

WHAT ARE SOME OF EARTH'S LANDFORMS?



Overview

In this lesson, students will observe local land features. Students use their observations to create a model of a single landform, then write a creation story about that feature.

Objectives

On successful completion of this lesson, students will be able to:

- identify local land features;
- create and use a model of a landform; and
- share a traditional story about a local land feature.

Alaska Standards

Alaska Science Standards / Grade Level Expectations

[4, 5] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring and communicating.

[4, 5] SE2.2 The student demonstrates an understanding that solving problems involves different ways of thinking, perspectives, and curiosity by comparing multiple explanations (e.g., oral traditions, folklore, scientific theory) of everyday events (e.g., weather, seasonal changes).

[4, 5] SF1.1-SF3.1 The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by telling a local or traditional story that explains a natural event (e.g., animal adaptation, weather, rapid changes to Earth's surface) and relating it to a scientific explanation.

Alaska English / Language Arts Standards

[4, 5] L.4.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

Alaska Cultural Standards

[B] Culturally knowledgeable students are able to build on the knowledge and skills of the local cultural community as a foundation from which to achieve personal and academic success throughout life. Students who meet this cultural standard are able to:

[B.2] make effective use of the knowledge, skills, and ways of knowing from their own cultural traditions to learn about the larger world in which they live.

[D] Culturally knowledgeable students are able to engage effectively in learning activities that are based on traditional ways of knowing and learning. Students who meet this cultural standard are able to:



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- [D.1] acquire in-depth cultural knowledge through active participation and meaningful interaction with elders.
- [D.3] interact with elders in a loving and respectful way that demonstrates an appreciation of their role as culture bearers and educators in the community.
- [D.4] gather oral and written history information from the local community and provide an appropriate interpretation of its cultural meaning and significance.
- [E] Culturally knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them. Students who meet this cultural standard are able to:
 - [E.1] recognize and build upon the interrelationships that exist among the spiritual, natural, and human realms in the world around them, as reflected in their own cultural traditions and beliefs as well as those of others.
 - [E.2] understand the ecology and geography of the bioregion they inhabit.
 - [E.3] demonstrate an understanding of the relationship between world view and the way knowledge is formed and used.

Bering Strait School District Scope & Sequence

4th Grade Sequence #7: Physical Features of the Earth

5th Grade Sequence #9: Physical Features of the Earth

Materials

- Teacher Information Sheet: Landforms in BSSD
- Student Worksheet: Topography and Landforms in My Village
- Additional lined paper (for each student)
- Clipboard or other hard writing surface (for each student)
- Modeling clay (enough for each student to build a landform)
- Heavy cardboard (one piece for each student)

For Extension Activity

- Modeling Clay
- Water
- Aluminum pan or bowl

Additional Resources

HSP IV: Ch. 8, Lessons 1, 2; Ch. 7, Lesson 3

HSP V: Ch. 9, Lessons 1, 2; Ch. 7, Lesson 3

HSP V: p. 360 — “Science Spin”



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Activity Preparation

1. Take a walk around your village, noting any interesting landforms or land features.
2. Talk to an elder or culture bearer to learn stories about how the land features came to be the way they are. Find out if there are any creation stories associated with landforms in your area.
 - a. If possible, invite an elder or culture bearer to visit your classroom and share stories telling how certain landforms and features in the area came to be the way they are today.
3. Review the Teacher Information Sheet: Landforms in BSSD and familiarize yourself with landforms and place names common in your area.

Note: It is advisable to ask a long-time resident of your area to help you identify place-names, important land features, and any associated creation stories. Commonly, traditional place-names are not the same as the names found on western-style maps. Becoming familiar with your surroundings is an important Native value.

Whole Picture

Landscape features and place-names play vital roles in the lives of many Alaska Natives. In addition to featuring prominently in origin stories and other folklore, people use landforms and place names for guidance when traveling, hunting, and camping. For example, people who live on St. Lawrence Island have keen awareness of how land features at different locations on the island might affect ocean currents (and subsequently affect the potential for hunting). Chester Noongwook, a respected elder and hunter, explained the differences between Gambell and Savoonga: “[Gambell’s] cape is so different than the place we have here. Here, our currents are much weaker and the wind pushes the ice much stronger to the land, pressures it. Gambell ice is smoother, because there is always some open water there to the west and southwest” (Krupnik and Jolly. 2002. p. 163-165).

Similarly, John Phillip Sr., an elder from Kongiganak, stressed that knowing what to expect from the land and how to safely navigate it was perhaps the most important skill a person could learn. Together with “expert knowledge of tides, clouds, stars, wind, and weather in their hunting areas” learning landscape features allowed a person to travel and harvest successfully from “yuilquq (the wilderness or uninhabited place). [This] knowledge of the land was essential not only for success but for survival” (Fienup-Riordan and Rearden, 2012, p.165).

