

Give Me Some Air!

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Summary

Students investigate the value of trees by calculating the number of trees needed to support the reservation population's oxygen needs.

Grade level

Third

Time required

45-60 minutes

Materials

[Flathead Reservation population totals](#)

[Satellite image of the Flathead Reservation](#) – see Resources

Flathead Reservation map

Calculators

Goals

By completing this lesson, students will

- 1) gain awareness of the role trees play in producing oxygen,
- 2) gain experience in interpreting maps and satellite images,
- 3) apply math in answering an inquiry question,
- 4) become familiar with basic reservation geography and
- 5) develop awareness of the importance of wise resource management and use.

Science standards addressed

National Science Standards

- Abilities necessary to do scientific inquiry
- Changes in environments
- Organisms and environments
- Systems, order and organization

American Indian Science Standards

- Observations and understandings of nature and ecological relationships traditionally formed an essential base of knowledge among American Indian cultures
- Various forms of scientific and technological work currently engaged in by American Indian men and woman and in what ways their fields require the process of problem identification, design and solution

Teacher tips

It may be useful to print out the satellite image. Alternatively, if you have an LCD projector, project the image in the classroom.

Print out the town population sheet for each group.

Read and become familiar with the information in the Background information section below.

Background information

During the process of *photosynthesis*, plants use the Sun's energy to convert carbon dioxide and water into energy-providing sugars and oxygen. A typical tree, for example, produces about 260 pounds of oxygen each year. Two trees can supply the average annual oxygen needs of one person, calculated to be about 400 pounds.

Trees cover about 450,000 acres of the total 1,245,000 acres of reservation lands. This equates to approximately 36% or just over 1/3 of the reservation being forested.

“Forests range from dry Ponderosa Pine and Douglas Fir types to subalpine fir and alpine larch. Timber harvesting is the second largest revenue generating activity on tribal lands. The forest products industry is a major component of the Reservation economy. Before the early 1900's, most of the timber cut on the reservation went for construction of the St. Ignatius Mission complex, the Jocko Agency, the Northern Pacific Railway and Indian farms. In the early 1900's, non-Indian settlement, the timber demands of World War I, and changes in national Indian policy contributed to the onset of large-scale commercial logging operations... Since 1911 an average of 28,000,000 board feet of timber per year has been harvested from Tribal lands... Forest management on the Reservation has changed from the extensive logging of large tracts that dominated the past. It is now a complex, interdisciplinary process that incorporates a variety of harvest and protection strategies, including the establishment and protection of wildland areas, interdisciplinary team reviews, and sustained-yield management.” (From the Flathead Reservation Comprehensive Resources Plan, Vol.1)

The 1982 – 1992 Forest Management plan allowed 279,000 board feet of timber to be harvested annually. Today, 262,000 board feet is the allowable annual harvest. Values are set with the dual purposes to provide income and to keep harvest levels such that there will not be a decline in forest growth. The standing timber of the reservation is calculated by selecting .25 acre plots throughout forested areas, and analyzing them in relation to the number of trees, their height, diameter, and average annual growth. With this data, Tribal Forestry can fairly accurately determine the average board feet of timber per acre. The reservation currently has approximately 1.8 billion board feet of standing timber.

Initially, the Bureau of Indian Affairs (BIA) managed the Reservation forests. Today the Tribal Forestry Department and the BIA Flathead Agency Forestry Division manage the

timber resource in conjunction with other tribal programs under the Tribal Council's direction.

Tribal policies, as well as Federal policies, affect forest management. These include policies found in the Cultural Resources Protection Ordinance 73A, Mission Mountain Tribal Wilderness Management Plan, Wilderness Buffer Zone Management Plan, National Environmental Policy, and the Endangered Species Act.

Although the CSKT practice *sustainable forest management*, this is not true for all parts of the world. Some parts of Earth, such as regions in the tropics, are being rapidly deforested. This is a potentially grave situation, particularly in light of human population growth. As our global population rises, demands on Earth's natural resources, both *renewable* and *nonrenewable*, increase. Because populations tend to grow *exponentially*, the severity of the problem also grows exponentially. Balancing our needs for resources, developing alternative resources (such as solar energy), and encouraging sustainable management practices can help lessen the impacts of humans on Earth's resources.

Procedure

Engagement

- 1) Arrange students in groups of three. Give each group a reservation map and a satellite image. Ask groups to compare and contrast the map and the image.
- 2) Write the headings "Same" and "Different" on the board. Ask students to report their comparison observations about the map and image, and list them under the appropriate heading. Ask students what kind of information you might be looking for when using the image? When using the map?
- 3) Ask students to find the following features and places on both the map and the image: Flathead Lake, Lower Flathead River, Ninepipe Wetlands, Pablo Reservoir, Hot Springs, Evaro, St. Ignatius, Elmo, Mission Mountains, students' homes.

Exploration

- 1) Instruct each group to use the reservation map to find the number of towns on the reservation, and write them down. When all groups are done, give students the census sheet and have them calculate the total reservation population.
- 2) Using the satellite image of the reservation, have students estimate how much of the land might be forested. Students can do this using a percentage or fraction, but then they should translate that into acres. Provide students with the total reservation acreage (1,245,000) to assist them in calculating. When all groups have their estimate, show them how to translate the percentage or fraction into acres.

Explanation

- 1) Have each group report out their population calculations and forested land estimates. Ask each group how they estimated the percentage of forested land.
- 2) Review the process of photosynthesis, emphasizing the production and release of oxygen. Share with students that a typical tree produces about 260 pounds of oxygen each year, and it takes about two trees to supply the annual oxygen needs of an individual. This is based on an estimate that the person consumes about 400 pounds of oxygen each year.

- 3) Using their previous population calculation, have students determine how many trees it will take to supply oxygen for everyone living on the reservation for one year. Using the forested acreage that students estimated, have students calculate the total number of trees in the reservation forests using the value of 400 trees per acre. Discuss the number of trees in relation to the reservation population's oxygen needs.

Elaboration

- 1) Show students a diagram of population growth over four generations, starting with one couple and assuming that each person in each family produces three children. Discuss how quickly populations can grow. Have student groups predict population growth on the reservation over 20 year periods up to 100 years from now.
- 2) Talk about *renewable natural resources* (such as trees), versus *nonrenewable natural resources* (such as coal and oil). Have students think of examples of each. Discuss the CSKT's policy of *sustainable management* of the forests on the reservation, sharing that the number of board feet harvested annually is controlled and is currently 262,000 board feet. Discuss the implications of balancing our use of resources, especially as world human population increases. Ask students what they think are the potential impacts of the deforestation occurring in some parts of the world.
- 3) Have students calculate oxygen needs over 20 year periods up to 100 years, based on their estimates of reservation population growth. Ask each group to create a graph comparing the number of trees needed to produce oxygen for the reservation population versus the number of trees available today. Have them graph tree numbers for their population estimates for the next 100 years. Will there be enough trees to provide our oxygen needs?

Evaluation

Ask students to write a journal response to the following questions.

- What is the difference between a renewable and a nonrenewable natural resource?
- Why is it important to balance the use of Earth's natural resources?

Vocabulary

sustainable management
renewable resources

deforestation
nonrenewable resources

photosynthesis

Resources

Satellite image of the Flathead Reservation

http://yoda.cec.umt.edu/sid/bin/show_newjava.plx?image=flatheadres.sid&client=Native_Lands§ion=Flathead%20Reservation&title=Native%20Lands