



## Unit III: People and Wetlands

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### Introduction

In recent years people have grappled with many difficult issues revolving around land use. Wetlands, overlooked for so many years, are now often in the middle of these controversies. Solutions are seldom simple and rarely satisfying to all involved. Compromise is not always easy to accept; yet it is often the only alternative for decision-makers.

It is educational to put students and ourselves in the shoes of these decision-makers; to bring to light the difficulty of land-use decision-making; to become more aware of the many different viewpoints on an issue; and to understand the need for trade-offs in a modern society. The task is never easy.

It is therefore important to impart a positive tone to the exercises in this unit. Emphasize possible solutions, rather than just problems. Point out the benefits of sound decision-making based on good information. Finally, encourage the human ability to learn and to take care of our environment.





## Topic A: Communicating Our Perceptions

### Activity 1: Down by the Bay

(adapted from Project Home-Planet: Seashores, by Susan Vanderburg)

<b>Grade Level:</b>	3- 12; with variations for K-2
<b>Time range:</b>	30 minutes for choral reading and discussion; several periods for extended projects
<b>Setting:</b>	indoors
<b>Subject Area:</b>	Reading, Drama, Arts, Music, History, Social Studies Environmental Education and Issues
<b>Vocabulary:</b>	dike, dredge, dredging, canneries, marina, yield

Students will learn how humans have interacted with wetlands throughout the history of the Northwest.

#### Objectives

Students will perform a choral reading and create a way to illustrate each stanza either through drama, art, or music.

#### Methods

Throughout history, people have failed to find value in wetlands and have degraded and destroyed them for a number of reasons. Early European settlers came to Puget Sound and found rich, fertile agricultural land for their crops. Wetlands appeared worthless in the settlers' eyes and were converted to farm land by digging canals to drain the land. Once thriving wetlands became crop lands, hayfields, cow pastures, and orchards.

#### Teacher Background

With the rapid population growth in the 1900's, wetlands, especially saltmarshes, were filled to provide more space for manufacturing. Some wetlands were dredged to provide deeper harbors for shipping. Additional losses resulted from residential and commercial development and road construction. Wetland losses are by no means limited to Washington State. Over half of the wetlands that once existed in the continental United States have been destroyed, and losses continue.

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**Materials**

“Down by the Bay,” a choral reading; art materials and/or rhythm instruments

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**Procedure**

Assign parts of the choral reading, “Down by the Bay,” to different groups of students. The following suggestion represents one way in which the parts could be divided:

Lines 1-8: All read

Lines 9-16: Girls read

Lines 17-24: Boys read

Lines 25-32: All read

Lines 33-64: Each line read by a different individual

Lines 65-72: All read

Discuss the history of human interaction with wetlands. What are some of the ways people have used wetlands and why?

Choose a creative way for students to illustrate or perform this choral reading. Suggestions include:

1. Make a mural showing a timeline from 1800 to the present. Along the timeline, have students record the nine stanzas from the choral reading and illustrate each one.

2. Make several class books of “Down by the Bay,” each page having half a stanza written and illustrated by students or pairs of students. Send a book home each night with a different student to share with his/her family.

3. Divide the class into nine groups and assign each group a stanza. Have each group create a way to present their stanza through choral reading and the use of rhythm instruments (or other sound effects). Tape record each group in sequence.

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**Grade Level Variations**

K-3: Use the activity entitled: “From Marsh to Marina” (Nature Scope’s Wading into Wetlands issue). Have students cut apart the pictures showing the history of humans in wetlands and paste them in the right order. Have students practice telling, orally, what is happening in each picture, or have them write one sentence for each picture.

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Have students describe three ways in which humans have degraded wetlands over the years.

**Evaluation**

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Project Home-Planet, K-6 Whole-language/ Environmental Education curriculum, “Wading Into Wetlands,” Ranger Rick’s Nature Scope; listed in Appendix A

**Resources**





## Down By The Bay

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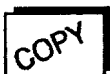
From *Project Home Planet*, by Susan Vanderburg

Long ago, on a quiet bay,  
An Indian family decided to stay.  
They built their homes from cedar trees.  
For their food, they turned to the seas.  
They gathered clams and mussels too,  
But never more than they could use.  
Salmon fed them all year long,  
And they offered thanks in prayer and song.

One day a giant ship appeared. 9  
To the men on board, one thing was clear;  
This bountiful land, there was no mistaking,  
Had wood, and furs, and fish for the taking.  
Before long, more white people came,  
Built trading posts, and hunted game.  
More ships now came into the bay,  
And some of the animals moved away.

Next, settlers came from over the land, 17  
With wagons and seeds and dreams and plans.  
They built their farms and soon saw how  
The rich, flat marsh could easily be plowed.  
To keep the sea away from the crops,  
The farmers built walls of heavy rocks.  
They diked off part of the beautiful bay,  
Any many more animals moved away.

More settlers came and wanted a town, 25  
But the shore by the bay was soggy ground.  
The marshland looked like a muddy place,  
A grassy place just going to waste.  
So they filled it with dirt and built wide piers.  
They dredged out the harbor so ships could come nearer.  
The dredgings were piled on the shores of the bay,  
And many more animals moved away.



33  
People made money by logging trees.  
Logs could float down the river with ease.  
Soon, the mouth of the river was filled  
With logs awaiting their turn at the mill.  
The saw blades screamed; the wood chips flew.  
Wagons carried lumber, and ships did too.  
The chips and bark settled into the bay,  
Many animals wished they could move away.

41  
Now the town has grown to a city,  
The noise and the garbage aren't very pretty.  
Canneries border one stretch of shore.  
They process fish for the local stores.  
A marina was built for pleasure boats.  
On the water more gas and oil floats.  
Factories dump waste water into the bay,  
And not many animals care to stay.

49  
People have always looked at the bay  
And thought, "What a great place for humans to stay."  
They used the bay to meet their needs,  
(Or in some cases, to satisfy greeds.)  
They didn't know that the bay, left alone,  
Was a valuable place, all on its own.  
"What good is a muddy old bay," you might **say?**  
Just look what a marshland can give us each day!

57  
For migrating birds, a resting ground,  
A more suitable place could hardly be found.  
For young salmon coming down from a stream,  
A place to feed and get used to the sea.  
For baby animals of every kind,  
A better nursery would be hard to find.  
The marsh is a natural filter too,  
Trapping pollutants that enter the slough.

65  
For living things, a saltmarsh can yield  
More food than produced in a farmer's field.  
The marshland food-chains even include  
Humans who harvest the bay's rich food.  
Next time you gaze at a grassy bay,  
Remember the poem you heard today.  
Remember the value of this special place,  
To all creatures, including the human race.



