"Trees are the earth's
endless effort
to speak to
the listening heavens."

Rabindranath Tagore

We All Use Forests

ALERT: ALASKA ECOLOGY CARDS OPTIONAL

Section 5
FOREST ACTIVITIES

Grade Level: K - 3

State Standards: A A-1

NGSS: K-ESS3-1.

Subjects: Science, art

Skills: Comparing, contrasting, applying, drawing, writing

Duration: 30-60 minutes

Group Size: Whole class

Setting: Indoors

Vocabulary: Forest, names of forest wildlife, wood

Objectives:

1. Students will identify the different ways animals use trees.

2. Students will identify the different ways people use trees.

3. Students will use a Venn diagram to compare and contrast animal and human use of trees.

Teaching Strategy:

Students will compare and contrast the uses of trees by forest animals and people.

Complementary Activities:

OUTDOOR: "Plant a Tree" *in this section. INDOOR:* "Home is a Tree" *in Section 2, Ecosystem Connections.* "Forests in Literature," "Voices in the Woods," "Wood in Our Lives," *and* "Paper Making" *in this section.* "Breath of Life" *and* "Rain-Making Partners" *in Section 1, Elements that Create Forests.*

Materials:

Chart paper or whiteboard, markers, magazines, glue, twigs, yarn or twine.
OPTIONAL: *Alaska Ecology Cards.*

Background:

See INSIGHTS, *Section 5, Human Uses and Impacts in Forest Ecosystems.* Also INSIGHTS, *Section 1, Elements: "The Giving Forests" and* INSIGHTS, *Section 2, Ecosystem Connections.* And *Alaska Ecology Cards.*

Procedure:

1. The teacher will record student observations as they brainstorm ways trees are used by forest animals.

2. Students will individually, or in groups, draw pictures and write captions illustrating how animals use trees. These pictures will be combined to form a classroom big book.

3. Students will cut pictures from magazines that show ways people use forests and wood.

4. The pictures will then be glued onto heavy construction paper. Yarn or twine will be attached to the pictures and used to hang them from twigs to form a forest-use mobile.

5. Students will use Venn diagrams to compare and contrast the use of trees by animals and people. Shared uses, such as the use of trees for shelter, will be written in the area where the two circles intersect.

Evaluation:

Students will name three ways animals use forests and three ways people use forests.

Credits:

Adapted by Jeanne L. Williams, teacher at Kingikmiut School, Wales, Alaska, from *Uses of Trees,* Amy Shirley and Edie Watson, Oklahoma State Department of Education, 1990.

Curriculum Connections:

(See appendix for full citations)

Books:

Alaska Wildlife Notebook Series (ADF&G)

Forests and Woodlands (Pipes)

In the Forest (Cooper)

In the Woods (Krupinski)

Timber (Jasperson)

A Tree in the Ancient Forest (Reed-Jones)

Look Closer: Tree Life (Greenaway)

Tremendous Tree Book (Brenner)

Teacher Resources:

(See appendix)

Watershed Guardians

Section 5
FOREST ACTIVITIES

Grade Level: K - 12

State Standards: Geo E-5

NGSS: K-ESS2-2-ESS3-3,2-ESS2-1. 3-ESS3-1, 4-LS1-1.,4-ESS2-1. 4-ESS3-2,5-ESS3-1,MS-LS2-4. MS-LS2-5,-ESS3-3.,HS-LS2-7

Subjects: Science, language arts

Skills: Observing, note-taking, applying, analyzing, writing

Duration: 30 minutes and periodic observation

Group Size: Pairs or small groups

Setting: Indoors

Vocabulary: Erosion, germinate, habitat, watershed

Objectives:

Students will conduct an experiment to demonstrate how plant roots affect the rate of erosion.

Complementary Activities:

OUTDOOR: "Forests and Soils" *in Section 4, Succession (compares forested and non-forested sites). INDOOR:* "Rain-Making Partners" *in Section 1, Elements that Create Forests.*

Materials:

Potting soil; grass seeds or seeds of other quickly-growing plants; plastic wrap or two large, clear plastic bags; a sprinkling can; two paint pans or similar sloping containers with catch trays.

Background:

See INSIGHTS, *Section 5, Human Uses and Impacts in Forest Ecosystems.* Also, INSIGHTS, *Section 1, Elements: "The Giving Forests."*

Procedure:

1. Students keep a daily log of the experiment. Each page should include the date, the subject, a drawing of it, and 2-3 sentences describing changes.

2. Fill the sloping parts of two paint pans with very moist potting soil. Spread the seeds of the grass or other plants thickly over the soil in one pan only. Cover both pans with plastic wrap or a large plastic bag and place in a warm, sunlit place or under grow-lights.

3. Ask students to predict what they believe will happen over the next several days. Students record their observations and note any changes. If you have more than one station, label them and ask students to consistently monitor one of them. When the seeds begin to **germinate** (sprout), ask students to define this process and write it in their journals.

4. After the grass is well established in one paint pan, explain that the grass in the pan represents a **watershed**, the forest of trees and other plants on a hillside. Students demonstrate the effects of rainfall by sprinkling water over the two pans and observe what happens to the soil. Less soil should be **eroded** or washed down the "hillside" in the "forested" pan. What if there were a stream at the bottom of the hill? How would it be affected by a clear-cut? How could a change of **habitat** affect the fish living in the streams?

5. Students compare their experiments to the world around them. How did the "forest" protect the soil of the hillside? What might happen to the soil if forests on steep hillsides are removed? Can new trees grow if the soil is washed away?

Evaluation:

1. Pairs or groups of students write an analysis of the experiment and the discussions.

2. Students compare their experiments to real forest issues such as reforestation on sloped land. Students present their experiment and their comparisons to another class.

3. Students design other experiments to demonstrate the possible complications of deforestation.

Credit:

Adapted from American Forest Foundation, "Growin' Seeds and Savin' Soil," *Project Learning Tree Supplementary Activity Guide for Grades 7-12*. 1987.

Curriculum Connections:

(See appendix for full citations)

Books:

Ancient Forests (Siy)

Deforestation (Owens) K-4

Shrinking Forests (Tesar) 7-12

Website:

Alaska Science Forum
<www.gi.alaska.edu/AlaskasScienceForum>

Teacher Resources:

(See appendix)

Forests in Literature

Section 5
FOREST ACTIVITIES

Grade Level: K - 6

State Standards: L A-5, Geo E-1, Geo E-4, A A-1
NGSS: K-ESS3-1., 4-ESS3-1

Subjects: Language arts, social studies

Skills: Writing, listening, listing, evaluating

Duration: 30 minutes

Group Size: 1 and whole class

Setting: Indoors or outdoors

Vocabulary: Values

Objectives:
1. Students will list three things we obtain from forests.
2. Students will identify the forest values portrayed in juvenile fiction books.

Teaching Strategy:
Students listen to a story, list things we use from trees, and write a thank-you note to a tree.

Complementary Activities:
INDOOR: "Papermaking" *and* "We All Use Forests," *both in this section.*

Materials:
The Giving Tree by Shel Silverstein, chalkboard or flip chart paper, chalk or markers, paper, pencils.

Background:
See Curriculum Connections *for resources.*

Procedure:
1. Have students read, or read to them, Silverstein's *The Giving Tree.*

2. Discuss the gifts the tree gave the boy. List the gifts on the chalkboard or flip chart. Did the boy initially give anything to the tree? How did the boy's attitude toward the tree change as he got older? In what other ways might the boy have treated the tree? How does this story show our society's attitude toward forests?

3. Have students write a thank-you note to a tree for one gift it gives to people. The note may include a picture of the child and a tree.

4. Compile the thank-you notes into a class book. If desired, send it to the USDA Forest Service, Resource Education, P.O. Box 21628, Juneau, AK 99802-1628 or the Alaska Division of Forestry, Project Learning Tree, 505 W. 7th Avenue, Suite 1450, Anchorage, AK 99501.

VARIATION FOR YOUNGER GRADES
A. Students draw a picture of the gift instead of writing a note.

B. Following the direction of the younger students, older students write the note.

VARIATION FOR OLDER STUDENTS
Students read several books and analyze how trees or forests are portrayed in the books. Use the following questions:

1. How was the forest portrayed in the story? *(dark and forbidding? friendly and interesting? important or unimportant?)*

2. What did the story tell us about the relationship between humans and the forest?

3. Was the forest in the story imaginary or realistic?

4. How was the forest in the story valued? According to the story, which value or values were most important?

Evaluation:

1. The students name one gift from trees in a thank-you note or drawing.

2. Students write their own *Giving Tree* type of story including at least three "gifts" from the tree(s) and a forest value statement.

Curriculum Connections:

(See appendix for full citations)

Books:
Giving Tree (Silverstein)

The Life and Times of the Apple (Micucci)

Once There was a Tree (Romanova)

Tremendous Tree Book (Brenner)

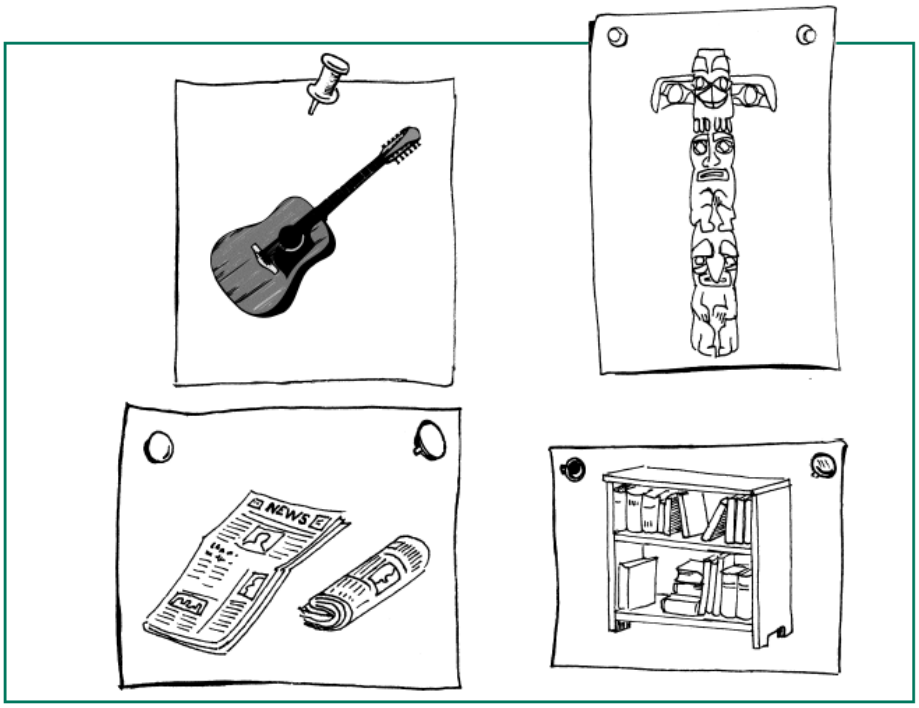
Media:
Once There was a Tree (Video) (Reading Rainbow)

Teacher Resources:

(See appendix)

"I think that I shall never see
A poem lovely as a tree."
Thus begins "Trees"
by poet Alfred Joyce Kilmer
who lived from 1886-1918.

Wood in our Lives
5 EXTENSIONS



Section 5
FOREST ACTIVITIES

Grade Level: K - 6

State Standard: Geo E-1

NGSS: K-ESS3-1.,4-ESS3-1. MS-ESS3-4

Subjects: Social studies, language arts

Skills: Decision-making, observing, comparing, classifying

Duration: 30-60 minutes

Group Size: Small group followed by whole class

Setting: Indoors

Vocabulary: Cellophane, rayon, renewable resource

Objectives:
Students will name at least 10 ways that we use wood in our lives.

Teaching Strategy:
Students search their school and home environments to find ways that wood is used. Students find samples and pictures and make a display board.

Complementary Activities:
INDOOR: "Paper Making" *and* "Voices of the Woods" *in this section*

Materials:
For each group of older students: paper, pencils, tagboard or large pieces of paper. *For younger students:* bulletin board, magazines for cutting pictures, scissors.

Background:
See INSIGHTS, *Section 5, Human Uses and Impacts: "Wood in Our Lives: Alaska Trees – Wood Products"* fact sheet.

Procedure for younger students:
1. Conduct a class discussion about forest products, focusing on where wood is found in nature. Discuss why trees are important to us as part of our natural environment.

2. Students look around the classroom and note things that are made of wood. Create a list of all of the things in the classroom made from wood or wood products. *Add things to the list that perhaps are not as obvious, such as paper, pencils, and boxes.*

3. Ask students to look around their home and identify one item made from wood and used frequently. They can bring a sample of the wood product, draw a picture of it, or cut a picture from a magazine.

4. The next day, collect the items and pictures and make a display showing the ways that wood is used in our lives. *As an extension*, students classify their products into groups of similar items.

Procedure for older students:
1. Discuss the importance of trees as part of our natural world.

2. Discuss how trees provide many products that we use every day. Students may think of lumber, but remind them that wood pulp is another form. Discuss uses for wood pulp such as **rayon**, **cellophane,** and additives in food products.
3. The class lists items in the classroom that are made from wood. Model the skill of classifying these items into such categories as school supplies, furniture, etc.
4. Assign small groups to find the many ways wood is used in our lives. Provide magazines and have students create a collage poster of the varied uses of wood. On the back of the posters ask them to list the uses in categories *(furniture, houses or shelters, etc.)* Encourage the use of encyclopedias or alternate resources to find additional unusual uses.
5. Students present the posters to the class. See how many categories of uses for wood the class can create.
6. Conclude the lesson with a discussion of other resources that could be substituted for wood. For example, could we build our houses effectively out of other resources? Is there a substitute for paper products?