In coastal areas, high points have traditionally been used as scouting areas — to closely observe changes in the sea and sea ice. Steven Aningayou of Gambell explained, “That high land, Aatnequsi, at the point northwest of Gambell, belongs to the elderly men. When all the men are out hunting, the elderly men used to get out early morning and go there to watch” (Krupnik and Jolly. 2002. p. 172-173).

Awareness of minute details in one’s surroundings can mean the difference between life and death if a person is lost on the land. When a person is intimately aware of their surroundings,



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s/he is able to recognize places as s/he travels, even in very poor weather. John Phillip Sr. was told to observe everything. "Even if it wasn't a trail, I was told to always observe the tundra ... A person who observes and keeps track of the ponds can reach his destination, even when the weather gets very foggy" (Fienup-Riordan and Rearden, 2012, p.166).

As the climate changes, communities across the Arctic are witnessing transformations to the land- and sea-scapes around them. Areas once known to be stable are sinking, rivers are becoming shallower, and traditional hunting areas are no longer accessible. Chester Noongwook, of Savoonga, explained his trepidation: "I am concerned about this happening to our weather and these changes — the global warming, the erosion on our island. If it erodes more, the permafrost is melting, our island might get smaller. Hunting is different, too because of this changing weather and ice. And the animals are different because they are living along with the ice, like the bowheads, walruses, seals, polar bears, maklaks (bearded seals). They all come close to our island because of the ice" (Krupnik and Jolly, 2002, p. 189). Similarly, traditional hunters in other areas along coastal Alaska have noticed that the sea ice now forms in patches, where once it was solid and extended outward to the sea. The lack of sturdy sea ice affects not only peoples' ability to hunt safely, but also animal behavior and predictability.

Despite these changes, it is no less important for young people today to learn to be aware of their surroundings. Safety and survival remain dependent on a person's knowledge of the land. Alaska features a variety of landforms throughout the state. Even within the relatively small area of the Bering Strait School District, landforms are diverse. The following list describes common landforms in this region. Please see the Teacher Information Sheet: "Landforms in BSSD" to find those that are common in your area.

Hill: A hill is a natural area of raised or mounded earth. Hills can be formed by rock and debris buildup leftover by glaciers; they can also be formed when Earth's crust pushes upward. Though hills have a distinct summit, they are generally less steep and smaller than mountains.

Mountain: A mountain is a naturally formed very tall, steep uplifting of earth. Mountains are formed when Earth's crust buckles and pushes upwards. They can also be formed over thousands of years by the buildup from volcanic eruptions. Generally, mountains form abrupt peaks near the ridgeline and are much taller and bigger than hills.

Peninsula: A peninsula is a landform that is surrounded by water on three sides. Most generally, peninsulas are formed over thousands of years by erosion. Wind and water begin to break down softer rock until the land has been carved away and water can surround three sides. Peninsulas are similar to capes, but they are generally considered to be larger. Peninsulas are also frequently connected to the mainland by an isthmus — a narrow strip of land.

Cape: A cape is a narrow, pointed strip of land that juts out into an ocean, lake, or river. It is similar to a peninsula in that water surrounds it on three sides, but is much smaller. Sometimes, capes are found at the tip end of peninsulas.

Island: An island is a landform that is completely surrounded by water. Most oceanic islands are the volcanic peaks of underwater mountains. Islands can be formed by earthquakes, volcanic eruptions, erosion, or flooding.



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Tundra: The tundra is a vast, treeless arctic plain. The tundra is cold and dry; temperatures average 18°F and it receives 10 inches of precipitation, on average, per year (mostly in the form of snow). Much of the ground beneath the topsoil in the tundra is permafrost — permanently frozen ground. However, with climate change, people are witnessing slumps where the permafrost has begun to melt. Plants common to the tundra are low-lying and have brief flowering periods in the spring; they include grasses, shrubs, lichens, and herbs. In the summer, the tundra abounds with animal life, especially migratory birds and insects. Other animals that live on the tundra include caribou, ermine, arctic hare, arctic fox, and musk oxen among others.

Ocean: An ocean is a large body of salty water that surrounds a continent. There are five oceans on Earth: Pacific, Atlantic, Indian, Arctic, and Antarctic. The Arctic Ocean, the smallest of the oceans, consists of the waters surrounding the North Pole between the North American and Eurasian continents. Throughout most of the year the Arctic Ocean remains frozen. In recent years, the summer sea ice extent has dramatically dwindled; local and scientific observers alike have noted more open waters and a resulting change in animal behavior.