## Topic A: Communicating Our Perceptions

### Activity 2: Wetlands Gazette

<b>Grade Level:</b>	3-12
<b>Time range:</b>	2-5 class periods
<b>Setting:</b>	indoors
<b>Subject Area:</b>	Environmental Education and Issues, Language Arts, Photography, Arts
<b>Vocabulary:</b>	ecologist

The students will be able to initiate research, conduct interviews, and collect information on the values of wetlands, and express their knowledge of, and concern for wetlands in writing.

#### Objectives

Students will gather information and prepare a newspaper devoted to wetlands.

#### Methods

local newspapers, writing paper, pens/pencils, duplicating facilities, computer (if available)

#### Materials

Newspapers, despite competition from television and radio, are still the basic medium of public record and information. Producing a newspaper will provide students valuable insight into this medium and will develop interdisciplinary skills.

#### Background

Wetlands conservation is a public issue that lends itself to exploration through a newspaper format. The extent of time allocated to this activity can vary according to the amount of time you have and the enthusiasm of your group. Students may develop just a few stories based on information from other activities, or they may form several departments and gather more information through interviews and library research.



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## Procedures

Explain to the group that they are going to write, print, and circulate a newspaper called “The Wetlands Gazette” or other title they choose. Discuss the need for various departments to be formed in order to produce a newspaper about wetlands and ask for suggestions. (Editorial, advertising, sports, local news, mart, and food sections are good examples.)

Study the local newspaper with the group. You might also arrange to take a trip to a local newspaper or invite a journalist to speak to the students. This will allow them to see how complex the news gathering process is—from ideas for a story, interviews, and other news gathering techniques, to the actual writing of the story. If your local school has its own newspaper, consult the staff for resources and advice, or invite the staff to work with you to produce “The Wetlands Gazette.” You may wish to separate the daily newspaper into sections so they have a sample right in front of them.

Before students settle into their news assignments, review what they already know about wetlands. Then organize the students into four or more news departments and ask each department to discuss types of stories and headlines they might write. Each department may produce more than one news item. Illustrations should accompany the stories. Photographs from the “Field Study:” Unit II, Topic C, Activity 4 could also be added if they are black and white prints. For higher quality photo reproduction, go to a full-service copy shop and have a photo mechanical transfer (PMT) or half-tone made. These processes add a dot pattern to the photo that better shows details when photocopied.



Department	Sample Topics
<b>Editorial</b>	<ul style="list-style-type: none"><li>■ value of preserving local wetland</li><li>■ value of converting local wetland</li><li>■ letters to the editor</li></ul>
<b>Advertisement</b>	<ul style="list-style-type: none"><li>■ Help Wanted ads for wetlands jobs (water quality technician, wetland ecologist, cranberry farmer)</li></ul>
<b>Sports</b>	<ul style="list-style-type: none"><li>■ Outdoor column</li><li>■ Sport fishing news; e.g. headline “Fishing at Wye Marsh”</li></ul>

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**Local News** ■ Interview with a senior citizen about local wetland changes, or interview with a hunter or bird watcher; e.g., headlines—  
**“Bird Watchers Spot Rare Bird”**  
or **“New Nesting Boxes Placed in the North Marsh”**

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**Food** ■ Local interest column, e.g. headline—  
**“Local Clams Unfit to Eat Because of Pollution,”** or  
**“Local Pulp Mill Takes Steps to Reduce Pollution”**

■ Recipes using wetland plants and/or animals; e.g. **“Local Delicacies; cranberry sauce; muskrat stew; watercress soup or salad”**

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**Art/Culture** ■ Logo for the newspaper

■ Drawings to illustrate some stories

■ Native American stories about wetland animals

■ Poems describing wetlands

■ Theme and program for a local Outdoor Art Exhibition

■ Cartoons

If the scope of your newspaper requires it, discuss what further information students will need and let reporters from each department develop a plan for gathering it. Suggestions for plans include: research in local publications or the library; and interviews with senior citizens, people who hunt or fish, local land or water quality managers, and city officials. For longer term projects, set copy deadlines.

Proceed with newspaper production according to the plan. If possible, arrange for the students’ stories to be typed by students or parents. Duplicate the students’ work. Let the class put the newspaper together.

A circulation department from the group should develop a plan to distribute the newspaper locally—in schools, or perhaps also in the community. Distribute the paper according to the plan. Contact the local paper and see if the editor will print one or two of the best stories.

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**Evaluation**

Use the students product for evaluation.

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**Resources**

“Running a School Newspaper” by Vivian Dubrovin;  
“The Student Journalist and News Reporting” by Hazel Presson listed  
in Appendix A.

## Topic B: Pacific Northwest Native Americans and Wetlands

### Activity 1: Plant Posters

<b>Grade Level:</b>	3-12
<b>Time range:</b>	60 minutes
<b>Setting:</b>	indoors
<b>Subject Area:</b>	Environmental Education and Issues, History, Arts, English, Language Arts, Social Studies, Biology, Life Science, Anthropology
<b>Vocabulary:</b>	ethnobotany

Students will be able to explain some of the many uses of wetlands plants to Northwest Native peoples.

#### Objectives

Students design and create posters advertising traditional uses of plants.

#### Methods

To native Northwestern people, nothing was more sacred than the earth; the land, water, animals, and plants were their relatives. Respectful and thrifty use of nature's bounty afforded them the necessities of life: food, medicine, shelter, clothing, and everything else.

#### Teacher Background

The study of how people use plants is called "ethnobotany" (from ethno- "people" and botany- "plants"). Though there are variations from tribe to tribe, it is evident that there is a vital connection between plants and all people. The plant cards in this curriculum outline native plant uses in the "Gee Whiz" section.

drawing or painting materials, poster-board or butcher paper, or construction paper, Plant Cards (see Appendix G)

#### Materials

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**Procedures**

Share with students the relationship between native Northwestern peoples and their environment.

Make copies of plant cards. Allow students time to study them and choose a plant used by native Northwesterners. Give students adequate time to make posters advertising their plant and its traditional use or uses. Display the posters in class.

You may want students to make a mural divided into saltmarsh and freshwater swamp, rather than individual posters. Have them draw and cut out their plant, then write about it on a 3x5 card and put it on the mural next to the plant.

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**Extensions**

Have a native feast. Easy plants to collect, buy, or prepare include cattails (from a clean water source), stinging nettles, huckle-, blue-, cran-, salmon-, and salal-berries. If you gather in the wild, be careful to positively identify the plant, and be sensitive to the area. Don't gather unless plants are abundant and you will cause minimal impact.

