

You Can Save The Town With Science
ELA in Science and Crosscutting Concepts as well as Levels of Inquiry
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Standards Engaged in this project:

Maine Learning Results:

Reading Standard 4: Key Ideas and Details: Read various texts closely to determine what each text explicitly says and to make logical inferences; cite specific textual evidence to support conclusions drawn from the texts.

Writing Standard 4: Inquiry to Build Present Knowledge: Use an inquiry process to gather relevant, credible information/evidence from a variety of sources (e.g., print, digital, discussions, etc.) that build understanding of and lead to conclusions about a subject under investigation.

MAINE SCIENCE AND ENGINEERING STANDARDS.4-ESS2 Earth's Systems.4-ESS2-1
Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

MAINE SCIENCE AND ENGINEERING STANDARDS.4-PS3 Energy.4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object.

MAINE SCIENCE AND ENGINEERING STANDARDS.4-PS3 Energy.4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.

Idea: Using Nasa Resources as well as others to connect what we know about forces in motion with what we are learning about Earth's systems and then create a plan to save a village/area from erosion or a landslide (students choice).

Resources needed:

- Books, websites, and other materials with information about erosion and landslides forces and motion (including simulation models.)
- Lab time with dirt, prevention materials similar to those they want to use and a way to simulate wind/water
- Rubric and/or assignment guide to be sure they complete all parts of the project.
- Guided notes as scaffolding for those who need it

Links:

[Erosion as art?](#)

- Seeing erosion and its effects around the world.

[Nasa Soil Book](#)

- Discussing different soil types in different areas. What natural erosion prevention is in those areas?

Erosion on Mars?

- What does erosion look like in space? How are Earth and Mars similar/different and how do those that affect erosion on the two planets?

Cliff Diver

- What is this showing us? How does this concept relate to erosion/mudslides?

Forces in Motion

- What basic rules about forces and motion is this showing us? How does that relate to erosion/mudslides?

Prior Information:

Students have already studied landforms and soil types. They have explored how water and wind erosion work. Students have also learned about how Earth's surface has changed over time, both long term and short term. This has all been introductory learning.

Project Goals:

Students will read, explore informational materials to gather information. This information and understanding will be used to then create a model showing some form of erosion and how they would prevent it. Students will be asked to cite sources of information as well as demonstrate their model for the class.

Another goal of this project is to make meaningful connections across scientific concepts. In this case they are connecting forces and motion to Earth systems. We are also bringing in a touch of space systems and how they relate to Earth's systems. All of this helps to take basic concepts and make them more global.

Students will also be introduced to the engineering cycle. They will be asked to produce a working model which means they will have to create a sketch of a model, a materials list, create and test their model as well as recreate it for demonstration.

Teacher Role:

To help facilitate student centered learning I will present the challenge of creating a working model to show erosion prevention. I will describe that we will first explore some resources while collecting information and then move into applying that information to the creation of a model. I will also explain that students will need to explain the processes happening and concepts connected to their model when they present this information to their peers.

While students engage with links and resources I will conduct pop in conferences to gauge understanding. I will also assess their progress and if tools such as guided notes or leading questions would be helpful. Given this assessment I will decide how much I need to be involved or if they are on the right track. My plan is to be more of a facilitator and less of a leader in the search of this information. I will encourage students to meet with peers and compare notes to share their understanding. This way they are gathering additional perspectives.

Once students are done with the informational gathering stage they will need to create a plan for their model. This plan includes describing what type of erosion will happen and explaining both the cause and their proposed solution. They should cite evidence in this plan as well. This will involve them brainstorming in some way, demonstrating on paper their plan as well as a list of materials needed and then this plan will have to be approved by the teacher before creating the test models. The approval is to ensure that we can get the materials needed as well as that the plan is reasonable. I will not give them feedback at this stage as to if I believe their model will be successful or not. They will determine that in the testing phase. I will however expect them to have information supporting the reasoning of their models which they were asked to gather during the exploration of information.

We will have a week or more if needed for model creation and testing. I will continually encourage students to improve upon their plans and seek feedback from each other as we continue through the testing and revising stages.

In the final week students will present their models along with a brief overview of their plan including the reasoning behind the model and why they expected the outcome they expected.

Day One - Review Soil types using the book resource above *The Scoop on Soils*. We will then talk about how and why soil types are different in different areas. We will talk about how these different types of soils and what grows in them might affect erosion in that area. Students will then be assigned to be on the lookout for erosion happening around them.

Day two - Students will start class with images of erosion in different areas such as the resources listed above with erosion on Mars and erosion photos used as art. We will then have a discussion where students will be asked to share what they have seen and how it might connect to soil types and plants growing in these areas. (I hope this leads to some natural soil erosion prevention plans such as planting trees, grass and larger root plants that help to create a protective network of roots preventing erosion.) At the end of this class students will be asked to draw a model of their plan for erosion and a prevention method.

Day three - I will start students with the Cliff Diver simulation. Here they will explore the concepts of gravity and mass and how once something starts to fall it gains speed the longer it falls. I am hoping this will help students to think about where their prevention method will be most helpful. In the time left students will take out their model and make any adjustments or add ideas about prevention methods.

Day four - I will have students start to develop how they will take their drawing and create a materials list. Students will need a detailed list of supplies needed along with a labeled drawing before they start the next part of their project.

Days five and six - Students will write a description of their project along with what is happening in the model. They will describe where the erosion is coming from and how they plan to prevent it. This will need to include evidence from class as well as observations from experiences. While students are writing their papers I will be conferencing with them to check to make sure

they are using all that they know about writing. I will also use these days and likely a weekend to gather materials needed for the projects.

Days seven to nine - Students will create their models. Some may be done early, some may continue working as we start presenting. I try to not rush students but encourage them to put as much thought into their project as possible. We will also do a trial run if possible to allow for some revision if needed.

Days 10 and 11 - Students will present their models and demonstrate how they work. Students will be encouraged to review their projects and a peers project. Giving positive and constructive feedback on each.

Project Rubric:

	Does Not Meet	Approaching Understanding	Meets Expectation	Exceeds Expectation
Information Gathering	Has no notes	Some notes without connection to gravity, erosion, or related topics	Has notes with connections to main concepts (erosion, forces and motion, gravity)	Notes includes main concepts as well as connections to experiences and or knowledge outside of classroom exposure
Plan Development	No Plan	Simple plan with basic connections to erosion and or related topics but no cited evidence	Has detailed plan with cited evidence connecting the plan to the information gathered by exploring concepts	Detailed plan with cited evidence connected to gathered information as well as including insight gained by connections made with other classmates
Model Creation	No model	Creates, tests, and presents model	Creates, tests, revises and presents model with reasoning	Creates, tests, revises and presents model with reasoning as well as additional considerations

				such as structure stability over time, environmental impact, ect.
Demonstration to class	No Demonstration	Demonstration includes a model, connections to topics discussed	Demonstration includes a model, connections to topics discussed and reasoning as well as mentioning sources of information leading to understanding.	N/A

Guided Notes:

What type of erosion is your model going to demonstrate?:

Describe the device or plan you have created to prevent or divert the erosion and solve the problem:

What Materials will you use to create your model:

Who could a prevention system like this be helpful for?

How does your plan connect with what you have learned?