Glacier: A glacier is a giant mass of ice that moves very slowly over the land. A glacier forms over many years when the snow that falls during winter does not completely melt in the summer. Through the years, the snow builds up and becomes quite heavy, compacting the snow crystals in the lower layers into ice. Eventually, the ice becomes so heavy it moves forward under its own mass.

Harbor: A harbor is a deep body of water that is mostly surrounded by protruding land. Because the land largely protects harbor waters from stormy weather, ships and boats typically remain safe if anchored in harbors during storms. Harbors are always part of a larger body of water (an ocean, sea, or lake). Harbors are similar to bays, but are more enclosed by landforms and are relatively small.

Bay: A bay is a large, semicircular body of calm water that is partly enclosed by land. Bay waters are always connected to larger bodies of water (oceans, seas, or lakes), and can vary in size. Frequently, multiple harbors can be found within a single bay.

River: A river is a long, flowing body of fresh water that typically empties into the sea or ocean. Rivers can also empty into other rivers; in this case, the river might be a tributary. Rivers are important parts of the hydrological cycle. Frequently a river's source, or headwaters, is located in the mountains and is fed by springs, snowmelt, rain, or glaciers. The mouth of the river is typically marked by a delta, a landform where the main stream splits into several distributaries before emptying into the sea.

Lake: A lake is a relatively large body of water that is surrounded on all sides by land. "Open" lakes contain freshwater because they are fed and drained by a river or stream. "Closed" lakes have no inlet or outlet; they are fed solely by precipitation and are drained by evaporation. Because evaporation leaves behind solids like salts, many closed lakes are saline. Lakes are larger and deeper than ponds, and their inland geographic location distinguishes them from lagoons.

Pond: A pond is a small body of water surrounded on all sides by land. It is smaller and shallower than a lake. Because ponds are relatively shallow, the water temperature from top to bottom



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remains mostly constant. The shallow waters and constant temperatures make ponds good habitat for water plants; these can grow even at the center of ponds (unlike in lakes, where the depth at the center prohibits plant growth). In cold weather, shallow ponds can freeze solid; the insects and other creatures that may inhabit ponds during summer frequently bury themselves in the ponds mud to hibernate at winter.

Marsh: A marsh is a wetland that is found alongside rivers, ponds, lakes, and the coast. Depending on their location, marsh waters might be freshwater, brackish water, or saltwater. They are dominated by treeless plant species, typically consisting of grasses and other herbaceous plants (seed-bearing plants that do not have woody stems, and die down to the ground after flowering).

Lagoon: A lagoon is a shallow body of coastal water that is separated from the ocean by small islands, sandbars, or reefs. They are formed when erosion breaks away the land and ocean water seeps inland. The size and depth of coastal lagoons varies with the tides.

Vocabulary

landform a natural land shape or feature
topography all the kinds of landforms in a certain place

Other Terms that May be Useful

delta a fan-shaped area of land, where the river empties into the ocean
hill a naturally raised area of land, not as high as a mountain
island land that has water all around it
lake a large body of water surrounded by land
landform Earth's surface features, including mountains, hills, valleys, islands, etc.
mountain a tall landform that rises abruptly from the surrounding areas
ocean a very large body of water
peninsula a piece of land almost entirely surrounded by water
river a large stream of water flowing in a channel to the ocean, a lake, or another river stream a small, narrow river
water bodies Earth's surface features including oceans, rivers, lakes, ponds, streams, etc.

Activity Procedure

1. With students, review what a landform is.
 - a. Invite students to identify different landforms found in your area. Guide students as necessary.



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2. Write the word “topography” on the board. Break it down into two parts: “topo-” and “-graphy.” Ask students to suggest what the word might mean.
 - a. Explain that “topo-” means “place”
 - b. Explain that “-graphy” means “written” or “to write”
 - c. Explain that “topography” is the description of a place, specifically concerning all the landforms and features of a certain place.
3. Explain that as a class, you will go outside and observe the topography in your area. Each student will choose a landform, and draw a sketch of it on his / her Student Worksheet: “Topography and Landforms in my Village.” (Students might draw a mountain, hill, dune, valley, cliff, ocean, river, pond, etc.)
4. Once outside in a selected area, instruct students to carefully observe their chosen landform’s shape and size as they draw. Tell students that these drawings will help guide them to building a model once they are back inside.
5. Back inside, distribute a heavy piece of cardboard and modeling clay to each student.
 - a. Instruct students to make a model of the landform they drew.
6. When students have finished building their models, place them all at the front of the room. Label each with a number.
7. On a sheet of paper, student should number down the side according to how many models there are (e.g., if there are 10 models, students should number 1–10 down the side of their paper, giving one line to each number).
8. Instruct students to observe the landforms at the front of the room, and write on their paper what they think it is (e.g., mountain, valley, ocean, lake, hill, etc.).
9. As a class, discuss each form, asking first, what students think it is, then using “how do you know” questions for further detail (e.g., Teacher: “Yes, this is a mountain. How do you know?” Students: “It is a steep form, that emerges abruptly from the land around it”).
10. Ask students how they think scientists use models to understand the earth. (Possible answer: models are useful for closely observing those details, which may be too big to observe in real life).
11. Explain to students that the earth is constantly changing and the landforms they see were created over thousands of years. Because the earth changes slowly, scientists use models to understand how the earth changes.
12. Explain that traditional knowledge also “models” how the earth came to be the way it is. These “models” are often told in the form of stories. Share a traditional story about a local or nearby landform.
13. As a class, brainstorm a list of traditional values — write these on the board.
14. Instruct students to write a creation story for the landform they built. Students should include traditional values and customs in their story. Provide students with additional paper if necessary.