Make lists of foods that we now get from wetlands.

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**Evaluation**

Use the poster's content to evaluate students' learning.

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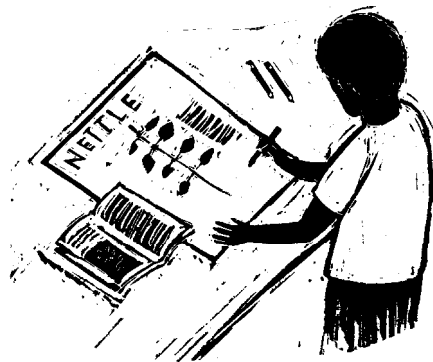
**Related Activities**

"Arts & Crafts," Unit III, Topic B, Activity 2, "Skunk Cabbage Story," Unit III, Topic B, Activity 3

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**Resources**

Plant cards in Appendix G; Ethnobotany by Erna Gunther, listed in Appendix A



## Topic B: Pacific Northwest Native Americans and Wetlands

### Activity 2: Arts & Crafts

**Grade Level:** 3-12  
**Time Range:** 60 minutes  
**Setting:** indoors  
**Subject Area:** Environmental Education and Issues, Social Studies, Anthropology

Students will be able to explain some of the many uses of wetland plants to Northwest native peoples.

#### Objectives

Students create cattail mats, paints and dyes, and skunk cabbage cups.

#### Methods

3 to 4 ft. lengths of green paper, scissors, tape, glue, cranberries and blueberries (frozen or fresh), charcoal, salmon eggs (fish bait), hemlock bark

#### Materials

Depending on time and resources, you may choose to have students do all or only some of these native arts and crafts.

#### Procedures

**Cattail mat:** Cut out several long slender leaves from green construction or butcher paper (3-4 feet long, if possible, and 2 inches wide and tapering to a point). Lay out 5 to 15 of the leaves on a table or the floor (Figure 1). Beginning in the center, weave leaves over and under through the first set (Figure 2). (Real cattails may be used for this project if available. Be judicious about collecting these. Preserve our wetlands.)

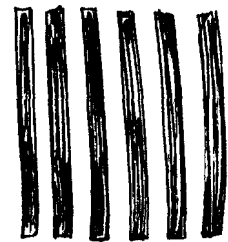


Figure 1

Ask students how Native Americans might have secured the edges. (*They often used string made from cattails or sedges to secure the mats.*)

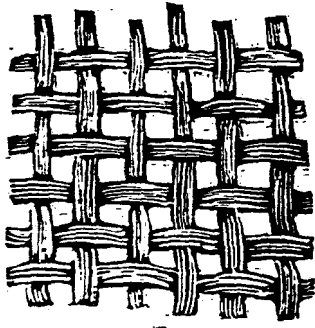


Figure 2

Use the mats for wall hangings; experiment making them into hats or baskets; fold them in half, stuff with newspaper, and secure the edges to make a pillow or kneeling pad. Use them to sit on the floor while the teacher reads the myth of the skunk cabbage. Or, color the mats in part B, using the native paints and dyes.

**Paints and dyes:** Make paints and dyes by:

- mashing blueberries or cranberries (makes purple or red);
- boiling a piece of hemlock bark in a little water (makes reddish-brown);
- mash salmon eggs into the hemlock dye (makes yellow-orange);
- grind charcoal or mud with salmon eggs (makes black);

Ask students where native people might have found charcoal; they didn't have briquettes.

Salmon eggs are the oily base of the paints or dyes. Other colors can be made. Experiment with green plants, other barks, clam shells, etc. Use the paints and dyes to paint designs on wood or your "cattail" mats. Ask student what Native Americans might have used for paint brushes.

**Skunk cabbage cups:** Cups made out of rolled skunk cabbage leaves were used to collect berries and for drinking water. Have students cut out leaves (figure 3) and experiment with ways to roll them into cups (figure 4). Explain how the cups were used, and how real leaves would hold water better than paper. Have students color the leaves with crayons to simulate the wax-like surface of leaves. See if these hold water better. Ask the students to think of other ways these large, flat leaves may have been used, such as lining baskets; wrapping berries for drying; wrapping salmon to hold in moisture while baking on coals, plates, etc.

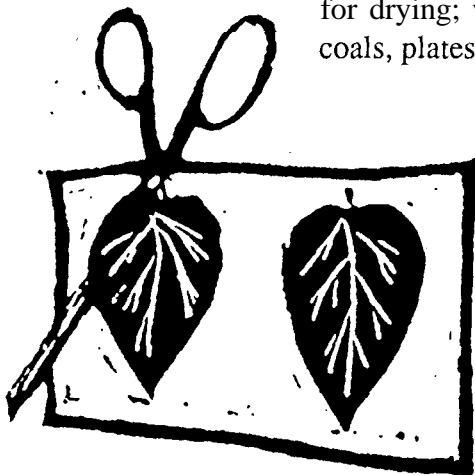


Figure 3



Figure 4



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Write a cookbook using materials Native Americans might have used for food.

**Extensions**

Make wind instruments from hollow reeds or elderberry stems.

Ask a Native American elder to come talk to your class about native uses of plants and native culture.

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Have students explain three ways that plants were used by native northwesterners.

**Evaluation**

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“Plant Posters: “Unit III, Topic B, Activity 1, “Skunk Cabbage Story,”  
Unit III, Topic B, Activity 3

**Related Activities**

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Plant cards in Appendix G; Ethnobotany by Erna Gunther, listed in Appendix A

**Resources**



## Topic B: Pacific Northwest Native Americans and Wetlands

### Activity 3: Skunk Cabbage Story

<b>Grade Level:</b>	3-8, with variations for K-2 and 9- 12
<b>Time Range:</b>	60 minutes
<b>Setting:</b>	indoors
<b>Subject Area:</b>	English, Language Arts, Biology, Life Science, Environmental Education and Issues, Anthropology

Students will demonstrate how legends are used to explain observations of nature.

#### Objectives

After reading the Kathlamet legend of skunk cabbage, students write their own legends “explaining” wetland plants.