Evaluation:

Students name at least 10 ways in which we use wood.

EXTENSIONS:

A. **Research wood substitutes.** Students research other products that replace wood in our lives. For example, explore the idea of building homes out of adobe, cement, or straw bales.
B. **List ways to reduce personal wood consumption.** Students list all the ways they can replace wood products used at home (for example, using cloth napkins instead of paper napkins).
C. **Compare historic and current uses of wood.** Using Eric Sloane's *Reverence for Wood* or Cameron Miller's *Woodlore* compare the ways we use wood today with the ways people used wood 100 years ago.
D. **Research local use of recycled wood products.** Students visit the grocery store in search of recycled wood products, finding and recording as many items as they can that use recycled packaging.
E. **Rank wood items on a scale of importance.** Students evaluate categories of wood products commonly used in their lives, rating each in terms of necessity for human survival on a scale of 1-10.

Curriculum Connections:

(See appendix for full citations)

Books:

Apple Trees (Patent)
Christmas Tree Farm (Jordan)
From Tree to Paper (Davis)
The Life and Times of the Apple (Micucci)
Lorax (Seuss)
Timber (Jasperson)
Woodlore (Miller)

Media:

The Lorax (Video)

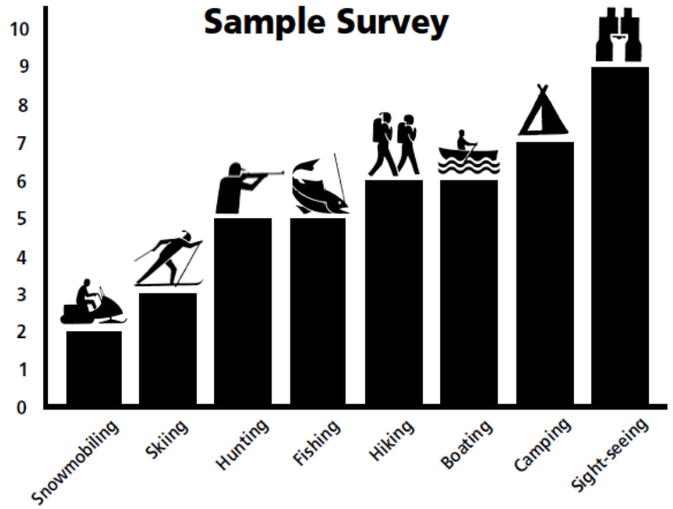
Teacher Resources:

(See appendix)

Historically, forests have been used for objects that we wouldn't recognize today. Early versions of chewing gum and rubber tires both came from trees. Today we use other materials.

Forests for People

5 EXTENSIONS



Grade Level: 5 - 12
State Standards: Geo E-1, Geo E-4, M A-4, M A-6
NGSS: MS-ESS3-4
Subjects: Social studies, math, language arts
Skills: Writing, analyzing, evaluating, graphing, interviewing, speaking, synthesizing
Duration: 3-4 hours
Group Size: Whole class and small group
Setting: Indoors and/or outdoors
Vocabulary: Values

Objective:

Students will understand that people go to forests for a variety of purposes.

Teaching Strategy:

Students devise and conduct a survey of the school to discover how individuals spend their time in forests.

Materials:

Questionnaire devised by students, pencils.
OPTIONAL: tape recorder and cassette tape.

Background:

See INSIGHTS, *Section 5, Human Uses and Impacts in Forest Ecosystems.*

Procedure:

1. Discuss techniques of surveying groups of people to gather information.
2.Introduce the idea of creating a survey about forest use and discuss the merits of such a survey. People spend time in forests for a variety of reasons and place a **value** on forests. Explain that the class will make a survey about Alaska forest use to determine how students and their families use the forest.
3. Explain the difference between open-ended and close-ended questions. The class assignment is to gather information on how students, teachers, and school staff spend time in the forest. Questions could include:
(a) Do you go to any forest areas. If so, which ones?
(b) If you go to forest areas, did you go in the past year? If so, how often?
(c) What kind of activities do you do in a forest area?
(d) Do you pay any fees to participate?
(e) How do you get to the areas you use?
(f) What is your favorite forest area? Why?
(g) Do you know who “owns” the forest?
(h) What do you think are the most valuable things in forests?
(i) Do you think forests have other important values, and if so what are they?
(j) How would you measure the value of an acre of forest?

4. As a class, construct a questionnaire using the questions students want answered.
5.Work with students to create a data log or organizational chart that will lend itself to easy information gathering and later tabulation. *Using a computer to create the log or chart is excellent practice. The chart may include a choice of responses and/or levels of agreement and disagreement.*
6. Practice asking the questions and recording the data in class before going out into the school community to gather actual data.
7. Working in small groups or pairs, conduct the survey of school staff and students. If feasible, conduct part of the survey outside the school to gather information from a wider range of ages. Assign a minimum number of interviews per student team.
8. Ask each team to make a table or graph to show the kinds of answers obtained. A computer works well for this task.
9. Discuss the answers obtained. Were the people interviewed from a variety of backgrounds? How might the answers change if the respondents were from other parts of the state? What kinds of values do people have about forests? What kinds of activities do people do most frequently? How important do forests appear to be to the community surveyed?

Evaluation:

Students write 1-3 paragraphs describing the results of the survey as if it were to be published in a newspaper. Use a "compare and contrast" format for their compositions. *If possible, print the best paragraphs as articles in the school or community paper.*

EXTENSIONS:

A. **Calculate outdoor recreation costs.** Use outdoor magazines and catalogs for outdoor gear to calculate the cost of outfitting a family trip to a forest area to go fishing, hunting, backpacking, hiking, camping, wildlife viewing, skiing, snowshoeing, or snowmobiling.
B. **Invite forest users as guest speakers.** Ask community members who log, carve, fish, hunt, gather plants, backpack, ski, guide, or create forest crafts to speak to the class on forest use.
C. **Display survey results.** Make a mural or bulletin board display showing the kinds of forest uses students found in their survey.
D. **Create media announcements.** Students design a public service announcement about using a local forest.
E. **Debate uses of a forest.** Use the Section 5 Student Activity "Whose Forest? Our Forest" as a follow-up activity.

Credits:

Adapted from American Forest Foundation "Local Recreation Preferences," *Project Learning Tree Supplementary Activity Guide for Grades K*-8, 1987.

Curriculum Connections:

(See appendix for full citations)

Books:

Alaska's Forest Resources
Alaska Wildlife Notebook Series (ADF&G)
Forests for the Future (Parker)
Shrinking Forests (Tesar) 7-12

Websites:

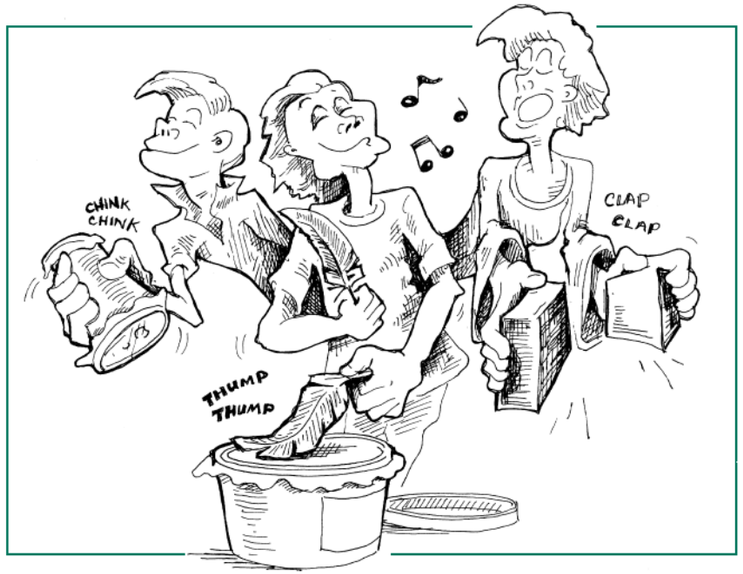
Alaska Department of Natural Resources <www.dnr.state.ak.us/forestry>
Alaska Statewide Databases <sled.alaska.edu>
Staff-written Alaska newspaper articles: Anchorage *Daily News* Archives <www.adnsearch.com> *or* Fairbanks *Daily News-Miner* <www.newsminer.com>

Teacher Resources:

(See appendix)

Voices of the Woods

5 EXTENSIONS



Grade Level: K - 3
State Standards: A A-1, A A-5
NGSS: K-ESS3-1.
Subjects: Music, art
Skills: Cutting, pasting, inventing, problem-solving
Duration: 30-60 minutes
Group Size: Whole class and individual
Setting: Indoors or outdoors
Vocabulary: Percussion, woodwinds

Objective:

Using forest products, students will create and use musical instruments.

Teaching Strategy:

Students make instruments of new or recycled forest products and play the instruments in class or outdoors.

Complementary Activities:

INDOOR: "Forests in Literature" *and* "We All Use Forests," *both in this section. Also, science lessons on pitch and volume.*

Materials:

New or recycled materials: 2x2s or 2x4s of any wood in varying short lengths *(up to about 10 inches);* sandpaper; glue; round, straight sticks, twigs, or straw; round cardboard containers *(ice cream, oatmeal, corn meal);* cardboard tubes *(wrapping paper, paper towel, toilet tissue);* small cardboard boxes *(up to shoe box size)* or pieces of corrugated cardboard; twine; rubber bands; waxed paper or cellophane; other natural objects such as dried elderberry or cow parsnip canes which are hollow.
OPTIONAL: tape recorder and cassette tape.

Background:

See also *INSIGHTS, Section 5, Human Uses and Impacts.*
People have made musical instruments out of forest products for thousands of years. Solomon Islanders still use the wind to play bamboo cane "pipes" of varying lengths set up on a beach. Australian aborigines use a long, hollow stick to make the droning didgeridoo.
Northern and western Alaska Natives, living where no trees grow, used driftwood to make the rim of their skin drums. Modern instrument makers use trees to make stringed instruments, **woodwinds**, and drums.

Procedure:

1. Ask students how long ago people made music. What might they have used in addition to their own voices? How might they have made instruments?
2. Give students suggestions for making different types of instruments from new or recycled materials:
(a) ***Wind Instruments.*** Tubes of different lengths become "wind instruments" with a piece of waxed paper or

cellophane stretched over one end and held in place with a rubber band. Hum against the waxed paper, or poke a hole in the side of the tube and blow into it, or blow across the open end of the tube. Although they are easily crushed, the dried elderberry or cow parsnip canes can be used the same way.
(b) ***Rattles.*** Tubes can also be rattles. Cover one end of the tube with waxed paper and secure with a rubber band. Put a small handful of wood chips, bark, small pebbles or sand in the tube. Cover the other end of the tube with waxed paper and secure with a rubber band. To play, tip the tube back and forth slowly, then quickly to make the chips "rain" down the tube.
(c) ***Stringed Instruments.*** Pieces of cardboard with twine or rubber bands stretched tightly between notches on opposite sides turn into stringed instruments. Pluck the strings gently. Small cardboard boxes of varying sizes can be used the same way for a variety of sounds.
(d) ***Percussion.*** To make percussion instruments, tap sticks together or clap blocks of wood. Glue sandpaper to some blocks, let dry; then rub two blocks together for another type of sound. Make a xylophone by securing sticks of different sizes to two parallel boards and striking them with two other sticks.
(e) ***Drums.*** Use cylindrical containers (ice cream, oatmeal, cornmeal) to make drums by covering the open end with cellophane or waxed paper held in place with twine, rubber bands, or glue from a hot glue gun. To beat the drum (gently!) using small twigs, sticks, straw, or even feathers.
3. Each student constructs an instrument from the materials available. Let dry, if necessary.
4. Play the instruments together in the class. The teacher can be the conductor at first, then let students take a turn directing when each group plays. You may wish to record the "music" so the class can listen to itself later.
5. Invite your music teacher to share this project with your class. This lesson also coordinates well with science lessons on pitch and volume.

Evaluation:

1. Students construct instruments and play them.
2. Students make the same instruments with different woods and compare the different sound qualities.

EXTENSIONS:

A. **Invite Native musicians to share music and culture.** Invite local Native musicians to class who can share their music and cultural traditions with students.
B. **Locate and play instruments of many cultures.** Locate instruments made of forest products by other cultures. Let the students try playing the instruments, if possible. Analyze the materials with which the instruments are made.
C. **Muse to the music.** Students listen to music while making a picture or painting of their listening thoughts.
D. **Invite guest instrument maker.** Invite an instrument maker to class to tell how the instrument is made and what materials are used.
E. **Invite guest musician.** Invite a musician to class to play her/his instrument and discuss its origin.

Credit:

Adapted from American Forest Foundation, "Musing on Music," *Project Learning Tree Supplementary Activity Guide for Grades K-6 and/or 7-12,* 1987.

