Unit 2:
The Forces of Wind and Water

Árbol de Piedra, a rock formation in the Altiplano, Bolivia sculpted by wind erosion, Thomas Wilken

Contents: Unit 2

Arc of Unit 2: The Forces of Wind and Water

Big Ideas	**Guiding Questions**
Wind and water can change the shape of the land. People can change the shape of the land. The changing shape of the land impacts people. Changes happen over time.	What does our Earth look like? What makes it look that way? How do land and water impact how people live in communities? What resources can we use to understand changes in the shape of the land? Should we intervene with nature?

	WEEK 1	**WEEK 2**	**WEEK 3**	**WEEK 4**
Lens	Our town	Close by and far away	Close by and far away	Close by and far away
Weekly Question	What are landforms?	What can we learn about land?	How can water change land, and why does it matter?	What is our relationship with water?
Texts	Horseshoe Bend (photo) *Earth's Landforms & Bodies of Water* (3) Yangtze River (photo)	*Dirt: The Scoop on Soil* (3) Popham Beach (photo) "Breakers" (poem)	*Water Rolls, Water Rises* (2) *Soil Erosion and How to Prevent It* *Erosion: Changing Earth's Surface* (2)	*I Know the River Loves Me* (2) "Natural Erosion Can Be Good" (informational text) Erosion at the Nile River, Egypt (slides) The Changing Mississippi River (slides)
Writing	Procedure	Procedure	Procedure (final)	Report (1 week only)
Science	Looking at physical maps, Practicing discourse	Looking at physical maps	Stream table experiments: water and sand	Stream table experiments: water and soil
Studios	Exploring landforms in various media	Reading maps and looking at images to learn about features of land	Using watercolor paints to consider properties of water.	Continuing a focus on water and trying out written procedures
Foundational Literacy	Follow guide	Follow guide	Follow guide	Follow guide

Arc of Unit 2: The Forces of Wind and Water

	WEEK 5	WEEK 6	WEEK 7	WEEK 8
Lens	Close by and far away	Our town	Our town	Our town, World
Weekly Question	How can wind change land, and why does it matter?	How do people interact with the land?	How can people prevent or slow erosion?	How do scientists share their ideas?
Texts	"Hurricanes" (informational text) *Soil Erosion and How to Prevent It* and *How Do Wind and Water Change Earth?* *Erosion: Changing Earth's Surface* "Dunes" (poem) Moving Away from the Edge (slides)	teacher choice for text A Problem on Popham Beach (slides) *Erosion: Changing Earth's Surface* and *Soil Erosion and How to Prevent It* What Can Grass Do? (slides) *Soil Erosion and How to Prevent It*	*Erosion: Changing Earth's Surface*, *Soil Erosion and How to Prevent It* and Terracing and Windbreaks (slides) The Muddy River (slides) Taking a Stand (slides) Taking a Stand (discussion) Choosing a Recommendation	*Off to Class* Landforms and Learning in Bangladesh (slides) Could It Work Here, Too? (discussion) *Soil Erosion and How to Prevent It* Sharing Our Work and Summarizing Our Connection Collection
Writing	Explanation (begin)	Explanation	Explanation	Explanation (final)
Science	Experiments with wind	Building models to test approaches	Building models to test approaches	Communicating our recommendation
Studios	Exploring and representing wind	Launching the Thompson Island Erosion Project	Continuing the Thompson Island Erosion Project	Finishing, Presenting, Celebrating the Thompson Island Erosion Project
Foundational Literacy	Follow guide	Follow guide	Follow guide	Follow guide

Unit 2: The Forces of Wind and Water

Unit 2 brings **science** to the foreground, with a study of how wind and water change land. In doing so, it throws into question the stability of the very ground we walk on. It's easy to forget that all over the globe the land is changing shape. In Unit 2, children explore the effects of wind and water on land and consider the ways people both attempt to meet these forces and live in response to them.

Building and using **models** comprises an essential part of the unit, beginning with maps and mapping. Children draw on their experiences of finding their way around new places and comparing the ways places are represented. As models, maps help children understand landforms and bodies of water and how they change. Children also build models in Science and Engineering lessons with a stream table and in the Building Studio with K'NEX.