#### Methods

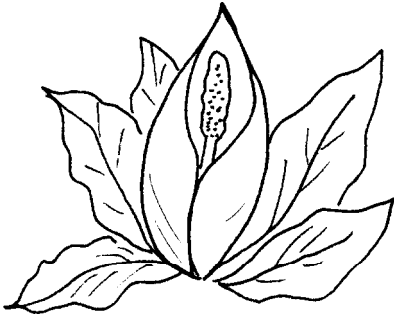
paper & pencil, picture of skunk cabbage (included in this activity)

#### Materials

Start this activity by explaining to students the nature of legends. Legends are often stories or myths that describe unexplainable things or events on earth. They are an important part of all cultures. The Kathlamet Indians, from southwest Washington, have an interesting legend about the skunk cabbage, a wetland plant. Show students the picture and read the following aloud:

#### Procedure

“In ancient days there were no salmon. The people had nothing to eat except roots and leaves. One of their most important foods was the root of the skunk cabbage. Finally, after many years, the spring salmon came for the first time. As they passed up the river someone stood upon the shore and shouted: “Here come our relatives whose bodies are full of eggs. If it had not been for me all the people would have starved.” “Who speaks for us?” said the salmon.



“Your uncle, the skunk cabbage,” was the reply.

Then the salmon went ashore to see him, and as a reward for having fed the people, the skunk cabbage was given an elk-skin blanket and a war club, and was set in the rich, soft soil near the river. There he stands to this day, wrapped in his elk-skin blanket and holding aloft his war club.”

Ask students to write a legend of their own about a wetlands plant. Remind them their plants may take personalities and do anything people can do. Some examples might be:

- why the cattail lives in wetlands;
- why a plant looks like it does;
- the plant’s relationship to another plant or animal.

Have students read their legends aloud to the class.

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**Grade Level Variations**

Younger students may need their choices of plants narrowed down. They could also make a picture and tell about it to reduce writing.

Older students may want to do outside research on plant uses. See resource section.

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**Extensions**

Act out the legends you have written.

Illustrate the legends and assemble them into a class book.

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**Evaluation**

Evaluate the quality of students’ legends. You may want students to self evaluate their legends. Develop a scoring rubric of quality with levels such as exceptional quality, quality, and not yet quality. Clearly define each level so students can evaluate their own.

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**Related Activities**

“Plant Posters,” Unit III, Topic B, Activity 1; “Arts & Crafts,” Unit III, Topic B, Activity 2

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**Resources**

Plant cards in Appendix G; Ethnobotany by Erma Gunther, listed in Appendix A

## Topic C: Personal Values

### Activity 1: Draw the Line

<b>Grade Level:</b>	3- 12; with variations for K-2
<b>Time range:</b>	30-45 minutes
<b>Setting:</b>	indoors
<b>Subject Area:</b>	Environmental Education and Issues, Social Studies, Debate

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Students will form opinions about issues and explain their reasons for making the decisions. Students will understand that different circumstances can change their opinions.

#### Objectives

Students will identify some of their own beliefs and values.

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Students will place themselves on a line according to the opinion they form about a statement.

#### Methods

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This activity is designed to allow students to form opinions based on statements and explore in themselves how new information may cause them to change their opinion. It is critical that students be assured there are no right or wrong opinions. As long as a student's opinion is not based on misinformation, an opinion cannot be wrong.

#### Teacher Background

Beliefs and values help people make decisions, especially when there are no right or wrong answers. Beliefs are things a person believes to be true, even though there may be little or no supporting evidence. Values are the worth a person places on something. Opinions are often formed based on these.

When another's beliefs or values contradict yours, it may be tempting to persuade or contradict them. It is wise, as a teacher, to respect students' rights to have their own beliefs and stick to activities that allow them to examine their values and beliefs on their own.

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**Materials**

masking tape, two signs: one says “Strongly Agree,” the other says “Strongly Disagree”

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**Procedure**

Place a masking tape line across the front of the room. Place one sign at each end of the masking tape line. Explain to students the nature of opinions. Assure them they will not be graded on their opinions and that they always have the option to pass.

Direct students to stand at the place on the line that reflects their opinion on the statement. Students will be asked to explain why they choose to stand where they did. Encourage discussion and thoughtful questioning.

**Statements:**

1. The Seahawks are better than the Mariners.
2. Cookies are better than ice cream.  
*Variations:* Chocolate chip cookies are better than cherry ice cream; Coconut cookies are better than chocolate ice cream.
3. Bicycles are better than cars.  
*Variations:* Bicycles are better than cars when driving on the freeway.
4. Dogs are better than horses.  
*Variations:* Race horses are better than greyhounds.
5. Hunting is fun.
6. Watching birds is fun.
7. Walking in a wetland is interesting.
8. People should never build roads across wetlands.  
*Variations:* People should be allowed to build a road over a corner of a wetland.  
People should be allowed to build a road over a wetland if there is no other way to get there.  
People should be allowed to build a road over a wetland if there is no other way to get to a good place for a school.  
People should be able to build a road across a wetland if it is on their own property and not owned by the state or federal government.

9. People should never build airports in wetlands.

*Variations:* People should be allowed to build an airport in a wetland if it is the safest place to land the planes.

People should be allowed to build an airport in a wetlands if it would cost a lot more to build someplace else.

10. Marshes are better than swamps.

11. Floods are always bad for wildlife.

12. The federal government should spend tax dollars to restore wetlands.

13. It's okay to build a marina and vacation homes in a wetland.

14. It is everyone's responsibility to save wetlands.

15. Shoreline development of wetlands should be halted to save our shellfish industry.

*Variations:* Shoreline development of wetlands should be encouraged even if it harms the shellfish industry.

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Very young students might try just a few of the simple statements.

### **Grade Level Variations**

Older students could research both sides of an issue and hold debates on various statements.

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Students can make up their own opinion statements and use them in class.

### **Extensions**

Students write letters to the editor outlining their rationale on an issue. This could be for a real or imaginary newspaper. Have students produce video commercials.

Have students cut out pictures of activities they think belong in wetlands and pictures of those they think don't. Make collages of positive and negative activities. Have students present their collages to the class, explaining their choices.

Read editorials on wetlands. Analyze the positions of the writer.

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**Evaluation**

Discuss the following:

What caused you to change your position on a statement?

What statements did you not change your opinion on, even in varying situations?

What is one statement you changed your opinion on after the statement was modified?

How did you feel about changing your opinion? Was it hard or easy and why?

List two or three beliefs that helped you decide what positions to take on statements.

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**Resources**

adapted from Wetlands and Wildlife - Alaska Wildlife Curriculum listed in Appendix A



## Topic D: Land Use Planning

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### Activity 1: Dragonfly Pond

**Grade Level:** 3-12, with variations for K-2  
**Time range:** 60 minutes  
**Setting:** indoors  
**Subject Area:** Environmental Education and Issues, Social Studies, Communication, Civics

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#### Objectives

Students will be able to evaluate various potential impacts from human uses of wetlands.

Students will develop land use proposals, evaluate the costs of these proposals, and participate in a consensus planning meeting.

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#### Methods

Students create a collage of human land use activities around an image of a pond.