Note: The creative writing portion of this lesson may be extended into Day 2. You may wish to do additional brainstorming with students as a class, to help them develop their stories.



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Alternatively, you may wish to assign it as homework, instructing students to speak with their family and community members to learn local stories concerning well-known land features in the area.

Extension Activity

If you live near the coast, where islands are visible (or if you live on an island), you may wish to have students create an island. Follow the instructions below, either as a whole class activity, or as an activity for individual students.

1. Build a hill out of modeling clay.
2. Place the hill in the center of an aluminum pan or large bowl.
3. Pour water into the pan until only the top of the clay is above the water.
4. Explain how this model is like a real-life island. (Answer: just like a real island, the model island has its base underwater; only the top of the hill is visible above the water's surface.)

Answers

Answers will vary depending on the models that students draw and build. For each landform, students should be able to describe various characteristics, like those outlined in the Whole Picture section above.

References

- Fienup-Riordan, Ann, and Alice Rearden. (2012). *Ellavut: Our Yup'ik World and Weather. Continuity and change on the Bearing Sea Coast*. Seattle and London: University of Washington Press.
- Krupnik, Igor, and Daynna Jolly. (2002). *The Earth is Faster Now: Indigenous Observations of Arctic Environmental Change*. Arctic Research Consortium of the United States and Smithsonian Institution Presses.



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Teacher Information Sheet: Landforms in BSSD

Village Name	Commonly Seen Landforms	Known Place Names <i>Ask an elder or culture bearer in your community to help you learn the place names for areas around your village.</i>
Brevig Mission	Port (Harbor), Agiapuk River, Small lakes, Hills	
Elim	Tundra, Bay (Norton Bay), Hills, Mountains (Darby Mountains), Kwiniuk River	
Gambell	Ocean, Mountain, Hills, Ponds, Lagoon, Peninsula (Northwest Cape), River	
Golovin	Bay (Golovin Bay), Hills, Lakes, Fish River	
Koyuk	Tundra, Koyuk River, Bay (Norton Bay), Lakes, Hills	
Little Diomede	Mountain, Ocean (Bering Strait)	
Savoonga	Mountain, Ocean (Bering Strait)	
Shaktoolik	Ocean (Norton Sound), Lakes, Shaktoolik River, Tundra, Hills (Nulato Hills), Mountains	





Teacher Information Sheet: Landforms in BSSD

Village Name	Commonly Seen Landforms	Known Place Names <i>Ask an elder or culture bearer in your community to help you learn the place names for areas around your village.</i>
Shishmaref	Inlet, Ocean (Chukchi Sea & Bering Strait), Island (Sarichef Island — part of the Barrier Island Chain, Permafrost	
Stebbins	Island (Stuart Island, Stuart Mountain), Ocean (Norton Sound), River (Nunavulnuk River), Lakes	
St. Michael	Island (Stuart Island, Stuart Mountain), Ocean (Norton Sound), River (Nunavulnuk River), Lakes	
Teller	Hills, Port (Port Clarence, Lakes, Permafrost	
Unalakleet	Hills (Nulato Hills), Rivers, (Unalakleet River & others, Mountains, Ocean (NortonSound), Tundra	
Wales	Hills, Mountains, Peninsula (Cape Prince of Wales, Continental Divide, Lagoon, Ocean (Bering Strait)	
White Mountain	Bay (Golovin Bay), Hills, Lakes, River (Fish River), Mountains	

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Student Worksheet: Topography and Landforms in My Village

Name: _____

_____ : a landform in my village.
(write the name of the landform on the line above)

Use this space to sketch a landform in your area. Include as much detail as possible.

On the lines below, write your own creation story for the landform you have chosen. Include traditional values and lessons in your story. Use more paper if necessary.