Text Talk includes several informational texts, a couple of poems, and lots of images. Some of the books are read over the course of several weeks, a couple of pages at a time, depending on the Weekly Question. All of the books, even those not demonstrating features of informational text, provide information through their illustrations and end pages (*Water Rolls, Water Rises*, for example). Because of the density of Text Talk selections, this might be a good time to introduce a fictional chapter book for read aloud at another time of day—time for children to sink into a story that carries them along while they encounter new information and debate ideas critical to building the knowledge of Unit 2.

Many of the conversations in these eight weeks will focus on *information*. Remember to also pay attention to what is beautiful about the land and mysterious about how it changes. Make space for children to *wonder* without trying to come up with explanations, even while Procedure, Report, and Explanation are the genres of study in **Writing**.

An emphasis on informational text

In a science-forward unit, the texts are quite different here than in Unit 1. As children encounter and interact with informational texts, they:

- learn about a topic;
- practice using text features and structures to navigate informational text and to determine key ideas and details;
- practice using context clues to figure out new vocabulary;

- practice identifying the main purpose of a text;
- practice supporting their explanations and thinking about scientific topics with evidence from text;
- learn how to ask questions to pursue while reading; and
- begin to learn how to monitor their understanding of a text by annotating it.

Wrapping up the unit and presenting ideas to others

Throughout the unit, ongoing conversation and exploration support the development of understandings; in the final weeks, children have multiple opportunities to present their ideas to others.

> Beginning to take a stand, children choose a side on an issue and make oral arguments to their classmates. In Week 7 of Text Talk, children are presented with the question "How should we respond to erosion?" They are asked to consider the question and choose either "Try to change nature" or "Change our behavior." Children on each side of the argument share evidence—both from their own thoughts and experiences and from text—and engage in a discussion of the question, defending their side of the argument.
>
> The explanations children write are finalized in the form of posters. These are presented to fourth graders to serve as introductions to a study of erosion, which the older students also take up this year.
>
> At the end of Week 7 and into Week 8, children consider all of the approaches to slowing and preventing erosion they have seen through examples across the unit and evaluate them in a local context. As a class, they make a recommendation for what might be done to slow or prevent further erosion.
>
> In pairs, children consider whether the recommendation they make for Popham Beach might also be effective in any of the global examples that have surfaced over the course of the study.
>
> As a culmination of science learning, the Pophman recommendations are exchanged with other second grade classes—within or across schools—to compare approaches and the experiences that inform them.

As curriculum writers, our own knowledge has expanded in developing Unit 2: The Forces of Wind and Water; we expect that as teachers, **your knowledge** will be stretched, too. Take time to read and digest the texts and other resources that will build your own understanding and feed your classroom investigation.

Rainy Days

While children are experimenting with erosion in science lessons and at the Landforms and Water Table, it will be wonderful for them to experience erosion on a very local, very small scale: the schoolyard. On rainy days, take the children outside to observe the formation of rivulets in the earth as rain trickles from higher to lower elevations. Where is it going? Why? What does the water carry with it? What impact does the movement of earth by water have on the place it came from, along the way, and where it ends up?

In Unit 2, looking at places close by and far away happens within a single week and sometimes within a single day. We begin and end in Maine, on Popham Beach. The classroom world map will be well-marked by the end of the unit, from the Nile to the Mississippi to the Muddy Rivers, from Bangladesh to Cape Cod. Weekly Question charts will cover the globe.
Happy traveling!

To build background knowledge for this unit, visit PBS Learning Media:

Rocky coasts and wave erosion
(https://mass.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.coastrock/rocky-coasts/#.WcJ-40pSxn4)
Go to Support Materials, then Background Essay

Erosion
(https://mass.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.erosion/erosion-and-weathering/#.WdQZxRNSxn5)
Go to Support Materials, then Background Essay

Flooding and effects of erosion on farming
(https://mass.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.flooderosion/flood-farming-and-erosion/#.WcKA7kpSxn4)

Popham Erosion Project Overview

In Unit 2, the project opens by posing a problem experienced by the community on Popham Beach: wind and water are eroding the parts of the coast. What can we do to slow this process?

