

Slip, Slidin' Away



Willagillespie Second Grade

In partnership with:



Parks



City of Eugene
and Open Space

www.stem.lane.edu

Content in Context

Lane County STEM for Success

Eugene Public Works Erosion Group



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by the teachers of Lane County.

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Section I. Project Overview & Standards Addressed

Name of Project: Slip, Slidin’ Away

Subject/Course: Science: Earth’s Systems and Engineering

Teachers: Jessica O’Shea, Beth Saxon, Laura Points

Grade Level: 2nd

Other Subject Areas Included:

Literacy: writing, shared research, reading informational texts;

Math: measurement, data collection, graphing

21st Century Competencies: Collaboration and Communication

Project Summary:

After just a twenty-minute walk from Willagillespie Elementary School to the Delta Ponds, students can investigate how erosion caused by rainwater has changed the shape of the land. This creates a meaningful and real-world learning experience. By communicating with local experts and participating in shared research, students will analyze the effectiveness of various erosion control measures.

During this unit, students will complete background research, including reading informational texts, speaking with community experts, taking field trips, and using online resources to articulate the danger to structures caused by rainwater erosion and various prevention measures to limit

that change. The whole class will create a control model by creating a model of a shore located at the Delta Ponds and measure the changing land.

Through the "Rainwater Erosion" project, students have an opportunity to investigate various erosion control measures used by the city of Eugene. Students will gather quantitative data to compare the methods and draw conclusions. Students will work in teams to create models of various erosion prevention measures. Students will create group Keynote presentations to communicate their results.

While the "Rainwater Erosion" project focuses on existing measures used by the city, students will have the opportunity to extend their thinking and create other prevention measures to test.

Driving Question:

- How can we as 2nd grade engineers, limit erosion caused by rainwater to protect structures?

Big Ideas: Students will...

1. Make observations of rainwater erosion
2. Articulate the importance of protecting structures
3. Compare various erosion control measures

Standards:

Earth's Systems Standards

- 2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
- 2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area

Engineering Standards

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Literacy Standards

- RI.2.3: Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
- W.2.2: Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.
- W.2.6: With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.
- W.2.7: Participate in shared research and writing projects
- SL.2.4: Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences.

Measurement Standards

- 2.MD.A.1: Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
- 2.MD.D.9: Generate measurement data
- 2.MD.D.10: Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

Section II. Eight Essential Elements of PBL

Significant Content

The *Rain Erosion Project* engages students in the NGSS by defining problems, testing solutions, and communicating relevant information in regards to slowing rainwater erosion. This will help to inform students about strategies for maintaining the shape of the land.

21st Century Skills

Through this project, students will be collaborate and communicate as they are involved in developing positive teamwork skills. They will explore questions related to a real-world problem, and test solutions to solve this problem.

In-Depth Inquiry

The students will investigate a landscape to define the real-world problem caused by rainwater erosion. Students will research existing erosion control measures to inform their understanding of their effectiveness. Students will create models to test their theories.

Driving Question

The driving question for this project will focus and engage students open-ended, real-world problem solving.

Need to Know

By creating a model using a house, students will grasp the importance of this problem and solution. (Our first time doing this project we did not have a house on the model).

Voice and Choice

This project encourages students to collaborate and problem-solve together to brainstorm ideas of how to slow rainwater erosion and revise their models.

Revision and Reflection

Together, students and teachers will collect data from all groups and discuss outcome and critique each control measure. Students will reflect on their project by creating a keynote presentation.

Public Audience

To help authenticate this project and show students that they are helping solve real world problems, students will present their findings and products to several different groups of stakeholders including peers, older classes, and community experts.

Section III. Teaching the “Rain Erosion” Project

- Reference the driving question at least 3x’s per session.

