puzzles, Problem Solving, Role Play(Pt. II or Cont...) ~10-30mins

### What changes the landscape/soil?

*Can everyone think of things that are part of the landscape?* **Hills, mountains, lakes, gullies, cities, ..** *How are these things formed?* **People, wind, water, ...** *Can you name things that change the landscape?* **water, wind, ice, tornado's, tsunami's, buildings, roads, turning forest into fields, ...** Write these things on the black board in a brainstorm way. Ask the students to group these items in 2 categories; what categories can they come up with? Let them discover that they could group these things in different ways: man-made and natural changes, or fast and slow changes. Or how about things that are bad and things that are pretty?!

Contingency, Plan B, extra game or activity (Back up plan) ~5-10mins

### Debate

Have a short debate about positive and negative effects humans can have on the landscape. Divide the class into two equal groups; 1 positive group and 1 negative group. Let each group take turns in naming 1 thing that man changed in the landscape that is positive/negative. List these in two columns on the black board. Stop when the groups run out of ideas or when you run out of time. Look up some positive and negative effects in advance, so you can help the groups a little when they have trouble thinking of positive/negative effects!

Presentation of Findings ~5-15mins

Let each group summarize the positive/negative effects people can have on the landscape and soil.

Review, Conclusion and steps towards continued action ~5-10mins

*Why is soil so important? What can we do to prevent erosion? What are man-made/ natural things that change the landscape? What is good/ bad in changing the landscape? How can we change the landscape to protect soil?*

### References

1. Teaching Green; the elementary years  
<http://www.soilerosion.net/>

Great work ecoMentor! After use of Lesson Plan revise, add ideas and repeat!