Curriculum Connections:

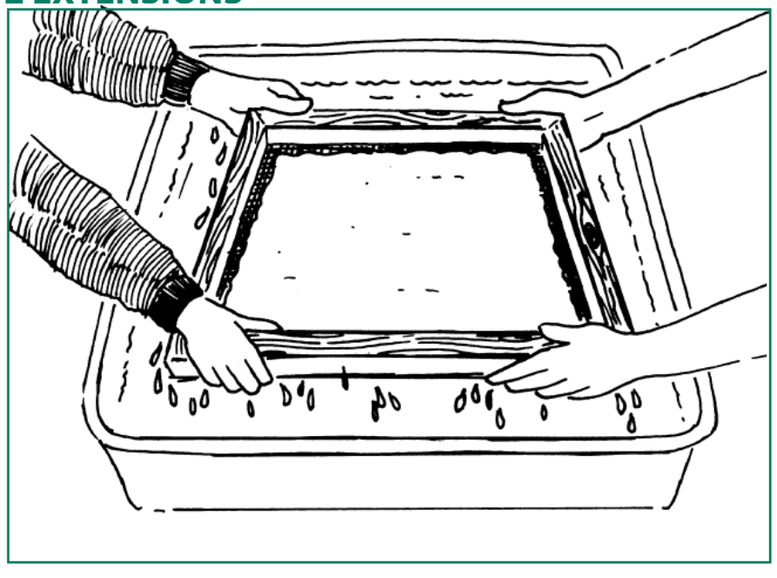
(See appendix for full citations)
Books:
Music Crafts for Kids: the How-to-do Book of Music (Fiarotta)
My First Music (Drew)
Songs are Thoughts: Poems of the Inuit (Foa)
Woodlore (Miller)
Media:
Drums Along the Tundra: Music of the Yup'ik Eskimo
(McIntryre)
My First Music Video

Teacher Resources:

(See appendix)

Paper Making

2 EXTENSIONS



Grade Level: K -8
Subjects: Science, social studies, math, art
Skills: Gaining information, small motor coordination
Duration: 2 sessions, 10 and 45-minutes
Group Size: Small groups
Setting: Indoors or outdoors
Vocabulary: Deckle, recycle

Objectives:

Students will make their own paper with recycled materials.

Teaching Strategy:

Students use wire screening to form paper from old, torn up paper and other materials.

Complementary Activities:

INDOOR: "Forests in Literature" *and* "How Much Paper Do We Use?" *in this section.*

Materials:

Wire screening (30 mesh); old paper of different types (newsprint, cardboard, tissue paper, notebook or copy paper); thread or yarn; water; wash basins or large pans like kitty litter trays; eggbeater or old blender; newsprint, blotting paper, or old sheets.
OPTIONAL: dried flowers or leaves, rolling pin or pipe, sponges, laundry starch (not spray variety), frame **(deckles**) to hold screening.

Background:

See INSIGHTS, *Section 5, Human Uses and Impacts in Forest Ecosystems.*

Procedure:

DAY ONE
1. Ask students where have they have seen the symbol for **recycled** paper recently? *Probably on documents, packaging, and catalogs. Recycled paper is also used for tissue papers, ticket stubs, insulation, animal bedding, and the "hard" in hardcover books.*
2. Tell students that paper cannot be recycled indefinitely into new paper products. Paper fibers eventually decompose.
3. Explain to the students that they will recycle paper products to make stationery.
4. Have students tear paper or cardboard into small pieces about the size of a quarter. Put the pieces in the basin or pan and cover with water.

DAY TWO (at least 24 hours later)
5. Make a pulp by covering scraps of paper in the basin with a mixture of water and laundry starch. *(Use one tablespoon starch to one cup of water.)* Beat with egg beater or buzz in small batches in the blender until mixture is pulpy and like gravy. *Pulp can be made of only water and paper scraps if obtaining laundry starch is a problem.*
6. Slide the framed screening into the mixture until it is entirely covered with the pulp mixture.
7. Lift the framed screen straight out of the mixture and decorate the new sheet of paper with threads, yarn, dried flowers or leaves, or very small pieces of bright construction paper.
8. Make a sandwich of screen, new paper, and another piece of screening. Press gently. Put this sandwich between several layers of newsprint or blotting paper, or on top of a sponge and press. Remove blotter and put the sandwich between several *fresh* layers of newsprint and step on it, or use the rolling pin or pipe to press out extra water.
9. Remove top screen. Then turn over the rest of the sandwich (new paper face down) on a piece of damp cloth such as an old sheet, or felt. The screen can be removed or left overnight. Remove the dried paper by gently brushing from the edge of the screening.

VARIATION FOR OLDER STUDENTS:
Students design and make a wooden **deckle** (frame) for the screening from lath and tacks.

Evaluation:

Students display their handmade paper and explain how it was made.

EXTENSIONS:

A. **Experiment with a variety of materials.** Make paper and add different materials – rags, thread, yarn, flowers and leaves. Compare the resulting recycled paper to see which is the strongest, the most water resistant.
B. **Write a special note.** Use the recycled paper to write a note to someone, perhaps a poem or thank-you note to a tree!

Credit:

Adapted by Shayla Dobson, art teacher, Anchorage School District, who has used this method with multiple special needs students and all grades.

Curriculum Connections:

(See appendix for full citations)
Books:
Arnold Grummer's Complete Guide to Easy Papermaking (Grummer)
How Paper is Made (Curtis) K-3
Papermaking for Kids (Wilkenson)

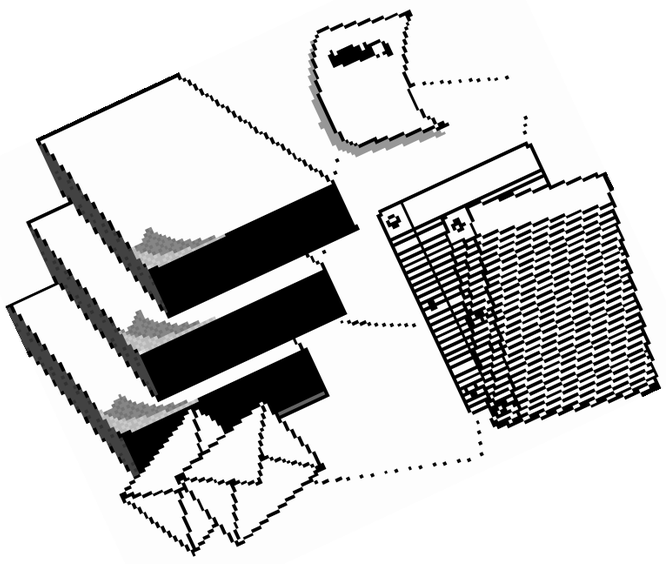
Teacher Resources:

(See appendix)

Reduce, Reuse, Recycle

How Much Paper Do We Use?

4 EXTENSIONS



Grade Level: K - 6
State Standards: M A-3, M A-4, M A-6, Geo E-1, Geo E-2, Gov E-6
NGSS: K-ESS3-1.,4-ESS3-1, 3-5-ETS1-2, MS-ESS3-3.
MS-ESS3-4, HS-LS2-7
Subjects: Social studies, math
Skills: Measuring, comparing, analyzing, graphing
Duration: 30-60 min.
Group Size: 1 and whole class
Setting: Indoors
Vocabulary: Recycle, reuse, reduce

Objectives:

1. Students will determine the amount of paper they use daily as individuals, as a classroom, as a school.
2. Students will understand that they can contribute to paper recycling.
3. Students will develop a plan for reducing the volume of paper waste in their classroom and/or school.

Teaching Strategy:

Students keep records of their paper use for one day and calculate the amounts used daily by their classroom and school. Students work in groups and as a class to make a plan for reducing paper use.

Complementary Activities:

INDOOR: "Paper Making" *and* "We All Use Forests" *in this section.*

Materials:

Large box for collecting paper from the classroom, a scale to weigh paper, pencil, paper.

Background:

See INSIGHTS, *Section 5, Human Uses and Impacts in Forest Ecosystems: "How Much Paper Do We Use?"* fact sheet.

Procedure:

1. List and discuss which classroom materials are made from trees.
2. Review daily class activities that use paper. Tell students that they will be keeping track of paper use for each day of one week. Ask them to deposit their paper in a central location such as a marked box. At the end of each day, weigh the paper. At the end of the week, calculate an average daily amount.
3. Divide the paper into two categories: "paper that can still be used," *(perhaps only one side has been used)* and "paper that has been used completely."
4. Discuss ideas for reusing paper. Ask the class to make a simple paper recycling plan and put it into action. Ask the children to determine at least three ways to reduce paper waste in the classroom.

5. After the plan has been in effect for a week, weigh the waste paper again to see if progress has been made.

VARIATION FOR OLDER STUDENTS

Use math to equate the percentage of paper saved over the course of the week. If the amount of paper saved were added up over the course of the year, how much paper, by weight, would be saved?

Evaluation:

1. Students name three ways to reduce paper waste in the classroom.
2. Students develop, carry out, and monitor a plan to reduce paper waste in the classroom or school.

EXTENSIONS:

A. **Research own paper use.** Students collect the paper individually at their own desks and determine their average personal use over a period of time.
B. **Estimate consumption of paper by school.** Estimate the amount of paper used by the school on a daily and weekly basis.
C. **Estimate how many trees supply school paper needs.** Estimate the number of trees used each year by the classroom and school (1 tree = about 300 lbs. of paper).
D. **Create and monitor plan for school paper reduction.** Create a waste reduction plan for the school and include ideas to help teachers and others who work in the school reduce their use. Monitor and follow the plan by weighing waste initially, and then periodically weighing after the plan has been in effect. The results can be recorded on a graph.

Credit:

This activity was originally contributed by the late Val Chalbot. Val taught elementary school in Eagle River, Alaska.

Curriculum Connections:

(See appendix for full citations)

Books:

Just a Dream (Van Allsburg)
Lorax (Seuss)
Remake It! Alaska: Anchorage Businesses Remake, Recycle, Reuse (Citizens for Recycling Solutions)

Teacher Resources:

(See appendix)

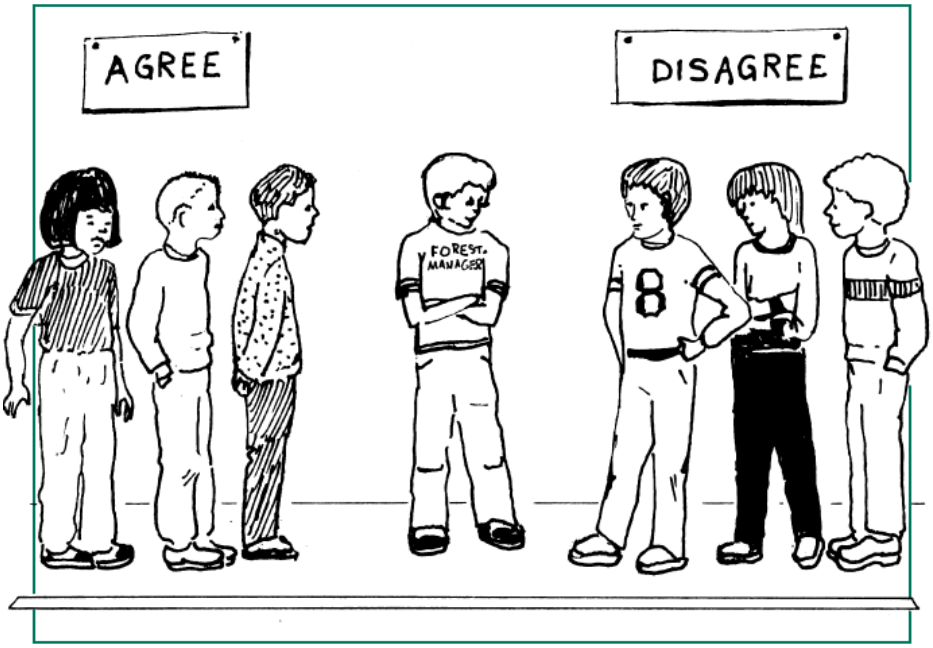
Alaska Recycling Sources

Citizens for Recycling Solutions (Anchorage, Alaska) <www.citizensrecycling.com> (907) 566-2405
ALPAR (Alaskan's for Litter Prevention and Recycling), P.O. Box 200393, Anchorage, AK 99520 *or* (907) 274-3266
RurAL CAP (Rural Alaska Community Action Program), 731 E. 8 th Ave., Anchorage, AK 99501 *or* <www.ruralcap.com>
Alaska Inter-Tribal Council, 431 W. 7th Ave., Anchorage, AK 99501 *or* (907) 563-9334 <www.AITC.org>
Anchorage Recycling Center, 6161 Rosewood St., Anchorage, Alaska 99518 <www.anchoragerecycling.com/>

The average American uses two trees worth of paper each year.

Whose Forest? Our Forest!

2 EXTENSIONS ***ALERT: ALASKA ECOLOGY CARDS OPTIONAL***



Section 5
FOREST ACTIVITIES

Grade Level: 7 - 12

State Standards: L D-1, D4, Geo E1, E4, Gov C1, C7, E7

NGSS: MS-LS2-1.,MS-LS2-4, MS-LS2-5, MS-ESS3-3.,MS-ESS3-4,HS-LS2-2.,HS-LS2-7, HS-ESS3-2,HS-ESS3-3, HS-ETS1-3.

Subjects: Science, social studies, language arts

Skills: Reading, writing, speaking, listening, decision-making, analyzing, synthesizing, role-playing

Duration: 60 minutes research, 60 minutes role-play

Group Size: Whole class

Setting: Indoors

Vocabulary: Conservation, preservation, management goal, multiple-use

Objectives:

1. Students will name three reasons why forest management is necessary.

2. Students will describe at least two problems related to managing a forest.

Teaching Strategy:

Students participate in an imaginary public forum regarding forest use in order to come to a consensus on managing the forest.

Complementary Activities:

OUTDOOR: "On the Trail of Human Uses" *in this section. INDOOR:* "Forests for People" *and* "Forest Careers" *in this section.*

Materials:

Forest Management Game Role Cards *(see following pages);* Policy Statements *(following*); four large cards with the words "Agree," "Disagree," "No Opinion," and "Need More Information" written on them; chalkboard.