Students will research and develop proposals in a land use simulation, then participate in or observe a consensus meeting.

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#### Teacher Background

Every human use of land affects wildlife habitat, directly or indirectly. Those impacts are reflections of human priorities and lifestyles. The quest for a modern day “good life” and all of its conveniences produces mixed results for wildlife and the natural environment. Often people see the undeveloped areas as little more than places for human use and alteration. Others believe that the natural environment is to be preserved without regard for human needs. Still others yearn for a balance between economic stability and health and vigor in natural systems. Frequently, even people who think actively about such questions have very real differences of opinion regarding that balance.

At the core of these issues is the concept of growth. Growth in natural systems has inherent limits, imposed by a dynamic balance of energy within the system. Energy in natural systems is translated into food, shelter, space, and reproductive opportunity. This means that the vitality of natural systems is expressed by the capacity of those systems to be self-regulating. This capacity for self-regulation protects the continuity of all members of that system. It is important to note that each system in each location has its own limits. Effective planning and management include a commitment to recognizing and working within these limits.

All the life forms of the system involved must be considered. The microbes in the soil are just as necessary to a habitat as the plants and predators. It is this natural dynamic balance, with all its inherent and essential parts, that much of human land use has tended to disturb. Given the extensive impacts humans have already had and continue to have on the land, a major challenge for humans now is how to act more responsibly. How can we develop the awareness, knowledge, and skills necessary to take care of the remaining areas of natural wildlife habitat? How can we develop the necessary understanding to restore a natural dynamic balance in places where human disturbance has existed for centuries?

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**Materials**

For each three students:  
scissors, masking tape, paste or glue, paper, one set of land use cutouts, one Dragonfly Pond cutout (found at the end of this activity), a large piece of paper (minimum 17"x17") upon which to fasten the cutouts.

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**Procedures**

Prepare copies of the two cutout sheets ahead of time. Divide the class into groups of three to five with each group representing one of the interest groups, then pass out the land use materials. Some possible interest groups are:

- farmers;
- business interests;
- gas station;
- park group (recreation);
- highway department;
- landfill representative;
- environmental organization (habitat protection);
- outdoor sports club (fishing, hunting);
- local or state environmental agency;
- forestry, timber industry.

Explain the activity. Tell the students that they will be responsible for arranging the pattern of land use around the Dragonfly Pond in such a way as to do the best they can to preserve the health of this beautiful pond. Tell them that for this activity all the land use cutouts must be used; they cannot be cut smaller than they are; and they cannot overlap. *(In reality, there are often means to protect critical wetlands - governments can use zoning ordinances to require setbacks, or developers can change a building design to reduce impacts. For the purposes of this activity, all land use activities must be used.)*

Have students cut out the land use pieces and the Dragonfly Pond. Pass out the large paper that will serve as the base for their pond and its associated land use activities. Use tape to fasten land use activities to the large base sheet. This will allow changes before final location of land uses.

Once the students have cut out the necessary materials, ask them to create a list of pros and cons for each land use. Guide the discussion so that they consider the consequences of each land use. For example:

	<b>Pro</b>	<b>Con</b>
<b>Farms</b>	produces food	uses pesticides and herbicides that may damage people and environment
	provides seasonal employment	source of natural soil erosion; uses chemical fertilizers that may damage water supplies
<b>Home / Business</b>	produces employment	produces wastes and sewage
	sense of community	may contaminate water through detergents, pesticides, herbicides, septic leaks
	commerce economic stability	uses chemical fertilizers for lawns, etc.

Remind the students that all the land use cutouts must be used. They cannot overlap and they cannot be cut into smaller pieces.

Have the students work in their teams long enough to begin to grapple with the challenge. Then ask them to stop. Invite each group to display and describe their work in progress.

Encourage discussion of their choices. In the discussions emphasize that:

- No land use can be excluded;
- Wildlife habitat must be preserved;
- Everyone must agree.

Look for the consequences of their proposed land use plan. Be firm about the issues, but fair about this being a very difficult set of choices. Ask additional groups to volunteer to show their work in progress, and discuss theirs. **NOTE:** For wildlife habitat, this is a “no-win” activity in many ways. The best that can be hoped for is that the land use plans will minimize the threats to the Dragonfly Pond.

Continue the discussion by asking more students to share their proposed plans. Again, be firm in discussing the consequences. Point out that shutting down the factory and businesses would likely destroy the economic base of Dragonfly Town. Abandoning the farm affects human food supplies.

Give the students additional time working in their groups to come up with what they believe to be the best possible land use plan, under the circumstances. Be sensitive to their frustrations. Display all the final land use plans above a chalkboard for all to see and discuss. Discuss the merits of each of the approaches. Point out that although their solutions may not be perfect, they can minimize the damage to Dragonfly Pond.



Now, using the chalkboard, continue Dragonfly Creek downstream. Show the route it might travel from the image on Dragonfly Pond above the chalkboard on the students' papers. Have Dragonfly Creek become another pond and wetland, and label it Laughing Gull Lake. Continue the drawing to Sea Oats Estuary and finally into Gray Whale Gulf.

Ask the students to brainstorm possible problems that could be faced within each of these aquatic systems as a result of the human activities at Dragonfly Pond.

Ask the students to return to the land use activities with which they started. Have them look at each activity anew. If they had been considering them as inherently bad, have them consider a different question. What could the people who are actually in charge of the various land use activities do in their practices to minimize the damage to Dragonfly Pond? Have them write down these "Best Management Practices" as a guide for local development.

Have the activity end with an emphasis on solutions rather than on problems. Point out, for example, the revolution taking place in the "mining" of industrial effluent to extract profitable resources. Agricultural practices are changing to reduce the use of potentially lethal agents. Petroleum wastes are being recycled and awareness regarding uses of herbicides, pesticides and detergents at home is evolving.

Ask students to create a list of things they think they can do to reduce the potentially damaging effects of their own lifestyle on their "downstream" habitats. If possible, invite them periodically throughout the school year to report on their progress in carrying out these new practices. Summarize with a discussion of the concept that all the waters of the planet are, in fact, part of a single "Dragonfly Pond," or that "we all live downstream."

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For younger students, the activity could be done with the whole class. Make overhead transparencies of the pages.

### **Grade Level Variations**

Older students could create an illustrated guide to "Best Management Practices" for the school or their home.

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Set up an action team to locate a "dragonfly pond" in your community. Determine the overall quality of the wetlands with which it is connected.

### **Extensions**

Trace any stream or river system that passes through your community from its source to its final entrance into the sea. List all the sites that you can identify that lower the quality of the waters in their journey and suggest how to reverse the process. List any sites that increase the quality of the waters in their journey and suggest how to increase the number of these.

