QUARTER 4 – EARTH AND SPACE

Chapter 1 – Processes that Shape the Earth's Surface

Lesson ____: Weathering and Soil Erosion

Duration: 4 days

I. Objectives

1. Communicate the data collected from the investigation on soil erosion
2. Identify ways on how to reduce the harmful effects of soil erosion on living things and environment.

II. A. Materials

Day 1- "Shower Them All"
Sand, plastic, water, strainer, mini houses, trees and grasses

Day 2- "Blow Them All"
Electric fan/fan, sand, mini houses, trees and grasses

Day 3-"What Have They Done?"
Pictures, strips of paper, manila paper, pentel pen

Day 4-"What Would You Do?"
Pentel pen, pencil, color, manila paper, bond paper.

B. References

Curriculum Guide for grade 5 Code:S5FE-IV-C-3, Internet oregostate.educ. Science and Health 5, Science 4 TG and LM lesson 57, www.landscapeplanet.com., www.omatra.gov.on.ca., www.landscapeplanet.com., www.erosionpollution.com. www.landscapeplanet.com., www.erosionpollution.com.

C. Process Skills

Observing, inferring

D. Values Integration: Cleanliness, concern for the environment

Note: Before the actual conduct of the activity survey the areas of the school which are prone to soil erosion to ensure that the pupils will have their actual observation. If there in none the teacher can provide a video of a place prone to soil erosion.

III. Learning Tasks

A. Engagement

Set standards on suggested instructions to be observed before taking the class outside of the classroom. (If not applicable set standards in video viewing or you may do the activity inside the classroom)

1. Avoid unnecessary noise in getting in and out of the classroom.

2. Be with the group
3. Bring notebook and pen
4. Work on the assigned Task
5. Be mindful on the allotted time
6. Observe cleanliness in the area

After setting the standards do the following.

1. Allow the pupils to go outside the classroom where they can go outside and walk on the uncemented school ground.
2. If the weather is not good, just stay in the classroom where they can still see the school ground.
3. Let them observe for 3-5 minutes.
4. Ask them to observe the part of the school which are prone to soil erosion and think of the possible ways on how to reduce it.

B. Exploration

Preparatory Activity

Say: Let us learn more about soil erosion as we perform the next activity.

Day 1 – LM Activity

"Shower Them All"

1. Check the materials ahead of time
2. Provide manila paper, tape and marker for group output.
3. Emphasize the use of senses in doing the activity.

Day 2- LM Activity

"Blow Them All"

1. Prepare/Check the materials ahead of time.
2. Check the materials of the pupils.
3. Provide manila paper, tape and marker for group output.

Day 3- LM Activity

"What Have They Done?"

1. Prepare/Check the materials ahead of time.
2. Check the materials of the pupils.
3. Provide manila paper, tape and marker for group output

Day 4- LM Activity

"What Would You Do?"

1. Group the class into 3.
2. Allow them to choose their leaders.
3. Ask the leader to get the activity assigned.
4. Set the standards in performing an activity.
5. Allow the pupils to perform their assigned task for 15 minutes.

C. Explanation

After all the group have posted their output:

Let a representative present their results or answers on the activity questions for 2 minutes only.

1. What is soil erosion?
2. What are the effects of soil erosion to living things?
3. What are the effects of soil erosion on the environment?
4. How can you help reduced the harmful effects of soil erosion caused by water/rain?
5. How can you help reduced the harmful effects of soil erosion caused by wind?
6. What are the human activities that causes harmful effects of soil erosion on our environment?
7. How can human prevent those activities?

D. Elaboration

1. Summarize the different concepts developed by the pupils using the table below.
2. Let them fully understand the effects of soil erosion on living things and environment, and the ways to reduce it.

Soil Erosion Because of	Effects of Soil Erosion on living things and environment	Ways to Prevent the Harmful Effects of Soil Erosion
Rain/Water	1. 2. 3.	1. 2. 3.
Wind/Air	1. 2. 3.	1. 2. 3.
Human Activities	1. 2. 3.	1. 2. 3.

Integration of Values

Now that you have learned the harmful effects of soil erosion to living things and environment, how would you show your concern to our environment? What are the things you can do to show love and concern to your environment?

E.Evaluation

Fill in the box with the correct answer.