Background:

See INSIGHTS, *Section 5, Human Uses and Impacts in Forest Ecosystems.*

Procedure:

Consider the following: *Resource issues touch all our lives and may be close to the heart of many of your students. In the following activity, students may be asked to represent a viewpoint that differs from their own. Explain to students that this activity may be an opportunity to enhance their understanding of how another person sees a similar situation.*

DAY ONE:

1. Brainstorm with students the ways people use forests and list these on the board. Help students think of logging, mining, camping, developing (homesteading, fish camps, homes), subsistence traditions, hunting, trapping, fishing, mushroom or berry picking, snowmobiling, hiking, skiing, and other forms of recreation. *[See* "Forests for People," *a survey activity in this section.]*

2. When students have run out of ideas, ask them to decide if each activity would change the forest and, if so, what the changes would be. List these effects on the board.

3. Ask students to consider what would happen to a forest and its users if all these activities occurred simultaneously without any controls.

4. Follow by asking students how loss of forests might be prevented. Do they think that we can get by without wood and paper, without minerals, and without land for homes. Explain that the process of balancing use and protection of forests is called **forest management**, and those who practice it are called forest managers or foresters. Explain the difference between **conservation** and **preservation.**

5. Review what forest managers need to know in order to manage forests wisely. Distribute the "Forest Management Role Cards" to students and explain that these roles represent citizens and experts concerned about forests. Give some students two or more cards – for example, a logger can also be a wildlife photographer, a hunter can be a birdwatcher.

6. The teacher or a student can play the role of forest manager. Students can also rotate through this role, having each one try to establish one policy. Students read their role cards carefully. Students should imagine that they are the person described on the card and act and think like (role-play) that person.

7. Provide materials and time for research and preparations for their roles.

VARIATION
You may wish to spend a week on this activity. Focus on 2-3 policies each day.

DAY TWO:
1. Conduct a "Forest Management Simulation." Place the "Agree" and "Disagree" signs on opposite sides of the room and the "No Opinion" sign in the middle between these. [*Optional*: Place the "Need More Information" sign at a separate location.]

2. The forest manager reads aloud a Forest Policy Statement (but not the Possible Modifications, until later). Students are to think quickly, then move to the card that describes their reaction to the policy ***based on the role they are playing.*** Props may be helpful in reminding students of their role.

3. Once students have all arrived at a card, ask those on the "Agree" side who they are and why they agreed with the policy *(that is, as if to testify at a public hearing).* Repeat this step for the "Disagree" side. Then, ask if anyone wants to change places after hearing the opinions of others.

4. If you are using the "Need More Information" sign, students who want more information ask their questions and see if anyone can provide an answer. *(For example, a bird watcher may be uncertain how a certain policy would affect birds; the bird expert might be able to tell them.)* If no one can provide an answer, discuss where students might be able to obtain an answer – from a scientist, resource manager, long-time local resident, and/or by doing research or experiments. Explain that a complete answer may take a fair amount of research and interviews.

5. After hearing all the testimony about the policy as stated, the forest manager should take into account what was said, then reword the policy and propose it again in modified form, using as guidelines the "Possible Modifications" on the "Policy Statement" cards.

6. Students then react to the new policy by moving to the sign that represents their opinion. Ask those who still disagree with the policy to state their reasons. Allow other students to change their minds based on the statements of those who disagree with the modified policy.

7. Repeat steps in 5 and 6 until the manager has made a policy with which the majority of students agrees. This process will increase student awareness of compromise in public land policy, the difficult job of a multiple-use land manager, the need for information on how human activities affect a forest, and the need for citizens to speak up for what they want.

8. Discuss how the game differs from real life.

- *Decisions are usually more complicated.*
- *Experts often are not certain of the answers to questions about the effects of change.*
- *People have even more widely varied ideas about forest uses.*
- *Many policies are set not by forest managers but through the political process* (state and federal regulating committees, public input, elected officials, ballot initiatives, for example.) *Forest managers must abide by any laws that relate*

to the forest they are managing. In some cases, laws may limit a forest manager's authority to regulate forest uses or use certain forest management tools.

Evaluation:

Students write an essay that gives at least three reasons for forest management and describes two problems of trying to balance use and protection of forests.

EXTENSION:

1. **Research local forest policies; compare to own.** Students find out the management policies for a forest in their area and compare those to the policies they developed. Encourage them to investigate differences.

2. **Follow forest issue over time.** Students research a local forestry issue, interviewing community members, land managers, industry representatives, etc., and track the public process over the course of the school year.

Curriculum Connections:

(See appendix for full citations)

Books:

Earth's Vanishing Forests (Gallant)

Forest: Identifying Propaganda Techniques (Anderson)

Forests for the Future (Parker)

Saving Our Forests (Hirschi)

Shrinking Forests (Tesar) 7-12

Websites:

Alaska Department of Natural Resources <www.http://dnr.alaska.gov/forestry

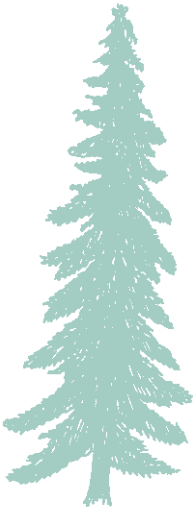
Alaska Science Forum <www.gi.alaska.edu/AlaskaScienceForum>

Alaska Statewide Databases <sled.alaska.edu>

Staff-written Alaska newspaper articles: Anchorage *Daily News* Archives <www.adnsearch.com> *or* Fairbanks *Daily News-Miner* <www.newsminer.com>

Teacher Resources:

(See appendix)



FOREST MANAGEMENT CARD
Fire Expert:

You are concerned about protecting people and property from forest fires. You know that fires near towns or small villages present a more serious threat to people than do forest fires in areas distant from people. Roads and trails can make it easier for you to control forest fires.

You think it is important to monitor all forest fires, and put out those that threaten people. You know that frequent small fires remove dead wood and branches (fuel) in a northern forest. If a fire has decades of fuel, it will burn bigger, hotter and be harder to control. Because it is very expensive to put out fires, you think fires that do not threaten should be watched carefully, but allowed to burn.

You realize that if more people build homes in remote areas, it will become more important to put out fires in those areas. This will make it more difficult to allow wild fires to perform their natural role, and will cost the public much more money.

FOREST MANAGEMENT CARD
Forest Fire Fighter:

You earn your living by putting out forest fires. There may be little work for you in Alaska in some years if there are few fires and if some fires are allowed to burn. You know that forest fires are often difficult to control. Some years your fire crew is sent to fight big fires in the Lower 48 states. Other years, there are many fires in Alaska and you have plenty of work.

FOREST MANAGEMENT CARD
Watershed Expert:

You are concerned about protecting the water supplies for human communities. You are concerned about preventing floods and droughts.

You know that forests are very important in the water cycle. They return moisture to the air, so they help make rain and snow. Forests store and purify water. Forests help keep streams, lakes, and underground water supplies full of clean water.

You know that land clearing, timber harvest, or burning of large areas of forest can cause more frequent and severe flooding and can result in less water in streams during dry periods. You know that small clearings have less impact than large clearings.

FOREST MANAGEMENT CARD
Fisheries Expert:

You are concerned about protecting habitat for fish. You know that forests are important because they help keep streams and lakes full of clean, cool water.

You know that removal of large areas of forest along streams by clearing, mining, timber harvest, or fire can cause soil erosion, destroying fish habitat. Increased sediment (*silt and soil in the water*) raises the water temperature and decreases oxygen levels so fish may not survive.

These activities also can reduce invertebrates in streams that fish eat. You know that small clearings have less impact than large ones. You know that removal of forests along streams has more impact on fish habitat than removal of trees distant from streams. You know that often more soil is eroded as a result of fire and logging trails and roads than as a result of forest fires or timber harvest alone.

FOREST MANAGEMENT CARD
Atmosphere Expert:

You are concerned about the atmosphere and the air we breathe. You know that forests are important in keeping the air clean and breathable because they remove dust, carbon dioxide, and pollutants from the air; and they return oxygen, the gas we breathe.

There is not enough research for you to be certain of the importance of forests on a global scale, but you know that they are important in local areas. You know that removal of trees and forests can lead to dustier, dirtier air. That can bother people with breathing problems.

FOREST MANAGEMENT CARD
Furbearer Expert – Boreal Forest

You are concerned about protecting habitat for furbearing wildlife (*foxes, mink, marten, lynx, weasels, and coyotes*). You know that permanent loss of forest habitat means less habitat for furbearers and therefore fewer furbearers.

You know that small openings in boreal forests, created by fires, timber harvest, insect outbreaks, or other disturbances, can improve habitat for small mammals such as voles, mice, and hares – the main foods of furbearers. But you also know these sites will only be good for small mammals if they have plenty of ground cover and shrubby plants for their food, and many fallen logs and branches for shelter.

You know that large openings in the forest are less valuable than small openings. Some furbearers, such as lynx and marten, need patches of old-growth forest for cover and den sites and can use only edges of large clearings.

FOREST MANAGEMENT CARD
Bird Expert:

You are concerned about protecting habitat for birds. You know that events that set back succession, such as forest clearing, timber harvest, and fire, can sometimes improve habitat for birds that need forest openings and shrub thickets (*sparrows, robins, and certain hawks and owls*). You know that small clearings create better habitat for these birds than large ones.

You know that clearing, timber harvest, burning, or any other activity that changes old-growth forests results in habitat loss for birds requiring this forest type (*spruce grouse, crossbills, warblers, goshawks, boreal chickadees, varied thrushes, three-toed woodpeckers*). Since young forests do not provide habitat for these birds, the only known way to protect these birds is to protect some areas of old forest.

You know that large dead or dying trees (*snags*) provide important feeding and nesting places for woodpeckers, kestrels, swallows, chickadees, owls, and other birds. You know that it takes 100 or more years to form snags suitable for use by some of these birds. You know that many of these birds eat insects and help to reduce the insect populations that harm trees.

FOREST MANAGEMENT CARD
Furbearer Expert – Coastal Forest:

You are concerned about protecting habitat for furbearers so that they will remain abundant in the coastal forest region. You know that most furbearers in the coastal forest use old-growth forests along streams, rivers, and the coast more than any other habitats.

You know that few studies have been done in the coastal forest, but those studies that have been done found that river otters and marten prefer old-growth forests over other habitats when hunting food or places to den.

You also know that furbearers are most abundant in places where their prey are abundant. Their prey are usually abundant along streams, in small clearings, and in old-growth forest; but are rare in mature and second growth coastal forests.

FOREST MANAGEMENT CARD
Commercial Firewood Cutter:

You earn a living by cutting firewood and selling it. The more firewood people need, and the more you can cut, the more money you earn.

FOREST MANAGEMENT CARD
Moose Expert:

You are concerned about protecting habitat for moose so that they will remain abundant. You know that moose feed on tall shrubs and sapling trees. These are most numerous along river banks and in forests that have recently burned or been logged.

You know that putting out all fires may reduce the amount of tall shrub areas available to moose. You also know that in areas with heavy snowfall, such as Southeast Alaska, moose require patches of old-growth forest to find winter food and shelter.

FOREST MANAGEMENT CARD
Deer Expert:

You are concerned about protecting habitat for deer so that they will remain abundant. You know that deer eat small plants and low shrubs. These foods are most abundant in climax (*old-growth*) forests and in forest clearings (*created by insect outbreaks, avalanches, fallen trees, timber harvest, and fire*).

You know that mature and second growth forests contain almost no food for deer. You also know that the most critical season for deer is winter. In winter deer require old-growth forests with very large trees. These trees catch snow in their branches, making travel on the ground much easier and food easier to find.

FOREST MANAGEMENT CARD
Tree-Growing Expert:

You recognize that trees are a renewable resource if they are harvested and regrown carefully. You favor timber harvest when conservation is part of the plan. You do not want activities that increase soil erosion, which some logging practices do. A healthy soil layer is needed for trees to flourish.

You know that forests should not be clear-cut on steep hillsides because the soil will easily erode and then new trees cannot grow. You know that fires and certain wood-eating insects and fungi kill trees. You want to stop the death of trees to these causes. You know that replacing large areas of natural forest with trees that are all the same species and age can lead to outbreaks of insects and disease.

Instead, you favor harvesting trees in small sections and helping a variety of trees to grow back. You know that replanting trees after an area is cleared is very important in some places, but that natural reseeding works better in other areas and is much less expensive.

FOREST MANAGEMENT CARD
Logger:

You make your living by harvesting trees from the forest. You see this as a valuable service to people because everyone uses wood in some form everyday. You know that the company you work for makes more money when it cuts large trees rather than small ones.

You also know that old-growth forests contain a lot of dead and dying trees that are not useful for wood products because they are rotten. You think it would be better to harvest trees when they are mature, but before they grow old and rotten.

You know that it would be easier and safer to harvest trees in remote areas if roads were built into these areas.

FOREST MANAGEMENT CARD
Hunter:

You harvest animals such as moose and deer to feed yourself and your family. You can see these animals in cleared areas more easily than in dense forests. You hunt with your entire family and therefore prefer driving to the area where you hunt.

FOREST MANAGEMENT CARD
Hunter:

You harvest animals such as moose and deer to feed yourself and your family. You like to hunt where you see few other hunters, so you always go by boat or hike to a remote area to hunt.

You do not want roads built to the areas you hunt because then more people will go there. You think that more people will cause animals to become scarce.