Have the students collect newspaper articles for local water-related issues as a current events activity.

Have students explore the concept of environmental impact statements. Try to obtain actual copies of statements about wetlands in your area. See what concerns are addressed in these documents.

Hold a debate on wetlands. Should they be protected? To what extent? How should they be protected?

Learn how the government helps develop, control, and protect natural resources.

Study how wetlands were used by people historically. Research and write a report on the Swamp Acts of 1849, 1850, and 1860 which encouraged the conversion of wetlands.

Write a report on why settlers would want to live near estuaries (food supply, jobs, transportation, recreation, etc.).

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**Evaluation**

Look at the various land uses in this activity. How might each minimize its negative impact to their area?

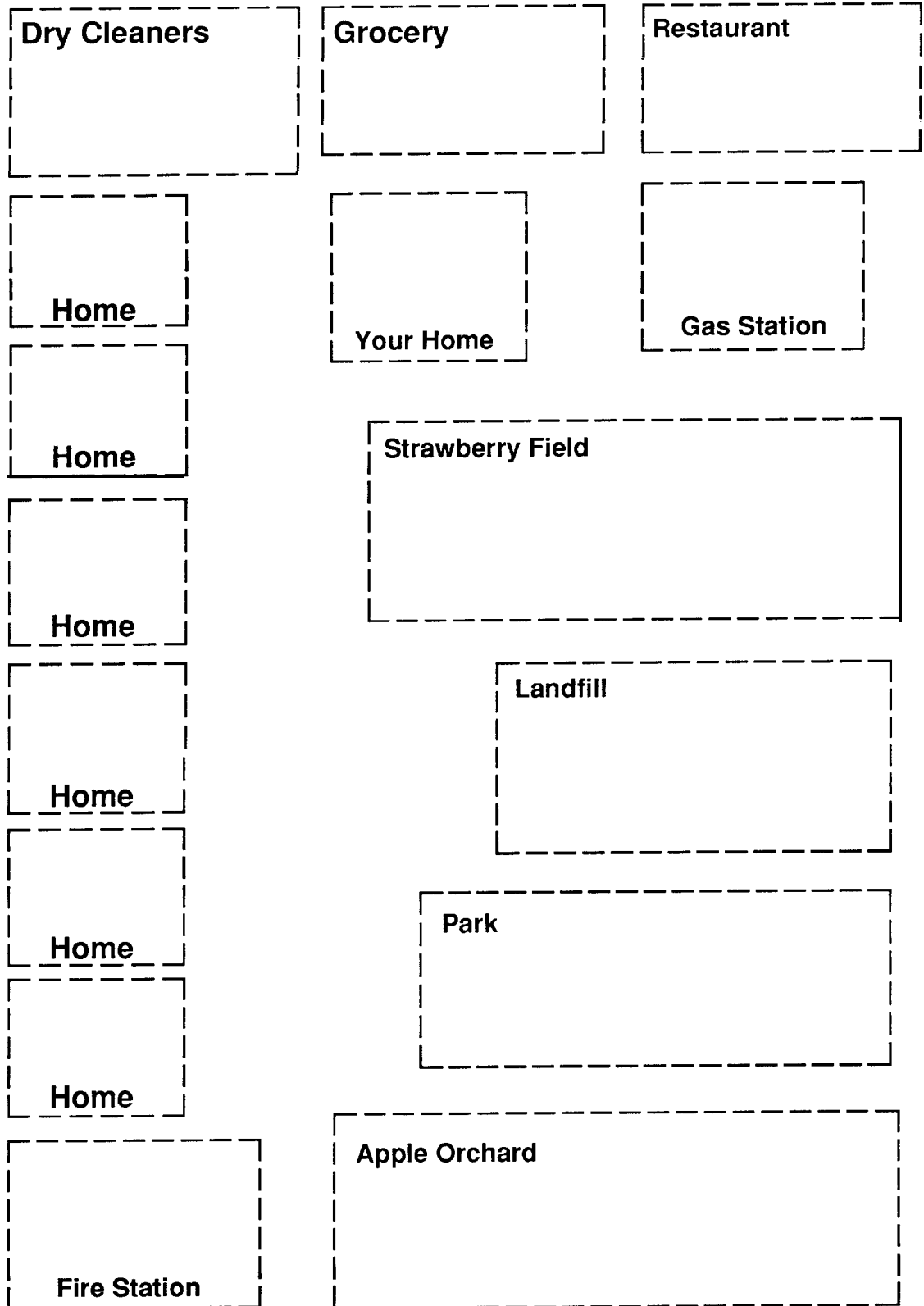
What are things you can do to minimize the effects of your individual activities on the local streams and wetlands?