_____ 1.the wearing away of soil or the transferring of soil from place to place

2. _____ 3. _____ 4. _____ causes of soil erosion

5.-6 Give two ways to prevent soil erosion caused by rain/water.

7-8 Give two ways to prevent soil erosion caused by wind/air.

9-10. Give two ways to prevent soil erosion caused by human activities.

IV. Assignment

Cut and paste 5 pictures on how to prevent soil erosion.

QUARTER 4 – EARTH AND SPACE

Chapter 1 – Processes that Shape the Earth's Surface

Lesson ____: Weathering and Soil Erosion

Activity 1: "Shower Them All"

Objectives:

1. Communicate the data collected from the investigation on soil erosion
2. Identify ways on how to reduce the harmful effects of soil erosion on living things and environment.

What you need:

Sand, plastic cover, water, strainer, mini houses, trees and grasses

What to do:

1. Make a sand pyramid on top of the plastic cover.
2. Design the toy houses, trees and grasses around the sand pyramid.
3. Make a rain using the strainer and water on the pyramid for 5 seconds, then 10 seconds.

Guide Questions:

1. What happens to the set up when you pour water on it for 5 seconds? For 10 seconds?
2. What made the soil erode or wear away?
3. When the soil loosens up and erode, what happens to the houses and trees?
4. What are the effects of soil erosion made by water or rain?
5. How would you reduce soil erosion caused by water or rain?
6. Complete the tables based on the activity.

SOIL EROSION BY RAIN OR WATER	
Harmful Effects to Living Things and Environment	Ways to Prevent/ Reduce the Harmful Effects
1.	1.
2.	2.
3.	3.

As soon as you have completed the assigned task, gather all your used materials and go back to your classroom to finalize your output for posting and reporting.

Remember These:

Erosion is the wearing away of soil by wind, water, gravity, or human impact. It occurs naturally but can be made worse by human activities such as farming, logging, and mining. The most common type of erosion happens when soil is washed off a slope by rainwater.

The implications of soil erosion by water extend beyond the removal of valuable topsoil. Crop emergence, growth and yield are directly affected by the loss of natural nutrients and applied fertilizers. Seeds and plants can be disturbed or completely removed by the erosion. Organic matter from the soil, residues and any applied manure, is relatively lightweight and can be readily transported off the field, particularly during spring thaw conditions. Pesticides may also be carried off the site with the eroded soil.

Soil quality, structure, stability and texture can be affected by the loss of soil. The breakdown of aggregates and the removal of smaller particles or entire layers of soil or organic matter can weaken the structure and even change the texture. Textural changes can in turn affect the water-holding capacity of the soil, making it more susceptible to extreme conditions such as landslides and drought.

QUARTER 4 – EARTH AND SPACE

Chapter 1 – Processes that Shape the Earth's Surface

Lesson ____: Weathering and Soil Erosion

Activity 2: "Blow Them All"

Objectives:

1. Communicate the data collected from the investigation on soil erosion
2. Identify ways on how to reduce the harmful effects of soil erosion on living things and environment.

What you need:

Electric fan/fan, sand, mini houses, trees and grasses

What to do:

1. Make a sand pyramid on top of the plastic cover.
2. Design the toy houses, trees and grasses around the sand pyramid.
3. Align the set on an electric fan a) number 1 speed b) number 2 speed c) number 3 speed.

Guide Questions:

1. What happens to the soil when you allow the electric fan to blow it at number 1,2,3 speed?
2. What made the top soil erode or wear away?
3. When the top soil erode, what happens to the houses and trees?
4. When the top soil wear away, do you think will happen to the quality of the soil for our crops?
5. What are the effects of soil erosion made by wind or air?
6. How would you reduce soil erosion caused by wind or air?
7. Complete the tables based on the activity.

SOIL EROSION BY WIND OR AIR

Harmful Effects to Living Things and Environment	Ways to Prevent/ Reduce the Harmful Effects
1.	1.
2.	2.
3.	3.

As soon as you have completed the assigned task, gather all your used materials and go back to your classroom to finalize your output for posting and reporting.

Remember These:

Wind erosion occurs in susceptible areas of Ontario but represents a small percentage of land – mainly sandy and organic or muck soils. Under the right conditions it can cause major losses of soil and property (**Figure 7**).

Figure 7. Wind erosion can be severe on long, unsheltered, smooth soil surfaces.