Why does erosion on Popham Beach matter? With more damaged spaces, there will be less dunes and beach space. There will be less space for public use such as picnic areas, trees, and parking lots. In addition, this threatens the animals that depend on these places. The waterways could be drastically changed, resulting in water flowing in the wrong direction.

The Final Product

As in Unit 1, each class will make a recommendation; this time the group focuses on an approach that could be tried next on Popham Beach to slow erosion. These recommendations are presented to other second grade classrooms so that children can compare and engage in dialogue about the merits of different approaches and how they have been identified. Each recommendation will take a form determined by the teacher and children who initiate it (see possibilities below).

Finally, children work in pairs to apply the Popham Beach recommendation to other places in the world where erosion is impacting human life. A short writing assignment addresses the questions, Might our Popham Beach recommendation work here, as well? If not, why not?

The Activities

The Popham Erosion Project unfolds through Science and Engineering lessons, Studios, and Text Talk. Writing runs parallel to the project (but does not fuel it, as it did in Unit 1).
At the beginning of Week 6, Text Talk focuses on Popham Beach. Unit texts provide information about various approaches to slowing or preventing erosion in different environments; classes make a chart for each approach. In Week 7, children wrestle with the question, Should we intervene with nature? In opposing groups, they take a stand, identify evidence, and use that evidence to discuss options for responding to erosion.

Consulting the charts begun in Week 4 to record approaches to erosion, from Egypt to Cape Cod, children continue to consider new approaches. Which of these might work, given the particular location, resources, and needs of Popham Beach?

In Science and Engineering, children continue to manipulate erosion scenarios and to test approaches. These experiments are critical in refining children's understanding about how erosion happens in different environments and in discussing possible human responses. Work in Studios contributes to this exploration.

Specific activities are laid out in the Weeks 6-8 lessons.

Teacher Preparation

Before the start of Week 6, spend a few minutes familiarizing yourself with Popham Beach. Resources include:

- PBS: Popham State Park (https://www.pbs.org/video/maine-sense-place-popham-beach-state-park/)
- Kiddle: Popham Colony Facts for Kids (https://kids.kiddle.co/Popham_Colony)
- Kiddle: Popham Beach State Facts for Kids (https://kids.kiddle.co/Popham_Beach_State_Park)
- History: The Lost Colony of Popham (https://www.history.com/articles/the-lost-colony-of-popham)
- You Tube: Province of Maine Popham Colony (https://www.youtube.com/watch?v=eoNqedmUYHY)

Throughout the project, have class charts available for whole and small group reference. Plan for movement among studios.

Collaboration and Coordination

Talk with second grade teaching colleagues about the direction of conversations in their classrooms. Circulate ideas from one class to another to broaden children's thinking.

If feasible within the school building, make a plan for exchanging recommendations between classrooms. Will this happen in person, with two classes coming together in one space, or through some kind of text? Will there be an opportunity for an exchange that includes questions and feedback, beyond the sharing of recommendations? If not, perhaps reach out to a nearby school.

Variations of the Project

For this project, children will choose and pursue a single recommendation to present to other second graders, based on research and experimentation. Each class will decide what form that

recommendation takes, from a letter to a slide presentation to a model with related written and visual materials. In addition, children may choose to work independently or in small groups to:

Write, create the set and costumes for, and act out a **play** about erosion on Popham Beach, including what people might do about it.

Build a **model** in the Landforms and Water Table that can be manipulated and **write procedures** for using it, for loan to classes with younger children.

Write an informational **pamphlet** or other easily-reproduced resource to share with a broader audience, such as upper grade classes that travel to Popham Beach.

Create a **public bulletin board** with visual and written information about erosion and how to approach it.

Write and illustrate a class **book** to add to the classroom library and share with other classrooms.

Build a **model** in the Landforms and Water Table, displayed in the school lobby or library.

Create a series of related artworks about forces of wind and water or inspired by different approaches to erosion.