You hike everywhere, but don't like to hike in areas where there are a lot of fallen trees and branches, such as clear-cuts and old burns.

FOREST MANAGEMENT CARD
Lumber Mill Worker:

You earn a living by processing the timber harvested from forests in your area. If there are not enough trees to be logged, the mill may have to lay off workers, and you could lose your job. You think wood is the most important benefit we get from forests.

FOREST MANAGEMENT CARD
Angler:

You like to catch fish, especially salmon, to eat. You have always caught more fish in clear, cool streams than in murky ones that have a lot of silt.

FOREST MANAGEMENT CARD
Bird Watcher:

You enjoy hiking in the outdoors and looking for birds. You know that different kinds of birds live in different habitats. Some birds live only in old-growth forests, some only in young forests, and others live only in more open areas. You want to be sure that all birds are around for you and others to watch and hear, so you want to protect all habitats.

You recognize that fire, insect outbreaks, wind, avalanches, and certain human activities (*such as timber harvest*) all create the habitats (*early successional*) needed by some birds, but remove the habitat needed by other birds that live in mature and climax (*old-growth*) forests.

FOREST MANAGEMENT CARD
Firewood Cutter:

You heat your home entirely with wood. Every summer you cut enough trees for firewood for the following winter. Last year's wood has dried and is ready for this winter. You also cut and sell firewood to your neighbors to make money. The amount is minimal, but every dollar helps your family. If you are not allowed to cut firewood, you won't be able to heat your house.

FOREST MANAGEMENT CARD
Gold Miner:

You earn your living by mining for gold. You have found the best places to look for gold are in the banks along rivers. To get the gold out, you must remove the trees or have loggers do this for you. Then you wash away all the soil so you can separate the gold. After you finish mining at a place, all that is left is a pile of gravel. You have noticed that small trees are growing in the places where other miners worked their claims years ago.

FOREST MANAGEMENT CARD
Trapper:

You trap animals to harvest their furs, which are used to make parka ruffs, coats, and other clothing. The more furbearing animals there are in the forest, the more you can harvest. Therefore you are very concerned that their habitat is protected.

You know that if too many people trap or travel in one area, furbearers may become scarce. You think that roads will allow more people to get into the area where your trapline catches the most animals.

FOREST MANAGEMENT CARD
Homesteader:

You homesteaded land in a remote forested part of Alaska. No one else lives within 10 miles of you. After 30 years of hard work, you have a nice house, a big garden, and everything you ever wanted.

Your biggest worry is that a forest fire might sweep through your area and destroy what you have worked so hard to build. You think it is the State's duty to put out all forest fires that occur anywhere near your homestead.

Now that you are older, you would like a road to your area to make it easier to get in and out.

FOREST MANAGEMENT CARD
Alaska Tourist:

You like to drive around and sightsee by car or motor home. You would like to have more roads built through Alaska's forests. You also like to fish, view wildlife, and photograph the spectacular views you see along the roads.

FOREST MANAGEMENT CARD
Alaska Tourist:

You hike and camp in remote forested areas taking pictures of scenery and wildlife. You are amazed at the wildness and beauty of the land and at the variety of plants and wildlife that you see. You think that areas of the earth where human activities haven't changed everything should be left that way. You would like Alaska to stay as wild as possible.

FOREST MANAGEMENT CARD
Commercial Fisherman:

You have been a commercial fisherman since your youth. Your children work alongside you and will inherit your business when you retire. You have always earned your living by catching salmon and other fish. If there are too few salmon, you won't be able to make a living.

You know the importance of healthy forest streams to **anadromous** fish populations. You think all people should be allowed to do what they want to do for a living.

FOREST MANAGEMENT CARD
Wildlife Photographer:

You earn a living by taking photos of wild animals. To do this, you travel to remote, forested areas of Alaska where human impact has been minimal. You fear that if wildlife habitat is further developed (*logging, mining, housing development*), wildlife populations will decline and become more wary of people. It will become much harder for you to photograph wildlife in wild places.

FOREST MANAGEMENT CARD
Hotel Owner:

You rely on tourists who rent rooms from you during the summer months. Without tourists, you would have to close your hotel and lay off your employees. Based on your conversations with your guests, most tourists come to Alaska to see scenery, wild areas, and wildlife.

You think that if the scenery is spoiled by more mining, logging, building, fire, insect infestation or if wild animals become scarce, fewer tourists will come to see Alaska.

FOREST MANAGEMENT CARD
General Store Owner:

You earn a living by selling groceries and supplies people need every day. Tourists are important customers at your store, but local people shop at your store year-round and are vital to your business.

You think that if your neighbors are allowed to log, mine, and build homes in this area, you will have more customers, make more money, and be able to hire more workers.

FOREST MANAGEMENT CARD
Land Developer:

You earn money by buying large sections of land. You divide the land into smaller lots, build roads and houses, and sell these individual houses to other people. You see forested land as open space to be developed, for profit.

FOREST MANAGEMENT CARD
Building Contractor:

You build houses and other buildings using a lot of wood. You know that wood is a renewable resource. The cost of shipping wood from the Lower 48 is expensive. You think it would be cheaper to buy lumber for building if more trees were harvested from local forests.

FOREST MANAGEMENT CARD
Newspaper Publisher:

You publish a newspaper. One of your highest expenses is buying paper. You think that the reason paper costs so much is that not enough trees are harvested.

FOREST MANAGEMENT CARD
Manufacturer:

You manufacture a variety of high-tech goods (*computers, cell phones*). Gold is an important metal used in your manufacturing process. As demand for your product increases, your need for gold rises.

FOREST MANAGEMENT CARD
Truck Driver:

You earn a living by hauling goods from place to place. You and your co-workers haul wood, building supplies, groceries, and many other items. You must have roads to do your business. If there were more roads, you could reach more areas and get more business.

You think that more timber harvesting and building will create more things for you to haul in your truck, so you can make more money. On your days off, you like to hike in wild areas.

FOREST MANAGEMENT CARD
Local Resident:

You moved to Alaska because you thought it was the land of opportunity – a frontier where everyone could still do whatever they wanted. You do not like restrictions of any kind. You think this place is big enough that people should be able to cut wood wherever they want, build where they want, and do as they please.

FOREST MANAGEMENT CARD
House Renter:

You are renting a house because land on which to build is scarce and few houses are for sale in your area. When you look at all the forest land around, you dream about having your own house. You think that land should be given or sold to people who want to build homes.

FOREST MANAGEMENT CARD
Recycling Center Owner:

You own a recycling plant where people can bring old papers, glass, and metals. These materials are processed, then recycled for a second use. You think that if people would recycle more, you could provide more jobs for people, and it won't be necessary to harvest trees or mine as much as we currently do.

FOREST MANAGEMENT CARD
Local Resident:

You moved to Alaska to get away from the crowds and development in the Lower 48 states. You like wild areas and seeing wild animals. You appreciate Alaska's clean fresh air and water. These things seem wonderful to you after growing up in a crowded city with few trees and lots of pollution problems.

FOREST MANAGEMENT CARD
Corporation President:

You are the president of a corporation that owns large tracts of forest. Your corporation harvests timber for profit. You find that it is difficult to make a profit in this business in Alaska for several reasons: (1) It is expensive to operate because so many areas are remote, and you have to pay high wages, (2) Many of the forested areas contain only small trees that are not profitable to harvest, and (3) accident insurance is high — the risk is high that someone will be cut by a saw or crushed by a falling tree. *(The standing dead snags are particularly dangerous.)*

You can make the most money if you are able to clear-cut large areas that contain the biggest trees and are near roads. Building roads to these sites makes it easier and cheaper to harvest the wood. With roads, loggers are safer, because, if accidents happen, they can be evacuated easier. This reduces insurance costs.

FOREST MANAGEMENT CARD
Librarian:

You think books are wonderful and you realize that we need lots of paper to have books. You know that we wouldn't have any paper unless we harvested trees from forests.

You also enjoy wildlife and the outdoors and want to keep Alaska a nice place to live.

FOREST MANAGEMENT CARD
Wilderness Advocate:

You see Alaska as one of the few places in the northern hemisphere that still contains large areas of pristine forests, almost untouched by human activities. You think that humans need wilderness areas if for no other reason than to keep some areas wild and untamed for the future.

You think it would be a tragedy if logging and mining turned Alaska's wild forests into managed, heavily impacted areas. If people used less wood products by reducing, reusing and recycling, the tree farms of the Lower 48 could produce enough wood. This would keep Alaska's wild places wild.

FOREST MANAGEMENT CARD
Traditional Carver:

You carve traditional items of beauty and symbolism from wood. You go into the forest to select the tree that speaks to you for your work. Your family has done this for centuries.

The forest has great meaning to you and sometimes your family and friends hold special ceremonies among the largest trees. You have found ancient tools and artifacts that show Alaskans have used this forest for several thousand years.

FOREST MANAGEMENT CARD
Traditional Gather/Artisan:

You and your grandmother go into the woods many times from spring through fall to gather greens and berries. You are learning basket-making from your grandmother. She knows just where in the forest to get the best materials for baskets. The trees must meet special standards and be just the right age. The baskets you are making are so fine they can hold water, just as the baskets of your ancestors.

You want these woods protected so in the future you can take your own children and teach them where to find the most delicious berries and how to make fine baskets from the forest.

FOREST POLICY STATEMENT:
Wood is the most valuable material we get from forests, so all trees in our forests should be harvested.

POSSIBLE MODIFICATIONS:
- wood is one of many benefits of forests.
- except on steep slopes where soil might erode.
- except along streams.
- only in parts of the forest, while other forest areas should be reserved for other values.

FOREST POLICY STATEMENT:
More roads should be built in Alaska's forests.

POSSIBLE MODIFICATIONS:
- but roads should never be allowed in some areas of forest.
- only if they are carefully designed to prevent soil erosion.
- if roads are built with methods that protect fish, wildlife, and streams.

FOREST POLICY STATEMENT:

All forest fires should be put out.

POSSIBLE MODIFICATIONS:

– fires that threaten human lives or property should be put out.
– controlled fires can be used to create habitat for wildlife in areas where uncontrolled wild fire might threaten lives or property.

FOREST POLICY STATEMENT:

Mining should be allowed anywhere in a forest that minerals are found.

POSSIBLE MODIFICATIONS:

– only in parts of the forest, while other forest areas should be reserved for other values.
– except along streams.
– only if erosion is prevented and the soil is restored after mining ends.

FOREST POLICY STATEMENT:

Timber harvest should not be allowed in any Alaska forests.

POSSIBLE MODIFICATIONS:

– in some Alaska forests
– in some parts of Alaska forests

FOREST POLICY STATEMENT:

In public forests only activities like camping, photography, viewing, hiking, bird watching, berry picking, motorized travel (snow machines, four wheelers), fishing, and hunting should be allowed everywhere.

POSSIBLE MODIFICATIONS:

– all activities in parts of the forest
– certain activities in certain areas of the forest
– certain activities at certain times during the year

FOREST POLICY STATEMENT:

Loggers and firewood cutters should be allowed to cut only dead trees.

POSSIBLE MODIFICATIONS:

– not be allowed to cut dead trees.
– be allowed to cut only certain dead trees.
– be allowed to cut certain age/diameter living trees.
– allowed to cut any tree in certain areas of the forest, while other forest areas should be reserved for other values.
– allowed to cut dead trees in certain areas of the forest, while other forest areas should be reserved for other values.

FOREST POLICY STATEMENT:

People should be allowed to cut as much firewood as they need from wherever they want in the forest.

POSSIBLE MODIFICATIONS:

– only commercial firewood cutters.
– only non-commercial cutters for private use.
– firewood cutting should be allowed only in certain areas.

FOREST POLICY STATEMENT:

Forest lands should be sold to private individuals, and then they can decide what they want to do with these lands.

POSSIBLE MODIFICATIONS:

– some lands.
– only lands near roads.
– only if other forest lands are protected as wildlife habitat, for watershed protection, timber production, and other values.
– only if restrictions requiring forest protection or renewal are placed on the land before selling it to private individuals.

FOREST POLICY STATEMENT:

People should be required to recycle paper because that would reduce our need to cut so many trees.

POSSIBLE MODIFICATIONS:

– government agencies will purchase recycled paper and recycle used paper.
– private recycling groups will be supported by the government for community recycling programs.
– citizens will receive **incentives** to recycle (*tax breaks, cheaper trash removal costs*).
– citizens will recycle voluntarily and not be required by law to recycle.

FOREST POLICY STATEMENT:

People should be required to use air-tight stoves with catalytic converters to reduce use of firewood and air pollution.

POSSIBLE MODIFICATIONS:

– in areas where wood is scarce.

– in areas where air pollution is a problem, citizens will receive **incentives** (*tax breaks, rebates after purchases of converters*).

FOREST POLICY STATEMENT:

People should be allowed to build private cabins on public forest lands.

POSSIBLE MODIFICATIONS:

– not be allowed.

– public use cabins should be built and made available to the public.

FOREST POLICY STATEMENT:

Whenever trees are harvested from forests, people should go in and replant trees.

POSSIBLE MODIFICATIONS:

– in areas where trees would not come back naturally.

– trees should only be harvested from areas where they will come back naturally.

FOREST POLICY STATEMENT:

Insects and fungi kill trees so pesticides and fungicides (poison chemicals) should be used to get rid of them.

POSSIBLE MODIFICATIONS:

– used on certain insects and certain fungi.

– only in places where producing trees for harvest is the main use of the forest.

– never be used.

