



How Much Is Too Much? How Much Is Not Enough? Analyzing Public Policy in the Petrified Forest

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Grade Level High School
Duration 2 class periods

National Standards

GEOGRAPHY

Element 2: Places and Regions

6. How culture and experience influence people's perceptions of places and regions.

Element 4: Human Systems:

14. How human actions modify the physical environment.
16. The changes that occur in the meaning, use, distribution, and importance of resources.

Element 6: The Uses of Geography

17. How to apply geography to interpret the past.
18. How to apply geography to interpret the present and plan for the future.

AZ Standards

ELA

Writing

Production and Distribution of Writing

11-12.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

MATHEMATICS

Number and Quantity: Quantities

A1.N-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities utilizing real-world context.

Modeling with Geometry

G.G-MG.A.2 Apply concepts of density based on area and volume in modeling situations utilizing real-world context.

Making Inferences and Justifying Conclusions

P.S-IC.B.6 Evaluate reports based on data

Arizona Social Science Standards

GEOGRAPHY

Human-environment interactions are essential aspects of human life in all societies.

HS.G2.1 Analyze interactions within and between human and physical systems.

Examining human population and movement helps individuals understand past, present, and future conditions on Earth's surface.

HS.G3.5 Evaluate the impact of social, political, and economic decisions that have caused conflict or promoted cooperation throughout time.

Global interconnections and spatial patterns are a necessary part of geographic reasoning.

HS.G4.1 Take an active stance on a geographic issue reflecting its scale (local, regional, state, national, or global)

Overview

Government agencies and lawmakers create policies that affect citizens. Are these policies based on scientific/mathematic reasoning or from other concerns? A good citizen is a well-informed decision maker; therefore, learning how to analyze policies is a life-long skill for students to develop and practice.

Purpose

In this lesson students will consider the current policy of the Petrified Forest National Park. They will

use geographical and archaeological knowledge, scientific understanding and mathematical reasoning to justify their own policy. Currently, collecting samples of petrified wood or any other natural, archaeological or historical object is forbidden by Federal Law in the United States. Students will be asked to determine if this is a reasonable policy and justify their decisions in a one-page brief.

Materials

- White board or similar board.
- Petrified Forest Worksheet
- Petrified Forest Policy Brief Notes

- Petrified Forest PowerPoint
- Background information on Petrified Forest
- Map of Petrified Forest and Wilderness Area
- Picture of Petrified Forest Floor
- Trees to Stone reading

Objectives

The student will be able to:

1. Identify the effects of humans on the Petrified Forest.
2. Identify the effects of nature on the Petrified Forest.
3. Calculate the area of the Petrified Forest forests.
4. Estimate the amount of petrified wood in the Petrified Forest.
5. Evaluate a governmental policy using scientific/mathematical reasoning

Procedures

Prior to Lesson: Teacher should read the “Background information on Petrified Forest” document. Use this information as you conduct the classroom discussions that follow. Also, the 1 hour DVD Timeless Impressions is an excellent source of information

SESSION ONE

1. Anticipatory Set: Ask students to brainstorm and identify several rules/policies that they like or dislike in 3 minutes. After the students brainstorm, write their answers on the board. As these are being recorded, discuss with the class what reasons they give for why these policies are good or bad and list them. Tell the students that today we will be looking at a National Park Policy, identifying reasons behind it, and evaluate if they are valid.
2. Show slides 1-11 in the Petrified Forest Slide Show and ask students to describe how they think petrified wood is formed. Have them read Trees to Stone. Show slides 12-13 of the Park itself and identify the forests that make up the park. Ask the students if petrified wood is a renewable or non-renewable natural resource. Show slides 14-16 about the National Park policy concerning collecting artifacts and preserving artifacts. Ask the students if they can identify reasons why this policy has been put into effect. Show slides 17-19 of before/after pictures of Petrified Forest areas, talk about the abuse of the forest that occurred in the late 1800’s and early 1900’s (blowing up whole trees with dynamite, taking large quantities, etc.) and comment on human abuse/misuse of the forest today. Identify one of the main reasons that we are not allowed to take petrified wood from the forest, the fear that after

a short time there will be no more petrified wood left, and then put up slide 20 with that question.

3. Ask the students to get into small groups and discuss ways they could make a mathematical test of the truth of the slide statement. What information do they need to know to prove or disprove the statement? After 3 minutes ask for each group to present their thoughts and list them on the board.
4. Put up slide 21 of the floor of the forest with all the petrified wood exposed. Ask the groups, if they saw this picture, is there some way they could use it to determine how much petrified wood is in the Petrified Forest?
5. Put up slide 22 and have them in their groups work out the answers to how much wood is in the Petrified Forest. They will have 10 minutes for this.

SESSION TWO

6. Put up slide 23 of the floor of the forest again. Tell the students that they will make a grid on the worksheet that is a replica of the slide that shows the petrified wood lying on the floor of the forest. Hand out the Petrified Forest Worksheet and Map of Petrified Forest and Wilderness Area. They are to calculate the number of pieces of wood in one of the grids, which represents a one square foot area. Show slide 24 as an example. They are to use their estimates of the total number of square feet of forest in the Park itself and consider how much of the Park has petrified wood forests in it. They are to then estimate how many total pieces of petrified wood are in the Park itself and answer the question, “Is there enough petrified wood in the Park for everyone who comes to the Park to have a piece and still have ‘enough’ left over?” Students will have 10 minutes to do these calculations as a group.
8. Hand out the Petrified Forest Policy Brief Notes that includes the assignment directions and the grading rubric. Show slides 25-28 and handle any questions about the assignment. The students will be given 2 days to complete and turn in their Policy Brief.

Assessment

Each student must complete the Policy Brief. Students will be evaluated according to the rubric. Mastery will be considered 3 or higher in each category.

Extensions

1. Discover how deep the bed is that holds the Petrified Forest and make volume calculations of the amount of petrified wood in the forest.

2. Research how, when, and why the National Park System was set up.
3. Find out more about petrified wood. How does it form? How old is it? Where else in the world can it be found?
4. Coordinate this activity with English class to develop persuasive writing techniques.
5. Use the same idea for another issue with multiple perspectives. Have students work in groups to complete the policy statement. (Sample topics: prohibition of liquor, amnesty for draft evaders or immigrants who entered illegally, aid to nations seeking independence from tyranny, etc.).

Sources

Petrified Forest National Park
(<http://www.nps.gov/pefo>)

Sidney R. *Petrified Forest: a Story in Stone*. Petrified Forest, AZ: Petrified Forest Museum Association, 2005. Print.

Timeless Impressions: Petrified Forest National Park/Painted Desert: A Story in Stone. Dir. Gray Warriner. Camera One Seattle, 2011. DVD.

Keller Lynn, K. 2010. Petrified Forest National Park: geologic resources inventory report. Natural Resource Report NPS/NRPC/GRD/NRR—2010/218. National Park Service, Fort Collins, Colorado. Accessed 8.26.11 at http://www.nature.nps.gov/geology/inventory/publications/reports/pefo_gri_rpt_view.pdf