

ADAPTATION

Overview:

Climate change is re-shaping the Arctic. Students assess how thawing permafrost is forcing many communities to make adaptations.

Objectives:

The student will:

- evaluate current climate change issues related to thawing permafrost to determine a proactive and a reactive response.

Targeted Alaska Grade Level Expectations:

Science

- [9] 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.
- [10] 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.
- [9] SE1.1 The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by recognizing that the value of any given technology may be different for different groups of people and at different points in time (e.g., different uses of snow machines in different regions of Alaska).
- [9] SG1.1 The student demonstrates an understanding of changes in historical perspectives of science by identifying those perspectives (i.e., cultural, political, religious, philosophical) that have impacted the advancement of science.
- 10] SG1.1 The student demonstrates an understanding of changes in historical perspectives of science by describing how those perspectives (i.e., cultural, political, religious, philosophical) have impacted the advancement of science.

Whole Picture:

Adaptation is the ability to adjust or change to ensure survival. While most plants and animals can only survive in environments that meet their needs, humans have made adaptations that allow them to live just about anywhere.

Adaptation is not new to the Athabascan people. In just the last two centuries, Alaska's indigenous people made the transition from a nomadic lifestyle to permanent village life then had to fight in Federal court for their aboriginal rights to the land they've inhabited for centuries.

The nomadic lifestyle is a vivid picture of historical adaptation strategies for maintaining subsistence hunting. Athabascans traveled in family groups or clans following the seasons in search of food. As noted on the Tanana Chiefs Conference website, "To the Athabascan, the only things that change are the ways of survival."

The Arctic environment provides ample opportunity for examples of human adaptation. From homes to transportation, Alaska's Indigenous people have always expressed a great ability to adapt.

Vocabulary:

adaptation – making adjustments in decisions, activities and thinking because of observed or expected changes

resilient – capacity to prevent or withstand shocks, to rebuild and respond to change and surprises

ADAPTATION

Materials:

- STUDENT INFORMATION SHEET: "A Resilient People"
- STUDENT WORKSHEET: "Adapting to a Changing Landscape"

Activity Procedure:

1. Write the word "adaptation" on the board. Ask students to help define the word. Remind students that animals have adaptations in order to survive in their environment. (For example, a ptarmigan changes color to blend in with the seasons to avoid predators.) People have a tremendous ability to adapt to environmental changes. We design clothes and homes in order to live in the Arctic. While this is not a genetically triggered adaptation, like changing color, human intelligence allows for making decisions that lead to adaptation.
2. Hand out STUDENT INFORMATION SHEET: "A Resilient People." Choose a reading strategy best suited for the class then read the material. Ask students to give specific examples of the way Alaska's people have adapted to living in the Arctic. (Think of housing, transportation, clothing, food, etc.)
3. Hand out STUDENT WORKSHEET: "Adapting to a Changing Landscape." Review proactive and reactive responses or adaptations. Ask students to work in pairs to complete the worksheet.

Extension Ideas:

The State of Alaska has a Governor's subcommittee dedicated to the issues surrounding climate change. For example, there is an advisory group on adaptation, an advisory group on mitigation, etc. Ask students to review information found on the site and report back on state plans and recommendations: <https://dec.alaska.gov/climate-change/>. Review the site beforehand to review current policies and recommendations before assigning students. Ask student to write a mock letter to the governor's Climate Change Sub-Cabinet about a local climate issue.

Answers:

1. A. Reactive, B. Proactive
2. A. Reactive, B. Proactive
3. A. Proactive, B. Reactive
4. A. Reactive, B. Proactive
5. Answers will vary but should reflect an understanding of proactive and reactive.

A RESILIENT PEOPLE

adaptation - making adjustments in decisions, activities and thinking because of observed or expected changes.

In an opinion article titled *Alaska Natives Left Out in the Cold* written for BBC News in 2007, Patricia Cochran, executive director of the Alaska Native Science Commission, and chairwoman of the Inuit Circumpolar Council writes:

“The sad fact is, according to the Army Corp of Engineers, more than 80% of Alaskan communities (comprised mostly of indigenous peoples) are vulnerable to either coastal or river erosion. Natives have traditionally located their communities near water bodies for access to wild foods; so here is an example of the age-old Alaska native wisdom that everything is connected.”

“Permafrost is thawing all over Alaska as a result of rising temperatures, causing land underneath many villages to subside and softening the soil on riverbanks like the mighty Yukon River. Adapting means more than adjusting hunting technologies and what kind of food we eat. It means re-learning how to garner information from a rapidly changing environment. Even science is recognizing the value of ancestral knowledge passed on to later generations of natives.”



© Bill Stokes, DEC 1999 “Norton Bay Shore, Elin”



© Mike Affleck, Alaska Division of Tourism “Ice Fishing”

“There is a reason Native people have been able to survive for centuries in the harshest of conditions, in the strangest of times; it is because of our resilience and our adaptability. And it is that strength from within that our communities now have to rely upon as we face an uncertain future.”

~ Patricia Cochran

Indigenous communities have always adapted, moving with changing migration patterns and availability of traditional foods. Lifestyle mirrored ecological changes. In recent times permanent villages have replaced the nomadic life. Now a changing Arctic landscape is forcing new types of adaptation.

NAME: _____
ADAPTING TO A CHANGING LANDSCAPE

Adaptation includes actions that take place before impacts are noticed (proactive) and after impacts have been felt (reactive). When it comes to climate change and thawing permafrost it involves making adjustments in decisions, activities and thinking because of observed or expected changes with the goals of moderating harm and taking advantage of new opportunities.

Adaptations can be proactive or reactive

Proactive: recognizing an approaching issue and creating solutions before it happens.

Reactive: making a decision about an issue after it shows evidence of affecting lifestyle.

Directions: Read each scenario and the two adaptations listed. Circle either **Proactive** or **Reactive** beside each adaptation.

1. The permafrost that keeps traditional ice cellars frozen is thawing and food is spoiling.

A. Don't use the ice cellars. Use modern refrigeration methods.	Proactive	Reactive
B. Insulate existing ice cellars or reinforce with modern technological advances to prevent thaw.	Proactive	Reactive

2. A nearby lake is shrinking, threatening the habitat of the fish and waterfowl, both important subsistence foods.

A. Look for new subsistence sites.	Proactive	Reactive
B. Investigate/research strategies for preserving the lake such as bringing in dense material to line the bottom.	Proactive	Reactive

3. Thawing permafrost is discharging sediment into the river, threatening to suffocate salmon eggs.

A. Monitor salmon population. Enact erosion control measures such as a buffer strip of netting or rock lining to keep sediment from the water.	Proactive	Reactive
B. Harvest what fish do return and rely on other food sources to supplement.	Proactive	Reactive

4. Thawing permafrost causes the ground to shift, disrupting waterlines.

A. Dig up the waterlines and repair them.	Proactive	Reactive
B. Design a water delivery system that avoids burying waterlines in unstable ground.	Proactive	Reactive

Directions: Now it is your turn. Beside the following climate change issue write a reactive and a proactive response.

5. An important community trail has become unusable due to permafrost thaw.

Reactive: _____

Proactive: _____