Sequence of the Project:

		Activities	Standards
L a u n c h i n g t h e P r o j e c t	D a y 1	Pre-Assessment and anticipatory event.	
	D a y 2	Building Background: Define erosion and describe how water can change the land. Videos can be shared at this time too. This helps with students understanding of water erosion.	K-2-ETS1-1
	D a y 3	Field trip to Delta Ponds to look at erosion measures	2-ESS2-2 K-2-ETS1-1
S c a f f o l d i n	D a y 4	Shared research and Literacy Create model of the Delta Ponds Shore	2-ESS2-1 2-ESS2-2 K-2-ETS1-2
	D a y 5	Learn from local expert: Ed, Ed.W.Fredette@ci.eugene.or.us Reframe the question Brainstorm erosion prevention measures Students create the model of a sloping landscape	2-ESS2-1 K-2-ETS1-2

g a n d M a n a g i n g t h e P r o j e c t	D a y 6 - 1 0	Data collection	2-ESS2-1 K-2-ETS1-2 RI.2.3 W.2.7
	D a y 1 1	Data Analysis and drawing conclusions.	
	D a y 1 2	Discuss the most successful erosion control measures and write conclusions.	2-ESS2-1 K-2-ETS1-2
A s s e s s i n g a n d S h o w c a s i n g S t u d e	D a y 1 3	Create a keynote presentation to share	<u>W.2.2</u> W.2.6 W.2.7
	D a y 1 4	Practice Sharing	SL.2.4

n t w o r k	D a y 1 5	Public presentation of project and post assessment	
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Step-by-Step Teaching Guide

- ***Preparing for the Project***

- Assign students to teams
- Create a section in the science notebooks to house student materials
- Identify and contact local experts
- Reach out to parents about the project
- Gather all student materials (*Science Notebook Page*)
- Plan Delta Ponds field trip
 - Determine an area that the city has focused on to control erosion

- ***Launching the Project: Day-by-Day Teaching Guide***

- Day 1
 - Pre-assessment (*Science Notebook page 1*)
 - What is erosion caused by rain?
 - Write down everything you know.
 - *Anticipatory Event:* After students complete their writing, place a bar of soap under the dripping faucet and leave it overnight.
 - Have students draw what they think the soap will look like in the morning. Will it stay the same? Will it look different? Write a prediction. (*Science Notebook, page 2*)
- Day 2
 - Daily objective: I will be able to describe how water can change land and define erosion.
 - Observe the soap left under the faucet and discuss changes.
 - Record the data in Science Notebook page 2.
 - Share the focus question: How can water change the shape of our land?
 - Students will watch a video of rain eroding a hillside.

- <https://www.youtube.com/watch?v=ChEHQUMekXw>
 - <https://www.youtube.com/watch?v=JME8XU8rZNI>
 - Discussion of the video.
 - Create a list of the moving water in the videos.
 - Vocabulary acquisition: erosion. Determine a class definition with shared writing. Post it on the science wall.
 - Explain that we are going to focus on how rainwater changes the shape of the land. Show the teacher model of the land and rain trough. Explain that we make it rain and observe the changes.
 - In teams, students respond to the question, "How can rain change the shape of our land?" (*Science Notebook, page 3*).
- o Day 3
- Daily Objective: I will be able to identify evidence of erosion at the Delta Ponds.
 - Groups share their response to the question, "How can rain change the shape of our land?" with the whole group.
 - Go over the student goals for the unit. (*Science Notebook, page 4*).
 - Prepare students for the field trip to Delta Ponds:
 - Focus questions: "Where can we see evidence of erosion caused by rain in the Delta Ponds?" "Do you see anything that can limit the erosion?"
 - Students take notes on what they observe around the area. (*Science Notebook Page 5*)
 - Group discussion focused on erosion caused by rain in the Delta Ponds. Teacher creates a shared writing word document of discussion to print out and add to their notebooks. (*Science Notebook Page 6*)