Presentation and Celebration

Beyond the sharing of recommendations to another second grade class, each class might plan for a presentation to families, a presentation to upper grade students if the school has an established relationship with Popham Beach or for an eventual field trip!

Studios At a Glance	Unit 2: The Forces of Wind and Water				
	Art 	**Building** 	**Discovery** 	**Research** 	**Writing & Storytelling**  
Week 1 *What are landforms?*	Children view landscape artworks and reconstruct them artistically, using familiar materials.	Children look at images of landscapes and then build and map those landscapes. This complements work in the Discovery Studio.	Children identify landforms and bodies of water, and then construct them with Beautiful Stuff.	Children look at and discuss images and maps to identify landforms and name similarities and differences.	Children tell, act out, and write and draw stories inspired by images of places.
Week 2 *What can we learn about land?*	Continue from Week 1	Continue from Week 1, adding landscapes from around the world.	Children complete and label a puzzle of a blank map of the world.	Children consult the world map to sort specific countries as they appear in different continents.	Continue from Week 1
Week 3 *How can water change land, and why does it matter?*	Children explore watercolor paints with wet and dry papers.	Children build with K'NEX, following published procedures.	Children investigate slope and erosion in stream tables, with sand.	Children write introductions for fiction and informational classroom books.	Continue from previous weeks
Week 4 *What is our relationship with water?*	Children try out each other's procedures in various studios, according to space and materials needed.				
	Children experiment with oil pastels and watercolor paints.	Continue from Week 3, adding children's own procedures and related building materials.	Continue from Week 3, with topsoil.	Children watch, talk about, and record responses to a timelapse video of a changing river landscape.	Continue from previous weeks, with new prompts

Week 5 *How can wind change land, and why does it matter?*	Using a variety of art media and inspired by children's book illustrations, children represent wind.	Using craft sticks, paper, Beautiful Stuff, and liquid glue, children make miniature structures to add to the Landforms and Water Table (Discovery).	Children identify landforms and simulate erosion, recording observations.	Children review, discuss, and write questions about images, maps, and other unit resources.	Children tell, act out, and write and draw stories involving wind.
Week 6 *How do people interact with the land?*	Begin the Popham Erosion Project: Children use the materials available in all studios to explore their ideas about how to prevent or slow erosion on Popham Beach. They develop a plan for communicating their ideas through various media.				
Week 7 *How can people prevent or slow erosion?*	With only one day dedicated to Studios work this week, children pause their erosion experiments to record findings and make and record next steps. These might include planning for or making revisions, gathering materials, identifying resources, enlisting collaborators, and/or joining with other projects. Alternatively, teachers might plan a more comprehensive Thinking and Feedback session to move a project that is stuck and/or identify opportunities for collaboration.				
Week 8 *How do scientists share their ideas?*	Children resume work on their various projects. They add to, revise, and refine their projects in response to Week 7 reflection, identified next steps, and feedback from classmates and adults. The emphasis is on finalizing projects and preparing for presentation to their selected audience. On Day 5, projects are presented to the group.				

Writing: Introduction to Procedure

Procedure is a genre of writing known to many teachers as "How To" writing. Over three weeks children deconstruct procedures for conducting science experiments, making art, building, and doing yoga. The class jointly constructs a soil experiment procedure to share with Kindergarten students. Then children individually construct procedures for using Studios materials in Art, Building, or Science and Engineering, or for doing yoga. The procedures children write are tried by their peers and are included in classroom materials for the year!

Skills learned when writing procedure support the writing of other genres, including report (Units 2 and 4) and explanation (Unit 2). Children learn how to order steps and to use verbs, adjectives, and adverbs to make their writing precise.

Purpose

The **purpose** of procedure is to give directions to accomplish a goal.

Structure and Language

Procedures unfold in three **stages**. They begin with a **goal**, which names what the procedure sets out to accomplish. The goal can be included in the title, or written immediately after.

The goal is followed by a list of **materials**. **Adjectives** are included in materials lists to specify the number and kind of materials needed. Depending on the audience, lists of materials might be accompanied by images to provide greater clarity. Some procedures, such the yoga poses children examine, do not require a materials list, because the only necessary material is one's body.