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**Resources**

Adapted from “Dragonfly Pond,” from Project WILD Aquatic - listed in Appendix A

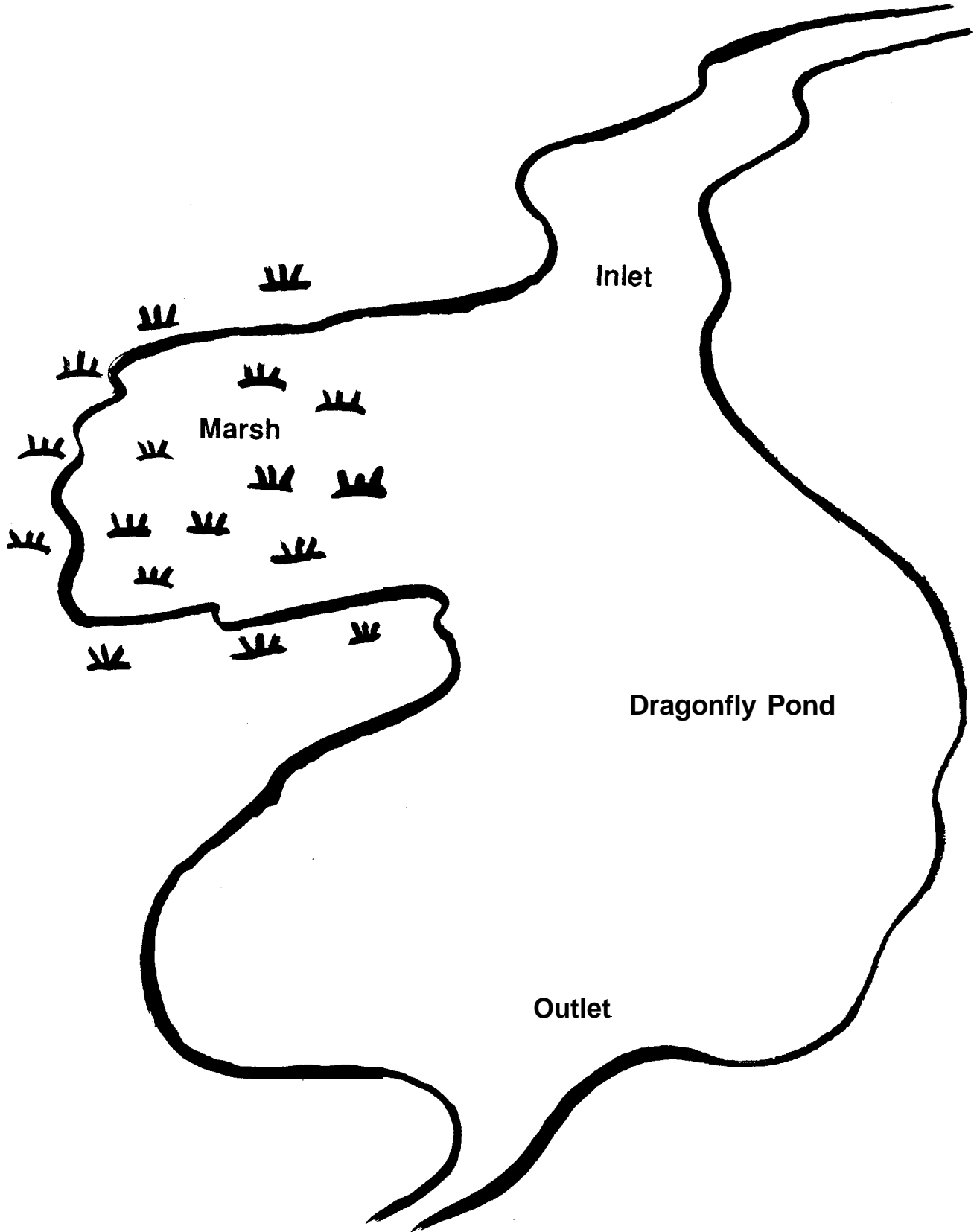
# Dragonfly Pond Cutouts



COPY

# Dragonfly Pond

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## Topic D: Land Use Planning

### Activity 2: Wetlands Controversy

<b>Grade Level:</b>	6-9
<b>Time range:</b>	50 minutes
<b>Setting:</b>	indoors
<b>Subject Area:</b>	Environmental Education and Issues, Social Studies, Communication, Civics
<b>Vocabulary:</b>	compromise, mitigate

Students will be able to recognize the many view points in a land use issue and will become familiar with the process of decision making.

#### Objectives

Students role-play a variety of different characters to enact a city council meeting concerning the fate of a local wetland.

#### Methods

costume materials (props): hats, ties, glasses, paper and pencil

#### Materials

In this exercise, students will role-play the characters listed below to enact a city council meeting. This type of forum is not necessarily the way land use decisions are made; however, it is a forum for public issues and will give students exposure to the variety of view points held by the public.

#### Teacher Background

To begin the activity, identify the wetland that you will be using in this lesson. You may choose a wetland in your area which is under development pressure. Otherwise, use a real wetland and pretend that it is under development pressure. You may even want to make up a totally fictitious wetland. This wetland, whatever the case may be, will be referred to as “local wetland” in this lesson.

Explain to the class that the situation concerning the local wetlands is this: There is a group of (fictitious) people in your community that hope to develop the wetlands. This group of people feels that the community would be better served if the wetland was allowed to be sold and zoned for development purposes. They call themselves “Citizens for Economic Development” or “CED.” On the other hand there is another group of people (also fictitious) that are aware of the development wishes of CED and have united to defend the local wetland. They believe that the wetland is valuable for a variety of reasons. They call themselves “Friends of Wetlands” or FOW.

You might want to review the values of wetlands with the class before you begin the lesson (*Unit 3, Activity #1 is a good reference*).

On hearing about the group dispute over land use of wetlands, the mayor has called a special meeting of the city council during which people of the town will offer their opinion on the subject as guest speakers. The city council and mayor want to make the best decision for the future of their community in accordance with local and state environmental laws.

In order for the city council to make informed decisions about the wetland they will be free to ask questions of the guest speakers. A decision will be made at the end of the meeting to determine the fate of the wetland.

The characters and a brief description are listed on the following page. Students may make up fictitious names for their characters. You may want students to work in pairs, depending on class size.

# Wetlands Controversy Characters

## Mayor

The mayor is a wise and fair person who wants to make the best possible decision for the community - especially since this is an election year.

## City Council Members (6)

All city council members are elected officials and may have other jobs. They will weigh the evidence and decide the fate of the local wetlands for the good of city residents.

## Guest Speakers (10)

**Student #1** is a carpenter who builds homes. He knows that if the wetland is filled in, homes could be built on that land. That would mean more jobs and more work for him.

**Student #2** is a restaurant owner who would like to open up a new restaurant on a small part of the wetland.

**Student #3** lives near the flood plain of a river and knows how important wetlands are in flood control. She is concerned that if the wetland is developed her house will be flooded during the rainy season.

**Student #4** is one of the older farmers in the community. He has filled a marsh on his farm and thinks wetlands should be filled and used for better purposes.

**Student #5** is a long time resident of the community and has lived next to the wetlands all her life. She enjoys the beauty of the wetland and wants it preserved for her grandchildren to see and enjoy.

**Student #6** is a sportsman who loves to hunt and realizes the value of wetlands to ducks and other animals.

**Student #7** is a local developer who would like to turn the wetlands into a lake and build "lake-view" condominiums all around it.

**Student #8** is the director of the Public Utility that provides drinking water for the city. She knows that wetlands are important areas for water purification.

**Student #9** is a scientist with a Ph.D. in wetland science. She has studied wetlands and knows how valuable they are to a community.

**Student #10** hates pests. He lives near the wetlands and feels that it is the source of all the insects that ruin his barbecues.

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## Procedure

1. Explain to the students that they will be enacting a city council meeting by role-playing characters with different view points. Their job is to inform the city council members as best they can. The city council members job is to make the best decision about the fate of the wetlands. Should they:

- A) Preserve it
- B) Convert it to use it for something else
- C) Make some sort of compromise. Define compromise for students.

### **Compromise:**

- 1.a. A settlement of differences in which each side makes concessions. b. The result of such a settlement.
- 2. Something that combines qualities or elements of different things.

2. Give students the background information for this exercise. Emphasize that all individuals are interested in what is best for the community, even though they have different ideas on what that is.