On the Trail of Human Activities

Section 5
FOREST ACTIVITIES

Grade Level: 5 - 12

NGSS: 5-ESS3-1, MS-LS2-1. MS-LS2-4, MS-ESS3-4,HS-LS2-2. HS-ESS3-3

Subjects: Science, social studies

Skills: Observing, predicting, values clarification

Duration:

Group Size: 1-4

Vocabulary: Succession

Objective:
Students will identify effects of human activities in a forest and classify them as helpful or destructive to the forest ecosystem.

Complementary Activities:
INDOOR: "Forests for People" *and* "Whose Forest? Our Forest!" *in this section.* "Succession's Path" *and* "Animal Adaptations for Succession" *in Section 4, Succession.*

Materials:
Clipboards and writing paper or field note books, pencils or pens, and "Science Card" *(following)* for each student. Chalkboard.

Background:
See INSIGHTS, *Section 5, Human Uses and Impacts in Forest Ecosystems.*

Procedure:
IN ADVANCE, locate a site where humans have altered the forest.

1. *IN CLASS,* brainstorm changes humans can make in a forest. List them as students say them. Discuss if or how these changes might affect forest wildlife.

2. Ask students to predict what human influences they might find in the forest they are about to enter. Remind them to use all their senses.

Classroom Follow-Up:
1. Make a class list on the board of human activities students observed in the forest.

2. Compare the predictions to what was found. Did students find some signs they hadn't expected?

3. Write the following headings across the top of the board:
"Harmed Most Wildlife"
"Harmed Wildlife That Need Old Forests"
"Harmed Wildlife That Need Early Successional Stages"
"Harmed People's Enjoyment of Forest"
"Other Harm To Forest"

"Helped Most Wildlife"
"Helped Wildlife That Need Old Forest"
"Helped Wildlife That Need Early Successional Stages"
"Improved People's Enjoyment of Forest"
"Other Benefits to Forest"

"Overall Effects"

3. Review each activity and place a +, -, or 0 in all the columns that apply. Then, based on the number of check marks on the positive side versus the number on the negative side, assign an overall +, -, or 0 (neutral) symbol in the "Overall Effects" column.

4. Ask students to discuss how the overall effects of each activity might differ if only one person did it, or 10, 50, 1,000, or everybody – or, if it occurred in only a few areas of the forest, or in most areas of the forest.

Curriculum Connections:

(See appendix for full citations)

Books:

Alaska's Forest Resources (Alaska Geographic Society)

Forests for the Future (Parker)

Pharmacy in the Forest: How Medicines are Found in the Natural World (Powledge)

Shrinking Forests (Tesar) 7-12

Media:

Ancient Forest: Rage Over Trees (Video) (National Audubon Society)

Websites:

Alaska Statewide Databases <sled.alaska.edu>

Staff-written Alaska newspaper articles: Anchorage *Daily News* Archives <www.adnsearch.com> *or* Fairbanks *Daily News-Miner* <www.newsminer.com>

Teacher Resources:

(See appendix)

SCIENCE CARD

Human Activities

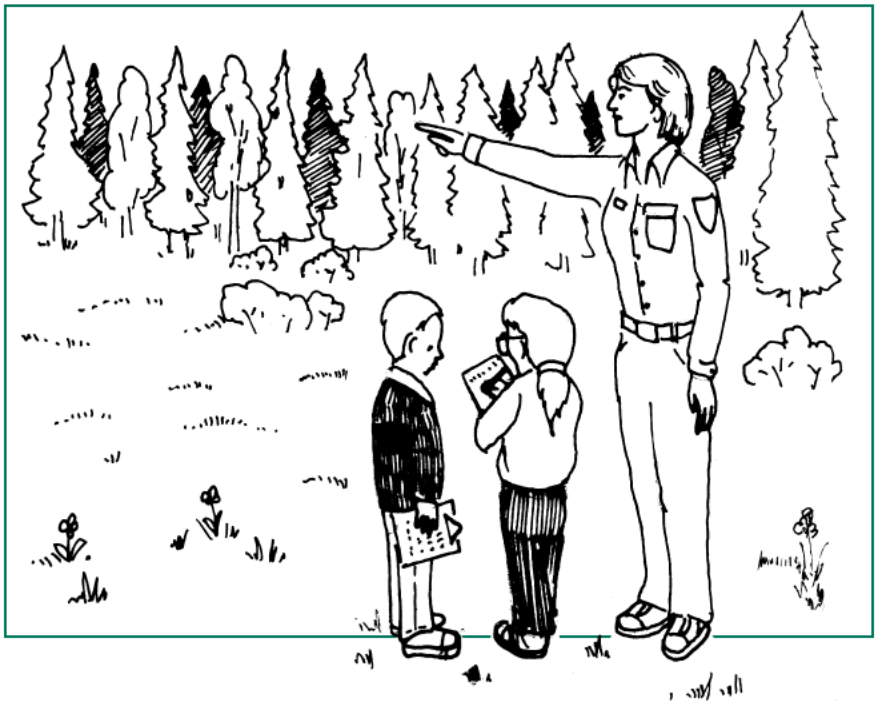
1. Turn to a page in your field notebook and label the page "Human Activities and the Forest."

2. Use your seeing, hearing, and smelling senses as you examine this area carefully. Record any evidence of human activity that you find. Don't forget that past human activities may have disturbed the site and caused this area to be at a different stage of **succession** than nearby sites.

3. List the signs of humans that you found, and put a plus mark by those you think improved the forest, a minus mark by those you think harmed the forest, and a "0" by those you think changed the forest but had mixed effects. *(Remember, a change in the forest may benefit some living things and harm others.)*

4. Add to your notes any evidence of humans you find elsewhere along the trail to or from the site.

Forest Careers
4 EXTENSIONS



Section 5
FOREST ACTIVITIES

Grade Level: 7 - 12

State Standards: L A-3, L A-4

Subjects: Language arts, humanities, social studies

Skills: Vocabulary development, interviewing, writing

Duration: 4 to 5 hours

Group Size: 1 and whole class

Setting: Indoors

Vocabulary: Ecologist, entomology, forest management, horticulture, hydrology, lobbyist, pathology, silviculture

Objectives:
1. Students will name and describe several careers related to forests.

2. Students will find information on one occupation and present it to the class.

Teaching Strategy:
Students create a list of forest-related careers, find information by interviewing or writing a letter, and compile a file of forest-related jobs.

Complementary Activities:
INDOOR: "Whose Forest? Our Forest!" *in this section.*
"Workers for Wildlife" *in Alaska's Wildlife Conservation.*

Materials:
Forest Careers Interview sheet *(see following pages)*, writing materials, telephone directory, computer with internet access.

Background:
See INSIGHTS, *Section 5, Human Uses and Impacts in Forest Ecosystems: "Forest Organizations and Careers."*

Procedure:
1. Explain to students that use and protection of forests is called **forest management**, and the professionals who practice it are called **forest managers** or **foresters**.

2. Forest managers work to protect forests from harmful human actions and prevent the loss of valuable forest resources. Forest managers make decisions about timber harvest, air quality and watershed protection, fish and wildlife habitat, and a variety of other benefits that people desire.

3. As a class, brainstorm possible jobs relating to forest uses and conservation. Also list agencies, businesses, or organizations that might have forest-related jobs *(see* INSIGHTS, *Section 5,"Forest Organizations and Careers" fact sheet for ideas).*

4. Each student selects a career to investigate and an

organization or agency related to the career.

5. Students brainstorm questions they could ask about the career, or use the following "Forest Careers" interview worksheet.

6. Each student selects one agency or organization. The student checks the organization's website or calls for printed information to be better prepared to ask questions.

7. The student then writes or phones the organization. Students explain their assignment and ask to speak to a knowledgeable staff person who has the career they are investigating. Students use their questions or the "Forest Careers Interview" worksheet as a guide for learning about the career.

8. Each student presents the information about the occupation to the class. They use whatever methods and props are needed to convey the tasks of the job.

9. Ask students to compile their research results into a file on forest-related careers. This can serve as reference material on forest careers for all students in the class, as well as for other students in your school.

10. Students write short thank-you notes to the professional they interviewed.

Evaluation:

1. Students name five types of work related to forest use or conservation and the kinds of training required for those jobs.

2. Students write advertisements for forest-related jobs. They include requirements and responsibilities for each position.

EXTENSIONS:

A. **Hold a natural resource job fair.** Combine the material collected for this activity with the results of "Workers for Wildlife" student activity in *Alaska's Wildlife Conservation* to start a "Natural Resources Job Fair" or career day.

B. **Invite forest career speakers.** Invite forest resource workers to the class and have students ask them questions. Add this information to the class file or booklet on forest careers.

C. **Work a day in a forest-related job.** Students spend part of a work day with an individual in a forest career.

D. **Role-play and video forest-related job.** Using a video camera, students role-play and tape a day's work in the life of a forest-related worker. Each student or group of students should create at least 2 roles.

Credits:

Adapted from American Forest Foundation, "Careers in Forestry," *Project Learning Tree Activity Guid*e, 1987. Adapted from Western Regional Environmental Education Council, "Wildwork," "Workers for Wildlife," *Project WILD*, 1992.

Curriculum Connections:

(See appendix for full citations)

Books:

Bull Whackers to Whistle Punks: Logging in the Old West (Nelson) Gives a historical perspective of logging.

Websites:

See the websites listed on the "Forest Organizations and Careers" fact sheet in *INSIGHTS, Section 5*.

US Forest Service fire links page
https://www.fs.fed.us/fire

Teacher Resources:

(See appendix)

Forest Careers
INTERVIEW

DIRECTIONS: Investigate a career related to forests. Contact an individual in a career that relates to forests and use this interview form. You may ask additional questions or add other information that the person provides on the backside of the paper. Print neatly or type your final copy so others will be able to read it.

Career/Occupation Title: _____

1. What is the function or purpose of this job and how does it relate to forests?

2. How does a person in this occupation spend his/her time? What proportion is spent at a desk, in a lab, indoors, outdoors, traveling, in meetings, etc.?

3. In conducting this job, what skills are used? (*writing, speaking, working with computers, numbers, measuring, physical labor, using specialized equipment*)

4. What training is needed for this job? Academic or vocational? What types of classes are needed and what level of education is required?

5. Where is training available? Does this person recommend a particular school or program for training?

6. What employers might hire people in this occupation? Be specific.

7. What are the typical benefits of this occupation?

   Monetary: $_____/ hour or _____/ year

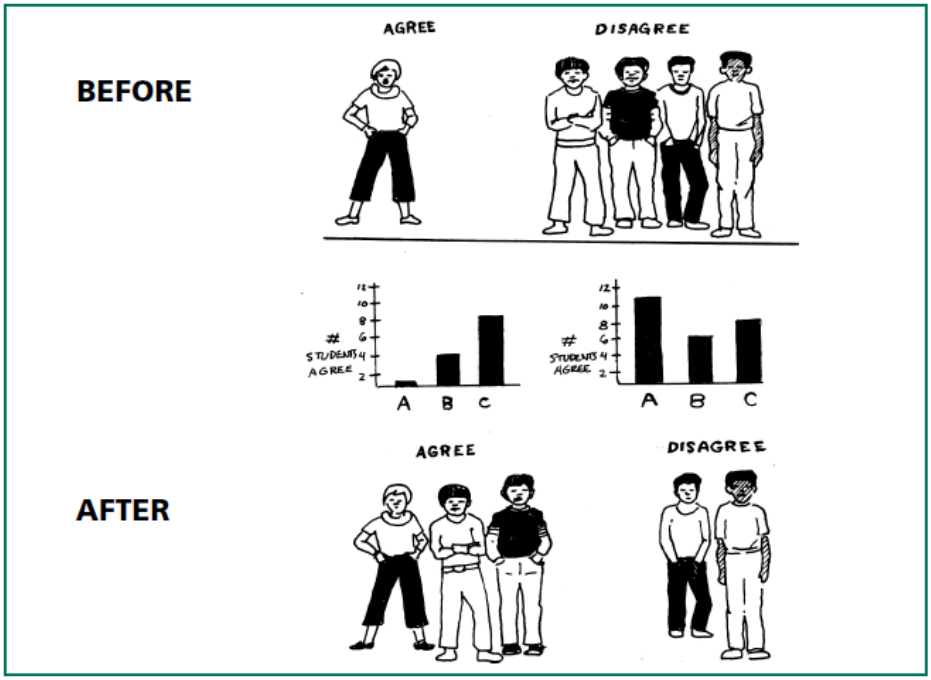
   What are the personal rewards? – *knowledge of doing something worthwhile, value to the community, to the future, chances for travel, security, prestige*?

8. Will there be a greater or lesser need for people in this occupation in the future? Specify where jobs are most likely to be available.

9. Will more training be needed in the future than is needed at present?

Forest Management Dilemmas

1 EXTENSION



Section 5
FOREST ACTIVITIES

Grade Level: 5 - 12
State Standards: L B-2, L D1, L D2, L D4, Geo E-1, Geo E-4, Geo E-5, Geo F-3, Gov C-1, Gov C-7, Gov G-2, Gov G-3
NGSS: 5-ESS3-1,MS-LS2-4, MS-LS2-5,MS-ESS3-3.,MS-ESS3-4,HS-LS2-2.,HS-ESS3-2,HS-ESS3-3 HS-ETS1-3.
Subjects: Science, social studies, language arts
Skills: Analyzing, synthesizing, gathering statistics
Duration: 3-50 minute class periods over several days
Group Size: Whole class
Setting: Indoors
Vocabulary: Dilemma, epidemic, logging slash, management goal, mandate, multiple-use, pitch, resin, seral stage, stands, suppression

Objectives:

1. Students will explain why decisions about forest management are often difficult.

2. Students will describe how to become informed on forest management issues.

Teaching Strategy:

Students model decision-making by beginning with little information on an issue; then researching the issue; and finally, reconsidering their decisions.