The materials are followed by the **steps**. In procedure, steps are numbered and follow one another in a list. They are not written in paragraph form. Each step begins with an **imperative action verb** and does not include additional words to indicate the subject of the sentence, such as "you." Steps also do not include connecting words such as "then" and "next." For example,

1. Pour soil into the jar until it is ⅔ full.
2. Pour water into the jar until it is full.

Adverbs make steps more precise by describing how and where each action is to be completed.

Some procedures end with a **final comment**, which may include an evaluation of the procedure, or, in the case of science experiments, follow-up questions.

Mentor Texts

Note that many science texts for children are written in more than one genre. The texts below, for example, are primarily reports or explanations, but include procedures.

Included in this Unit:

Science:

Earth's Landforms and Bodies of Water by Natalie Hyde, pages 20-21

Erosion: Changing Earth's Surface by Robin Koontz, page 22

How Do Wind and Water Change Earth? by Natalie Hyde, pages 20-21

Art:

Kindergarten: "Steps for Watercolor Painting" and "Score and Slip"

"Easy Kirigami Decoration"
(http://www.origami-resource-center.com/kirigami-decoration.html)

Yoga:

Yoga Pretzels by Tara Guber and Leah Kalish: Bear Breath, Dragon, Cobra, Rock

Building:

K'NEX 35 Model Ultimate Building Set Instructions: Butterfly, Coconut Tree, Swingset, Ice Cream Cone, Fish

LEGO Classic Building Instructions: Ice Cream Cone, Remote Controlled Car

Kapla Art Book, volume 1 (red): Snail, The Lord of the Mountain, Camel, The Desert Voyagers, Japanese House, Pyramid Structure

Additional Texts to Consider:

recipes

Vocabulary

accomplish: to complete successfully
action verb: verb that express action
adjective: a word or phrase used to describe a person, place, thing, or idea
adverb: a word or phrase used to describe a verb
audience: an individual or group for whom a piece of writing is composed
directions: instructions
feedback: specific, helpful suggestions given to improve work
genre: a type of writing
goal: aim; objective; what someone wants to accomplish
image: a representation of something in the form of a drawing, photograph, etc.
imperative verb: a verb that gives directions
materials: the items needed to complete a procedure
noun: a word that names a person, place, thing, or idea
precise: exact; specific
procedure: a genre of writing whose purpose is to give directions to accomplish a goal
publish: prepare writing for an audience
purpose: the reason for doing or creating something
revise: to make changes to writing
revision: change made to improve writing
stages: the parts of a piece of writing
steps: the actions taken to complete a procedure
title: the name of a piece of writing
verb: a word that expresses a physical action, mental action, or state of being

Adapted from Brisk, M.E. (2015). *Engaging students in academic literacies*. New York, NY: Routledge.

Writing: Introduction to Report

Report is a genre of writing that shares features with procedure and explanation. However, it is not organized chronologically. For just one week in Unit 2, children are introduced to report; in Unit 4, children will revisit this genre and deepen their skills. In Unit 2, Week 4, the very short reports children write are in the form of captions for photographs of landforms affected by the types of erosion they will write explanations for in Weeks 5-8. This introduction to report provides the children with more background knowledge about the landforms they will write about, and it gives them additional practice with packing information into a sentence using adjectives, a language feature shared by report and explanation.

Purpose

The **purpose** of reports is to organize information about a topic. The organization of the information is dependent upon the chosen medium. In Unit 2, the children write one-to-two-sentence captions and therefore do not delve deeply into the organization of text.

Structure

Reports unfold in two **stages**. They begin with an opening **general statement**, which introduces the topic of the text. The body of report is made up of **subtopics**, information grouped together and ordered in a way that makes sense to the reader. An important distinction to make is that subtopics are not arranged chronologically. Reports sometimes end with a **summarizing comment**, but this is optional. The children are not introduced to the structure of report until Unit 4.

Language

In Unit 2, children explore the use of **adjectives** to provide more information about a topic. They learn how to use adjectives to pack information into one to two sentences.