● **Scaffolding & Managing the Project**

- o Day 4: Shared Research & Literacy
- Teacher creates large chart paper titled, "Shared Research." When students find something interesting, they can record it on a post-it and add it to the chart.
 - Focus Question: "What do people do to limit erosion caused by rain?"
 - Data collection (*Science Notebook page 7*)
 - Small group literacy time:
 - Students read leveled informational text about erosion caused by rain.
 - Whole group science:
 - Students will investigate pre selected websites to gather more data.
 - Students share their research data and teacher compiles a class research page. Print these out to add to their science notebooks. (*Science Notebook, Page 8*)
- Erosion Websites

- <http://education-portal.com/academy/lesson/what-is-soil-erosion-definition-causes-effects-prevention.html#lesson>
-
- http://www.geography4kids.com/files/land_erosion.html
-
- <https://www.youtube.com/watch?v=CRYdiCjMEjE>
-
- <http://www.wikihow.com/Prevent-Soil-Erosion>
-
- <http://www.factmonster.com/dk/science/encyclopedia/erosion.html>
-
- <http://www.onegeology.org/extra/kids/earthprocesses/weathering.html>
-
- http://www.montessoritraining.net/elementary_program2/courses/physical_geography/sample_lessons.pdf
-
- <http://ees-ecsd-fl.schoolloop.com/weathering>
-
- Generate a list of questions for a local expert. Record the questions on large chart paper to refer to during the interview.
- o Day 5
 - Interview a local expert. Ed, Ed.W.Fredette@ci.eugene.or.us>
 -
 - Whole group discussion: Let's decide which erosion control measures we want to investigate.
 - Students will create a list of erosion control measures. We will list these on chart paper.
 - Teacher will assign groups an erosion control measure. Put students in 6 groups.
- o Day 5.5: Creating Models
 - Students create a model of a landscape with an erosion control measure. (*Science Notebook, page 9*)
 - Teacher will be in charge of the control model with no erosion control measures.
 - Must be prepared for each group:
 - Students record their predictions.
- o Days 6-10
 - Students will have:
 - 2,000 mL of water
 - 2 landscape models

- Graduated cylinder to measure the volume of sand that erodes.
 - Procedure:
 1. Collect 2,000 mL of water.
 2. Carefully and slowly pour the water into the trough, slowly moving from side-to-side. Make sure the 2nd graduated cylinder is in place to collect the runoff.
 3. Using the 2nd graduated cylinder, collect the water and sand that erodes.
 4. Let it settle in the graduated cylinder. Measure the volume of sand.
 5. Record your data. An adult should take a picture of each tub daily.
 6. Repeat for 5 data points.
 - Day 11
 - Students add their 5 data points to find the total amount of sand that eroded.
 - Students will share their data with the group and the teacher will create a group bar graph.
 - Teacher will print the bar graphs and students will put this into their science notebooks (*Science notebook page 15*).
 - Day 12
 - Discuss the success of the various erosion control methods.
 - Write their conclusion. (*Science notebook page 16*.)
- Assessing and Showcasing Student Work
 - Day 13
 - (Keynote Link will be added soon).
 - Students use the data collected in their science notebooks to create a group keynote presentation of their projects.
 - Day 14
 - Review the rubric
 - Students practice sharing their project
 - Day 15
 - Share with public
 - Post assessment
- Extensions to the Project
 - While the "Rainwater Erosion" project focuses on existing measures used by the city, students will have the opportunity to extend their thinking and create other prevention measures to test.

Section IV. Student Handouts

https://drive.google.com/drive/folders/0B7iunl_t0SDKb1FVV3h3bWRVTIk

Section V. Teacher Materials

- 10 clear plastic tubs with a drainage hole in one corner- Please note you will need something to prop the container up so the runoff will not drip on the floor.
- 10 rain troughs
- 20 2,000 mL graduated cylinders
- Soil to create a sloping landscape
- Erosion control material- Jute netting, leaves, hay, gravel, sod.
- Sod will need to be purchased before doing this lesson.
- Data collection sheet- see student handouts