Complementary Activities:

INDOOR: "Succession's Path" *and* "Animal Adaptations for Succession," *both in Section 4, Succession.*

Materials:

Large cards labeled "YES" and "NO," Dilemma Background Sheets *(following pages*), newspaper and magazine articles on the specific issues.
OPTIONAL: masking tape.

Background:

See INSIGHTS, *Section 5, Human Uses and Impacts in Forest Ecosystems.*

Just as forests are complex, so is the process of managing them. The purpose of this activity is to encourage **students to obtain information before forming an opinion** and to acquaint themselves with current forest issues. Teachers should stress that there is NO right or wrong opinion about these **dilemmas**.

Opinions about the issues using logic, emotion, or philosophy are valid as long as they are supported by accurate information.

Procedure:

1. Tell students that just as forests are complex, so is the process of managing them. As citizen students they will be asked to form an opinion about several current forest issues.

2. Stress that there is NO right or wrong opinion about these **dilemmas**.

3. Explain to them that opinions about the issues using logic, emotion, or philosophy are valid as long as they are supported by accurate information.

4. Place the "YES" card at one end of the room and the "NO" card at the other. Ask students to imagine a line on the floor connecting these two cards, or put masking tape on the floor.

5. Tell the students that after you read aloud the following forest dilemmas, they are to stand along the imaginary line in a place that reflects their opinion – before they know anything more about the issue. The closer to the end of the line they stand, the more they agree with the decision card at that end.

DILEMMA 1:
Fires are an important, natural ingredient of the boreal forest ecosystem in Interior Alaska. Forest fires can also threaten human lives, properties, and marketable timber and reduce the amount of habitat for wildlife needing old-growth forests. **Your question: Should forest fires in the boreal forest be put out whenever possible?**

DILEMMA 2:
To be profitable, the timber industry must have access to large areas of commercially valuable trees. The most profitable is old-growth forests on public lands such as the Tongass National Forest in Southeast Alaska. Other parties say that Alaska's old-growth forests are more valuable for fish and wildlife habitat, watershed protection, subsistence, scenic beauty, and recreation. **Your question: Should the timber industry continue to log public old-growth forests in Alaska?**

6. Draw a bar graph of this "uninformed" class opinion. Repeat for each dilemma.

7. Divide the class into two or four groups to further examine these issues. Assign each group one of the dilemmas and ask them to find more information about the issue.

8. Ask them to find articles from newspapers, magazines, and the internet; read the "Dilemma Background" information sheets *(following pages);* and contact experts and representatives of various groups concerned about the issue.

9. They could invite these experts to come to class to speak or be interviewed by students. They could obtain brochures, reports, or other information from these individuals. Stress the importance of contacting experts and representatives of groups with different views on their dilemma.

10. Ask each group to divide in half. One subgroup will evaluate the YES position, and one group will evaluate the NO position. **Their evaluations should be structured in terms of both positive and negative consequences.**

11. Present each dilemma to the class again, but before students choose their places along the decision line, ask the group examining that issue to present its findings. Each group should present the positive and negative consequences of the decision assigned to them.

12. After the consequences of the positions have been presented, have the entire class (including the study group) find places along the line that best describe their opinions about the dilemma.

13. Draw another bar graph, this time of "informed" student opinions. Repeat for each issue.

14. Compare the bar graphs of the "uninformed" and "informed" student opinions: Did the students' opinions about these forest management issues change after they learned more about the issues? Ask how many students changed their personal opinions in either direction. Discuss the importance of becoming informed about all sides of an issue before making a decision or forming an opinion.

15. Read aloud "What is being done?" for each issue if the students did not find experts to give the current status. *(Keep in mind that the information provided with this activity is only up-to-date as of this publication. Changes may have occurred since that time.)* How do the decisions made by the government, with public input, compare to the opinions of the class?

16. Discuss the importance of public participation in decision-making through voting, attending and testifying

at hearings, becoming a representative on an advisory board, letters-to-the-editor, or other methods. What are the values of having a variety of people express their opinions? Are opinions based on facts more convincing than opinions based on misinformation? Discuss the responsibility for becoming informed that comes with our right to participate in decision-making.

Evaluation:

Evaluation in this activity is based on students' role-playing rather than expressing their personal opinions.

1. Given a new forest management dilemma, students write a paragraph describing their initial opinion of how it should be handled, and what resources they would use to become better-informed about the issue.

2. Students write or demonstrate why it is important to become well-informed on an issue before defending an opinion.

EXTENSION:

For older students: Attend a public hearing on a forest- or wildlife-related issue. Ask students to select one individual that they will focus on during the hearing. Students record the testimony of that person and any responses made towards their comments. Students then introduce themselves to the person they observed, explain their assignment and ask to talk with them then or at a later date.

Students meet *(by phone or in person)* to clarify any questions they have and to learn more about the person's experience and opinions. Students write up a summary including a profile of the person, their perspectives, and position on the issue. Papers are presented in class with a discussion to follow.

Curriculum Connections:

(See appendix for full citations)

Books:

Alaska's Forest Resources (Alaska Geographic Society)

Alaska Wildlife Notebook Series (ADF&G)

Ancient Forests (Siy)

Earth's Vanishing Forests (Gallant)

Forest: Identifying Propaganda Techniques (Anderson)

Forests for the Future (Parker)

Saving Our Forests (Hirschi)

Shrinking Forests (Tesar) 7-12

Media:

Rage Over Trees (Video) (National Audubon Society)

Websites:

Alaska Department of Natural Resources <www.http://forestry.alaska.gov/

Https://www.gi.alaska.edu/AlaskaScienceForum/administration

Alaska Statewide Databases <sled.alaska.edu>

Tongass National Forest <https://www.fs.usda.gov/tongass/>

US Forest Service fire links page <https://www.fs.fed.us/fire

Teacher Resources:

(See appendix)

Forest Dilemma One

BOREAL FOREST FIRES – *Background*

QUESTION: Should all forest fires in the boreal forest be put out, or should some be allowed to burn?

PAST: Lightning-caused fires are thought to have occurred in the boreal forest since the last ice age, 10,000 years ago. In addition, humans have both accidentally and purposefully caused forest fires since arriving in the boreal forest.

RECENT: We set fire to small areas of forests to clear land for homes, mining, and livestock pastures. Under dry, windy conditions, fires can easily escape control and spread. Some scientists estimate that from 1900-1940, 1.5 to 2.5 million acres of boreal forest burned each year in Alaska. From 1940-1969, about 1 million acres of forest burned each year. During the 1970s the number of acres burned per season varied from less than 8,000 to 2.2 million acres.

CURRENT DATA: Due, in part, to fire control efforts, fewer acres have burned in recent years. (For fire records from 1990 to the present, refer to the Alaska Department of Natural Resources, Division of Forestry website <www.dnr.state.ak.us/forestry/> and search "fire management programs" for "annual fire season statistics.")

SMOKEY THE BEAR: Until about 1970, forest fires were believed to be bad. The Smokey the Bear campaign successfully created a fear of fires. People thought all fires threatened human life and property and destroyed commercial timber and wildlife habitat.

TRUE CONFESSIONS: Forest fires do kill trees, burning timber that might have been logged. Some forest fires change watersheds, kill wildlife, and endanger human life or property. Forest fires that burn in mature and old-growth forests can reduce that habitat for certain wildlife. But is fire so bad that we should suppress it? Read on . . . .

DETECTIVE WORK: Researchers studying boreal forest ecosystems now have proved that forest fires are a natural ingredient in this northern forest. Fires help recycle minerals and in some locations improve water drainage and soil fertility.

Alaska fires leap and dance across a forest, burning some trees to charcoal and barely touching others. That creates a greater mixture of forest habitats than before the fire. Although some boreal forest wildlife need mature or old-growth forest sites, other species find better living conditions in shrub thickets and young forests.

ANIMAL PREFERENCES: Moose and snowshoe hares love the abundant shrubs and saplings that fires foster. Fires create openings in the forest needed by some sparrows, owls, hawks, swallows, and other birds. Trees killed by fire provide homes for wood-boring insects and the woodpeckers that eat them. Lynx and others may survive best in areas with a mixture of **successional stages**.

Some wildlife, however, require mature and climax stages of forest to survive. Flying squirrels, spruce grouse, crossbills, goshawks, and boreal owls do poorly after fire because fire removes their nesting habitat and food sources.

DISAPPEARING FORESTS: Old-growth forest sites are becoming less abundant because: (1) They are the most profitable forests to log. (2) Many exist on prime land where people want to live, so they are cut to make way for roads and houses.(3) If there is a fire, mature forests are much more likely to burn than younger forests with less fuel to burn.

Allowing old-growth forests to burn and harvesting trees from other mature forest sites could eventually lead to a shortage of old-growth and mature forest habitat. Wildlife that depends on this habitat would have no where to go.

WHO FIGHTS FIRES? WHO PAYS? The federal Bureau of Land Management, USDA Forest Service, and Alaska Department of Natural Resources work together to detect, monitor, and control forest fires in Alaska. The ability of these agencies to do this work is limited in part by the amount of money they receive.

CONTINUED

Forest Dilemma One

BOREAL FOREST FIRES – *Background*

QUESTION, Continued

Current federal and state budgets are not large enough to allow these agencies to control all fires in the boreal forest. The costs of fire-control programs are ultimately paid by taxpayers, either through higher taxes, or reductions in other government services.

HUMAN-CAUSED FIRES: Some, but not all forest fires, threaten human lives and property. Human-caused fires are more common along Alaska's road systems and near human habitations. That makes them more often a threat to people and property than lightning-caused fires.

SMOKEY AIR: Smoke from forest fires can interrupt aircraft flights and the travel plans of residents and tourists. Smoke can cause health hazards for persons with breathing difficulties downwind of large fires.

PILES OF FUEL: Some foresters and fire scientists worry when fires are prevented. They fear we may be creating a stockpile of dead wood, branches, and undecayed material that will feed an even bigger fire. They say it may be wise to allow more natural fires to burn to prevent the buildup of fuel.

WHAT A MESS: Fire **suppression** efforts include cutting fire lines and trails, applying fire retarding chemicals, and pumping water from streams and lakes to spray on the fire. Sometimes these actions cause more damage to lands, vegetation, and watersheds than uncontrolled forest fires. Concern has prompted some rehabilitation efforts. Fire fighting groups work after a fire to help restore some areas damaged by fire suppression activities.

SOMEONE HAS TO FIGHT: Fire fighting is dangerous, exhausting, sporadic, and seasonal. At times it's one of the few jobs in the village. Several Alaskan villages have contributed members to "Hot Shot" fire suppression crews that fly to fires here and in the Lower 48. Where fire crews are stationed, others gain income from selling goods and services to them and their agencies.

(Refer also to Forests INSIGHTS Section 4 "Succession – Changing Forest Habitats" for more information on fire in the boreal forest and charts on the stages of forest succession after fires)

Forest Dilemma One

BOREAL FOREST FIRES

What Is Being Done?

LETS COOPERATE: In the late 1970s, state, federal, and private land managers joined to form the Alaska Interagency Fire Management Council. This organization plans cooperative fire fighting throughout Alaska. The council treats fire as a natural force with both beneficial and potentially harmful effects.

THERE'S A PLAN: Members wrote the Alaska Interagency Fire Management Plan. The plan sets a priority for fire fighting work. All lands in Alaska have been given one of four fire protection categories. The categories range from an all-out attack when human lives, property, or valuable resources are in danger to allowing a carefully watched fire to burn if no danger is involved.

Four categories of fire management

1. ***Critical Protection Areas:*** In areas where human lives or homes are affected, all fires will be immediately and continuously suppressed to minimize loss of life and damage to property.

2. ***Full Protection Areas:*** Fires occurring on sites with commercially valuable timber stands, historic structures, or other valuable resources, but where people and homes are absent, will be immediately and aggressively suppressed to limit the number of acres lost.

3. ***Modified Action:*** Fires that occur in uninhabited areas and where valuable timber (or other types of resources) are absent will be monitored, but efforts will depend upon a comparison of the costs of fire suppression versus the potential number of acres that will burn. Greater efforts to control fires in these areas will be made when the risk of large, hot fires is high. Less effort will take place during cool, wet seasons when fires are unlikely to spread. After mid-July, the policy for these lands changes and they are treated like Limited Action sites.

4. ***Limited Action:*** Fires will be monitored but allowed to burn in areas where natural fires are considered beneficial, or where the costs of fighting the fire are greater than the potential fire damage. Suppression efforts will be made only to limit such fires to the designated area, or to protect critical sites within the limited action area.

CONTROLLED FIRES: Even when there are no wild fires, the fire managers work to contain potential fires in safe areas. They will deliberately start a "controlled" fire.

They select a day when weather and fuel (flammable forest debris) conditions are adequate for a burn, but when a fire is unlikely to burn too severely. They make sure firefighters are ready just in case. Then they set the fire, careful to keep it in the desired area.