Mentor Texts

Included in this Unit:

Earth's Landforms and Bodies of Water by Natalie Hyde, page 10

Additional texts will be included in Unit 4, when report is explored more deeply.

Vocabulary

adjective: a word or phrase used to describe a person, place, thing, or idea
caption: a short explanation of an image
feedback: specific, helpful suggestions given to improve work
genre: a type of writing
image: a representation of something in the form of a drawing, photograph, etc.
information: facts or details about a subject
noun: a word that names a person, place, thing, or idea
organize: to arrange
purpose: the reason for doing or creating something
report: a genre of writing whose purpose is to organize information about a topic
revision: change made to improve writing
subtopic: a smaller part of the topic
topic: what the writing is about

Adapted from Brisk, M.E. (2015). *Engaging students in academic literacies*. New York, NY: Routledge.

Writing: Introduction to Explanation

Explanation is a genre of writing that shares features with procedure and report. Over four weeks, children write explanations of how particular kinds of erosion happen. To prepare for writing explanation, the children build content knowledge about erosion through the other components of the day. In addition, they draw from other writing experiences to support writing explanation: sequential organization from personal recount and procedure; using adjectives from argument, procedure, and report; and drawing clear illustrations from procedure.

The final product in this unit is a poster created to introduce fourth graders to erosion. The children explore posters as a medium and discover that information is communicated largely through illustration. Thus, this unit includes an emphasis on clear illustrations, accompanied by concise written text.

Purpose
There are different types of explanations, which are organized differently and written for different purposes. The explanations written in this curriculum are sequential scientific explanations, whose **purpose** is to explain a phenomenon, in sequence.

Structure
Explanations begin with a **phenomenon statement**, which names the phenomenon introduced in the explanation—in this case, a type of erosion. After the statement of phenomenon are the **explanation steps**, which are all of the steps needed to explain the phenomenon, written in order.

Language
The children learn about **verbs**, **nouns**, and **adjectives** as they write explanations.

Explanations are written with **present tense action verbs**. The verbs are in the present tense because the phenomenon is happening now, and they are action verbs because they show what is happening.

The **nouns** in explanations are general, naming a group or class, rather than something specific. For example, an explanation about erosion by waves talks about waves' effects on cliffs (in general), rather than on the cliff at Popham Island (a specific example).

As in report, **adjectives** are used in explanation to pack information into a sentence. Adjectives can be single words or prepositional phrases that describe the nouns.

Mentor Texts

Included in this Unit:
How Do Wind and Water Change Earth? by Natalie Hyde
Erosion: Changing Earth's Surface by Robin Koontz

Additional Texts to Consider:
Published, child-friendly explanations are available on many topics. Using the above texts to develop content knowledge while developing knowledge about the genre will be the most effective. *Soil Erosion and How to Prevent It,* by Natalie Hyde, is another unit text that can be used to develop both content and genre knowledge.

Vocabulary

action verb: a verb that expresses action
audience: an individual or group for whom a piece of writing is composed
caption: a short explanation of an image
explain: to describe in detail
explanation: a genre of writing whose purpose is to explain a phenomenon in sequence
explanation steps: the phenomenon explained, in order
feedback: specific, helpful suggestions given to improve work
general: naming a group; not specific
genre: a type of writing
illustration: picture
image: a representation of something in the form of a drawing, photograph, etc.
layout: the organization of a page
medium: a form of communication
noun: a word that names a person, place, thing, or idea
phenomenon: an observable thing that happens
phenomenon statement: the beginning of an explanation, where the phenomenon is introduced
precise: exact; specific
present tense: happening now
publish: to prepare writing for an audience
purpose: the reason for doing or creating something
report: a genre of writing whose purpose is to organize information about a topic
revise: to make changes to writing
revision: change made to improve writing
sequence: in a particular order
sketch: a rough drawing
stages: the parts of a piece of writing
verb: a word that expresses a physical action, mental action, or state of being
visualize: to create a mental image

Adapted from Brisk, M.E. (2015). *Engaging students in academic literacies*. New York, NY: Routledge.