Soil particles move in three ways, depending on soil particle size and wind strength – suspension, saltation and surface creep.

The rate and magnitude of soil erosion by wind is controlled by the following factors:

Soil Erodibility

Very fine soil particles are carried high into the air by the wind and transported great distances (suspension). Fine-to-medium size soil particles are lifted a short distance into the air and drop back to the soil surface, damaging crops and dislodging more soil (saltation). Larger-sized soil particles that are too large to be lifted off the ground are dislodged by the wind and roll along the soil surface (surface creep). The abrasion that results from windblown particles breaks down stable surface aggregates and further increases the soil erodibility.

Soil Surface Roughness

Soil surfaces that are not rough offer little resistance to the wind. However, ridges left from tillage can dry out more quickly in a wind event, resulting in more loose, dry soil available to blow. Over time, soil surfaces become filled in, and the roughness is broken down by abrasion. This results in a smoother surface susceptible to the wind. Excess tillage can contribute to soil structure breakdown and increased erosion.

Climate

The speed and duration of the wind have a direct relationship to the extent of soil erosion. Soil moisture levels are very low at the surface of excessively drained soils or during periods of drought, thus releasing the particles for transport by wind. This effect also occurs in freeze-drying of the soil surface during winter months. Accumulation of soil on the leeward side of barriers such as fence rows, trees or buildings, or snow cover that has a brown colour during winter are indicators of wind erosion.

Unsheltered Distance

A lack of windbreaks (trees, shrubs, crop residue, etc.) allows the wind to put soil particles into motion for greater distances, thus increasing abrasion and soil erosion. Knolls and hilltops are usually exposed and suffer the most.

Vegetative Cover

The lack of permanent vegetative cover in certain locations results in extensive wind erosion. Loose, dry, bare soil is the most susceptible; however, crops that produce low levels of residue (e.g., soybeans and many vegetable crops) may not provide enough resistance. In severe cases, even crops that produce a lot of residue may not protect the soil.

The most effective protective vegetative cover consists of a cover crop with an adequate network of living windbreaks in combination with good tillage, residue management and crop selection.

Effects of Wind Erosion

Wind erosion damages crops through sandblasting of young seedlings or transplants, burial of plants or seed, and exposure of seed. Crops are ruined, resulting in costly delays and making reseeding necessary. Plants damaged by sandblasting are vulnerable to the entry of disease with a resulting decrease in yield, loss of quality and market value. Also, wind erosion can create adverse operating conditions, preventing timely field activities.

Soil drifting is a fertility-depleting process that can lead to poor crop growth and yield reductions in areas of fields where wind erosion is a recurring problem. Continual drifting of an area gradually causes a textural change in the soil. Loss of fine sand, silt, clay and organic particles from sandy soils serves to lower the moisture-holding capacity of the soil. This increases the erodibility of the soil and compounds the problem.

The removal of wind-blown soils from fence rows, constructed drainage channels and roads, and from around buildings is a costly process. Also, soil nutrients and surface-applied chemicals can be carried along with the soil particles, contributing to off-site impacts. In addition, blowing dust can affect human health and create public safety hazards.

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Activity 3: "What Have They Done?"

Objectives:

1. Communicate the data collected from the investigation on soil erosion
2. Identify ways on how to reduce the harmful effects of soil erosion on living things and environment.

What you need:

Pictures, strips of paper, manila paper, pentel pen

What to do:

1. Make to columns on the manila paper.
2. Title the first column "Human Activities That Causes Soil Erosion" and title the second column "Effects of Human Activity to the Environment and Living things"
3. Arrange the given pictures and phrases in its proper column.
4. Answer the guide questions correctly.

Guide Questions:

1. What are the human activities that causes soil erosion?
2. How does deforestation and constructions cause soil erosion?
3. How does these affect our environment?
4. How does agriculture cause soil erosion?
5. Knowing that these human activities has harmful effects on the living things and environment, what are the possible ways to reduce soil erosion?

As soon as you have completed the assigned task, gather all your used materials and finalize your output for posting and reporting.

Remember These:

Human activity on and around the earth's surface whether it is in your backyard or down the park are known to cause erosion 10 times more than naturally occurring processes. Human life has been the number on cause of erosion dating back to the first millennium. Agriculture and construction are the 2 ways in which humans cause erosion. Construction when unnecessarily conducted can be quite damaging to soil and dirt. Vegetation and agriculture are also 2 human causes of erosion because humans move the top soil and make it prone to erosion.