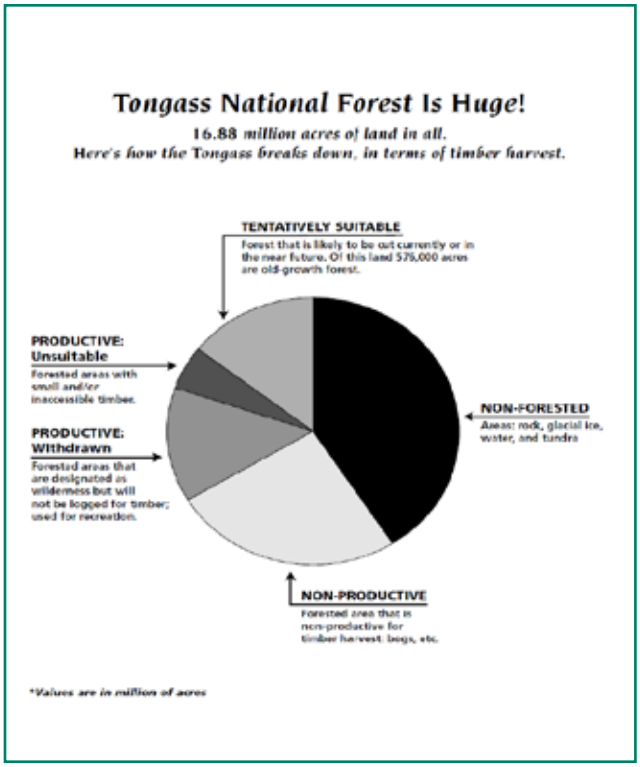
This method is currently being used on an experimental basis to improve habitat for moose which like to eat the tender young branches that grow after fires.

Forest Dilemma Two

OLD-GROWTH MANAGEMENT – *Background*

QUESTION: Should the timber industry continue to log public old-growth forests in Southeast Alaska?

ALASKA CHALLENGES: Harvesting timber in Alaska has always been more costly than in the more productive forests of the Pacific Northwest. The cost of doing business rises with our difficult weather; remote locations of commercially valuable timber stands; lack of roads and expense of building them; and the high cost of labor, equipment, and services.



INTERNATIONAL MARKET: To date, the majority of Southeast timber products has been sold and exported to Japan or other Asian markets because domestic markets buy cheaper supplies from Lower 48 forests. International timber markets change, based on the global economy, making logging a bit of a gamble.

RESEARCH ALL VIEWPOINTS: The issues surrounding timber harvest in the Tongass are clouded by differing viewpoints and differing values. The story you hear depends on the storytellers' experience, values, and knowledge. Research as many as viewpoints possible before you make your own decision.

FORESTS OF TIME: In Southeast Alaska most of the unharvested coastal forest is old-growth. This forest type is the climax stage of **succession**. It includes live trees of a variety of ages, from seedlings to 600-year or older giants, as well as standing and fallen dead trees. Over 200 years are required for old-growth forest to develop after disturbance.

HARVEST VALUES: Old-growth forests vary from scrub stands of noncommercial-quality timber to lots of large trees of great economic value. Noncommercial forests are those with small, widely-spaced trees of little profit to harvest.

"Low-volume" old-growth forests have small or widely-spaced trees which could yield some profit if harvested. The expense of cutting such stands may be greater than the market price of wood obtained, however. Noncommercial and low-volume old-growth stands grow mainly at high elevations and in poorly drained soils.

"High-volume" old-growth forests have huge trees up to 8 feet in diameter and 200 feet tall. Most high-volume stands grow on well-drained soils at low elevations and along rivers that drain watersheds.

LOCAL PROCESSING: National Forest lumber cannot, by law, be shipped out of state without being squared off. **Cant** is minimal processing. Timber from the Tongass National Forest must be milled by Alaska companies prior to export. Cant exports were primarily used for pulp production.

GOOD GROWING: Easily accessible, high-volume old-growth timber stands provide the most wood at the least cost for the timber industry. The land under these trees has the best environmental conditions for growing new trees. Forest planners predict that a new crop of marketable trees could be harvested from these sites in 100 to 120 years.

CONTINUED

Forest Dilemma Two

OLD-GROWTH MANAGEMENT – *Background*

QUESTION: Continued

(To grow commercially harvestable trees on poorer quality sites would require more time.)

Forest managers say that management of high-volume sites for wood production would provide a continual supply of wood for harvest along with logging industry jobs and income for Alaska. Some people believe that this use of the land with high-volume old-growth forest is the best use and say all high-volume sites should be managed for production of wood.

OLD-GROWTH SUPPLY: High-volume old-growth stands suitable for harvest are a relatively small portion of Tongass National Forest. About 2.4 million acres *(14% of the total Tongass)* are classified as tentatively suitable for timber harvest. Of that, 576,000 acres or 20% is old-growth forest.

WILDLIFE NEEDS: Biologists who have studied the wildlife of coastal old-growth forests say that harvest of high-volume old-growth stands and the proposed second logging 100 to 120 years later could mean long-term or permanent loss of habitat for those species of wildlife that need high-volume old-growth forest stands.

The dense shrub thickets and second growth forest that grow back after logging an old-growth forest are quite different from the original old-growth forest. These stands provide relatively poor habitat for many wildlife species that use or depend on old-growth forests.

CONCERN FOR DEER: Biologists from the Alaska Department of Fish and Game (ADF&G) predict that management of high-volume old-growth sites for wood production will lead to a substantial decline in the number of Sitka black-tailed deer on logged lands throughout Southeast Alaska. Deep snows prevent deer from reaching foods in young clear-cuts during winter. Second growth forests provide very little food for deer at any time of year.

EAGLE FUTURE: Bald eagle nest-trees and trees within 300 feet of a nest-tree are officially protected during logging on public lands. Despite the buffer, US Fish and Wildlife Service biologists predict that harvest of high-volume old-growth forest is likely to cause a decline in Southeastern Alaska's bald eagle population for two reasons:

(1) Trees in the buffer zone and the nest trees as well often blow down in wind storms once the surrounding forest is harvested. (2) Eagles depend on fish populations that may be harmed by timber harvest.

CONCERN FOR FISH: High-volume old-growth trees grow along many of the fish-rearing streams in Southeast Alaska. ADF&G fishery biologists admit that the effects of timber harvest are complex and vary from stream to stream, but warn that salmon and trout populations may decline if too much timber harvest occurs along streams or in watersheds that feed into fish-rearing streams.

Harvest of high-volume old-growth forest along streams often changes water temperatures, stream flow, silt loads, and productivity. These changes, in turn, can affect the reproduction and survival of fish.

SIZE AND BUFFERS: Some studies have shown that *small* clear-cuts along streams may increase productivity of the stream and the survival of fish fry. The detrimental effects of clear-cutting on fish habitat may be reduced by leaving buffer strips of forest along the stream — if the buffer strips are wide and stable enough to prevent the wind from uprooting trees during a storm.

In summary, the effects of timber harvest on fish spawning and rearing habitat are uncertain. The impacts depend on how much forest is harvested in each watershed, how it is harvested, and other variables.

Forest Dilemma Two

OLD-GROWTH MANAGEMENT – *Background*

QUESTION: Continued

NO SNAGS: The absence of **snags** *(large dead trees)* in second growth forests will reduce populations of cavity-nesting animals like woodpeckers, chickadees, swallows, owls, and flying squirrels. Even if snags are retained during timber harvest, they eventually decay and fall or are blown down. New large snags will not be created if second growth forests are repeatedly harvested when the trees are 100 to 120 years old.

VARIED WILDLIFE: Research on winter songbirds, river otters, Vancouver Canada geese, mountain goats, and brown bears indicate that these wildlife use old-growth stands in some areas of coastal forest. The impact of old-growth logging on these species is unclear.

TESTING: Some biologists argue that some wildlife may adapt to the changes after logging. They suggest we can modify logging methods and manage second growth forests in ways that reduce the negative impacts on wildlife that depend on old-growth forests. Tests are underway to see the effects of retaining snags, thinning second growth stands, clearing of slash, and other forest management techniques. So far, none of these methods has proven effective or affordable.

SCENIC CONCERNS: The scenic value of various-aged forests has not been thoroughly investigated. Some people argue that the scenic value of Southeast Alaska wilderness will be significantly reduced by timber harvest and its potential to reduce wildlife populations. They predict extensive timber harvest in the coastal forest will cause a decline in tourism, fishing, and guiding.

Other people argue that tourists do not notice or may enjoy the scenic variation of old-growth, clear-cuts, and second growth. They predict that timber harvest will not affect tourism.

IN THE BALANCE: Some foresters agree that extensive harvest of old-growth will reduce the number of deer. They argue that we have enough deer in Southeastern Alaska even at lower population levels. These foresters say we must balance our desire for high deer populations with our desire for jobs and timber. The public must help resource managers choose how to balance competing uses of the forest.

IN SUMMARY: Old-growth forests are unique ecosystems that provide habitat for a variety of plant and animal species They have aesthetic, recreational, subsistence, and economic value to humans. It is challenging to manage public forest lands to meet the variety of public interests while maintaining a long-term, ecologically healthy forest.

Forest Dilemma Two

OLD-GROWTH MANAGEMENT

What Is Being Done?

A TIME OF CHANGE: Changes in the timber industry, markets, social values of the forest, and the Tongass Land and Resource Management Plan have lead the Forest Service to study techniques to find alternative harvesting methods that avoid clear cuts and retain some trees.

LOGGING HISTORY: The Forest Service established long-term timber sale contracts in the 1950s to help stabilize the economy of Southeast Alaska that shifted seasonally with the fish industry and was declining in the mining industry. The 50-year contracts attracted investment for pulp mills and year-round timber enterprises.

MILLS CLOSE: The requirements for timber harvest to satisfy these long-term contracts came to an end in the 1990s when the pulp mills closed in Ketchikan and Sitka.

CURRENT SALES: The Tongass prepares timber sales that allow loggers to harvest a yearly average about 220 million board feet of timber. Many sales are designed so they can be sold to small, local enterprises in Southeast Alaska. The local timber industry is diversifying so it can provide employment for additional local wood processing and take advantage of markets for specialty wood products.

RETHINKING: The Alaska Region of the Forest Service is changing the way it prepares timber sales for several reasons. (1) It is learning more about fish and wildlife habitat needs in the forests. (2) Foresters have also increased their knowledge of how trees grow in Southeast. (3) And the agency is responding to concerned public who say they oppose timber harvesting, particularly clear-cutting.

Plant a Tree
2 EXTENSIONS

Section 5
FOREST ACTIVITIES

Grade Level: K - 12

Subjects: Science

NGSS: K-LS1-1.,2-LS4-1.,5-LS1-1

Skills: Observing, comparing, predicting

Duration: Entire school year

Group Size: 1 and whole class

Setting: Indoors and outdoors

Vocabulary: Seed, seedling, transplant

Objectives:
1. Students will describe the process of growth in trees.
2. Students will help to renew a previously forested area.

Teaching Strategy:
Students grow a tree from seed, make a graph of its growth, then plant it to "renew" a cleared or burned area.

Complementary Activities:
All activities in this book.

Materials:
Tree **seeds** *(birch and alder are relatively easy to grow from gathered seeds),* paper cups or other containers, potting soil, water, fertilizer, trowels or shovels, plastic sandwich bags to cover each container or a plastic sheet to cover many, paper and pencils, "Investment in Tomorrow" certificate *(following*).

Background:
See INSIGHTS, *Section 5, Human Uses and Impacts in Forest Ecosystems: "Plant a Tree – Arbor Day"* fact sheet.

Procedure:
1. Give each student one or two tree seeds to plant in containers. The containers need a pencil-sized hole in the bottom for drainage. Ask students to mark their containers with their names, the type of seed, and the date.

2. Students put the containers in a sunny window and cover the top loosely with a plastic bag. Care for the tree by watering it until it sprouts, but remember that if it gets too wet, the seed may rot. It may take a while to sprout. If you begin this activity in the fall, you might be able to **transplant** the **seedlings** in the spring.

3. Each student makes a graph of the growth of the seedling over a set period. Compare the graphs, especially if using more than one type of seed.

4. When the seedlings are about 4-6 inches high, transplant them to a location outdoors where reforestation or tree planting for beautification is desired.

5. Award each student an "Investment in Tomorrow" certificate.

VARIATION
Obtain tree seedlings from a local forestry association or other agency, and plant the seedlings instead. Observe growth of the seedlings while caring for them.

Evaluation:

1. The teacher observes student participation in caring for the seedling and in the transplanting activity.

2. Students graph the growth of their seedlings.

EXTENSIONS:

A. **Plant trees on schoolyard or adopt an area.** Conduct a beautification or reforestation project near your school or at some other site in your community.

B. **Problem solve a forestry issue.** Pose a question like this to the class and have students hypothesize a reason for the problem:

"Recently a thousand-acre plot, which was clear-cut two years ago, has been replanted with spruce seedlings. These trees were planted at the same time. The plot is on a northern slope. These trees are not surviving. Why not?"

Students should be able to defend their idea based on what they know about forests. They can base their responses on research. *(*INSIGHTS *sections 1,2, and 4 will provide some answers*.)

Credits:

Adapted from Alaska Cooperative Extension Service "Transplanting Trees Successfully." Anchorage, Alaska: Cooperative Extension Service, University of Alaska, 1990.

Curriculum Connections:

(See appendix for full citations)

Books:
Christmas Tree Farm (Jordan)

Gift of a Tree (Tresselt)

Grandpa Tree (Donahue)

Johnny Appleseed (Kellogg)

Man Who Planted Trees (Giono)

Song of the Trees (Taylor)

Media:
The Man Who Planted Trees (Video, Audio Tape, or CD)

Teacher Resources:

(See appendix)

CERTIFICATE:

Investment in Tomorrow

I have made an investment in tomorrow by planting a tree.

My tree is located at _____

My name _____

Date _____

Teacher's signature _____

Forest official's signature _____