Grazing and deforestation are also human causes of erosion because human life is making the grounds surface soil bare and extremely prone to erosion by natural forces. Across America where soil is being eroded due to human activity.

Another way in which humans cause erosion is by simply watering their gardens. Erosion occurs when watering the gardens of your residential property mainly because the force of water which is coming from your garden hose or irrigation system is too fierce and it makes the soil eroded quite quickly. We can prevent this also by not over watering garden areas containing soil.

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Activity 4: "What Would You Do?"

Objectives:

1. Communicate the data collected from the investigation on soil erosion
2. Identify ways on how to reduce the harmful effects of soil erosion on living things and environment.

What you need:

Pentel pen, pencil, color, manila paper, bond paper.

What to do:

Group 1 (Poster Making)

1. Using the manila paper draw ways on how to reduce soil erosion caused by rainfall

2. The leader will report their work.

Group 2 (Jingle/Song)

1. Using the tune of a familiar song, create its lyrics on ways on how to reduce soil erosion caused by wind.

2. The group will sing it to the class.

Group 3 (News Report)

1. Make a news report on ways of how to reduce soil erosion caused by humans and animals

2. Present it to the class acting as if each member is a tv reporter.

Guide Questions:

1. What are the causes of soil erosion?
2. What are the harmful effects of soil erosion on living things and environment?
3. What are the different ways on how to reduce soil erosion caused by rainfall?
4. What are the different ways on how to reduce soil erosion caused by wind?
5. What are the different ways on how to reduce soil erosion caused by humans and animals?
6. How did each group present their task?

Remember These:

Soil erosion impacts the agricultural industry as well as the natural environment. The effects of soil erosion can be felt both on-site, meaning at the site of soil disruption, or off-site, meaning the location where the eroded soil deposits. Let's start by building our understanding of the impact of soil erosion on-site. When the topsoil is eroded from an area, that area loses its most nutrient-rich layer, and therefore soil quality is reduced.

Poor soil quality means smaller crop yields and may even wash away seeds and small plants. This may call for more of a need for artificial fertilizers and pesticides, which can runoff of fields and contaminate waterways. Also, when the organic matter that is found within the top layer of soil is removed, it can weaken the soil's ability to hold water, leaving the field susceptible to weather conditions such as droughts.

The soil that is carried away has to go somewhere, and this leads to off-site problems. As mentioned, when soil is carried away from a farmer's field by water, it carries with it contaminants, such as fertilizers and pesticides. This runoff can cause water pollution that contaminates drinking water and disrupts ecosystems of lakes and wetlands. This negatively impacts the fish and wildlife that depend on these downstream waters for food and habitat. Sediments that accumulate down slope of the erosion can obstruct the flow of water in streams and drainage canals, leading to flooding.

As we see, much of the effects of soil erosion are the result of water erosion. But wind erosion can also transport topsoil and weaken soil quality. Wind can also damage young seedlings by blasting them with sand and other small particles. Wind also distributes topsoil, which might uncover and expose some seedlings, while at the same time, burying other seedlings too deep. Also, when farmer's fields undergo excessive tillage, meaning that the field is worked too hard in preparation for planting, the soil structure can be lost, making it more susceptible to erosion.

There are ways to avoid and manage soil erosion. One of the best ways to prevent soil erosion is to increase vegetation. Plants and trees grow above the surface, protecting soil from erosion, and their roots meander down through the soil and become like bars in a prison,

locking the soil particles in place, making it hard for them to escape and be carried away by water.

Embankments and sloped land are most vulnerable to erosion due to gravity. So adding plants, shrubs and other vegetation to these areas is important. Vegetation not only locks in water, it can keep wind away. For example, if an area is vulnerable to damaging winds, a natural windbreaker created by trees planted across the wind's direction acts like a wall, cutting down on wind erosion.

Because soil erosion is such an important issue to farmers, any practice that will help prevent water runoff or helps to maintain the strength of the soil structure will be beneficial. **Terracing** is an option for controlling erosion on sloped land by cutting in flat surfaces. When land is sloped, water runs down the slope, so by cutting steps or terraces into a slope, a farmer's field will have an easier time holding water. A field that contains terraces looks like a stairway for a giant.