3. Assign characters to the students.

- Select one person for the Mayor. This person will be the facilitator of the meeting.
- Appoint the six city council members who will listen to testimony and ask questions of the public.
- You may want to copy the Character List and cut out the individual characters and then hand them to the students. Students that don't receive a character may make one up. Students may also create a citizens group of two or three students with one person as the spokesperson for the group, for example, a Home Builder's Association or a Wetland Walkers Club.

4. Give each character a Character Worksheet and give them time to answer the questions. **IMPORTANT:** Remind students that the character they portray may not necessarily think the same way they do. Encourage them to put themselves in the shoes of their character and say what that person might say, according to their character description.

5. Arrange seven desks in the front of the classroom for the city council members and the Mayor. Put name cards on the desks for each member. Seat the Mayor in the middle.

6. After everyone has filled out the Character Worksheets, let the students get into character by wearing hats, glasses or other costumes that are appropriate for their character.

7. Have the Mayor open the meeting by introducing him/herself. Have the city council members introduce themselves. The Mayor should give a brief description of the problem and then invite the public testimony from the guest speakers.

8. When called on by the Mayor, guest speakers or spokesperson should stand before the council. After introducing themselves, they are to express their viewpoints on the wetland, using the Character Worksheet as a reference. For example: “My name is Kathy Cranford, and I am a long time resident of our community. For many years I have enjoyed walking around the local wetland with my husband Andy and our children. I have seen many different kinds of birds and animals living there. I want to preserve the wetlands so future generations can enjoy them.”

9. After each character has spoken, the city council may now ask them questions. Explain to the city council members that they should be taking notes and preparing questions for the characters while hearing their testimony. Characters should be prepared for some tough questions from the city council members. For example: “Why can’t the restaurant owner build somewhere else?” Or, “why do some homeowners think that development in or near the wetland will affect their homes?”

NOTE: If time allows, assign a committee (several students) to study the problems and report back to the council at a later date. Have them prepare a report: 1) describing the value of wetlands; 2) analyzing the potential effects of the other activities on the wetlands; and 3) proposing several alternatives for how the site could be used. When the committee is ready to report to the council, reconvene the meeting. Allow time for the council to ask more questions.

10. After all the questions have been asked and answered, the Mayor will call for a vote by the city council:

- All in favor of preserving the wetlands?
- All in favor of converting the wetlands?
- All in favor of a compromise?
- All in favor of PLAN A, B, C? (Possible plans characters created and shared with city council)

Have the Mayor call for a vote from the public to find out their opinion.

11. After the results are in, the Mayor will make a declaration of the fate of the wetlands determined by the city council vote. The Mayor will then announce the results from the public vote. If students are dissatisfied with the results of the vote, remind them that this is an election year and city council members can be voted out of office.

12. Follow up the meeting with a class discussion. Ask students questions to stimulate ideas.

■ Should all people be involved in making a decision about the local wetland?

■ Was enough information presented to the city council for them to make the best decision? Do you think that happens in real city councils? If so, why?

■ Did working in groups help you get votes for your point of view? How should decisions like this be made?

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## Extensions

Take students to a planning commission meeting or a city/county council hearing.

Invite real city or county council members to observe or mentor your student council members. Ask for their observations about how closely this activity simulated reality.

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## Evaluation

Ask students to write a paragraph about their feelings on the following:

- 1) Role-playing a character;
- 2) How well did the City Council members consider the testimony in making their decision;
- 3) How would you change this hearing and voting process to better reflect the needs of the community?

## Character Worksheet

### Guest Speaker

Name your character: \_\_\_\_\_

Describe your relationship with the wetland in question:

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How do you feel about the development planned for the wetland?

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What value(s) does the wetland have for you?

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What do you think should happen to the wetland in your city? Circle One:

1) Keep it as it is now      2) Develop It      3) Compromise (Describe your compromise suggestions)

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How does your decision benefit you?

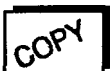
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How does your decision benefit the whole community?

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**Character Worksheet**  
**Mayor and City Council Members**

Name your character: \_\_\_\_\_

What do you do for a living?

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How do you feel about the wetland in question?

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Write possible reasons why people would want to preserve the local wetland:

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Write down possible reasons why people would like to convert and develop wetlands.

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You will be making an important decision about the wetland in your community. You will want to know everything you can about the situation so you can make the best decision. Keep an open mind. Use the remaining space to write down possible questions to ask the guest speakers about why they feel the way they do.

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## Topic D: Land Use Planning

### Activity 3: Wetland Decisions

<b>Grade Level :</b>	6-12
<b>Time range:</b>	50 minutes
<b>Setting:</b>	indoors
<b>Subject Area:</b>	Environmental Education and Issues, Social Studies
<b>Vocabulary:</b>	revenue, bulkhead, erosion

Students will be able to recognize different viewpoints of land use issues and consequences of land use decisions.

#### Objectives

Students will use decision cards to determine the value of preserving the wetlands.

#### Methods

There are many controversies concerning land use and wetlands even though there have been many efforts in raising awareness of wetland values. This lesson illuminates some of the realities in land use decision making.

#### Teacher Background

This lesson is designed to eliminate the “us versus them” attitude. Tell students that the goal of the activity is to determine what is the best use of land. Students will explore how wetlands and development can exist together or if that is possible at all.

Wetland decision cards, map from “Loon Lake” activity or other wetland map enlarged onto butcher paper approximately 5x5 feet, 9 wetland plant cards, 6 animal (including 2 fish, no birds) cards, 7 bird cards, Ziplock®-type bags of soil or small pieces of cloth that can be used as wetland fill, a jar labeled money, and 10 play money pieces or pennies for each student. Optional: At the end of the game students can cash in their play money for M&Ms®.

#### Materials

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**Procedure**

1. Place the large map on the floor in the center of the room or in a place where all students can access it easily. Place all the animals, birds and plants on the wetland section of the map.
2. Place the money jar in an easily accessible place.
3. Hand out ten dollars of play money to each student. Optional: you may want to tell the students that at the end of the game they can cash in their remaining money for M&Ms®.
4. Pass out decision cards to each student. Students may be grouped in pairs if needed. Have the students read their card silently to themselves. Explain that each card has a statement and an action. Show the student the different action that they might have to take; removing or adding animals from the map, placing money in the jar, or taking a class vote.
5. The cards are numbered and will be read aloud by each student in order.
6. To spark discussion you may ask students why they made their decision. Allow spontaneous discussion between students.

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**Evaluation**

Follow up the lesson with a brief discussion on the outcome of the map. Were some of the decision cards similar to wetland situations that you might know about? Ask students what wetland value was represented on their card and why they made the decision they did.

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**Extension**

Ask students to make more decision cards. Remind them that each card should express a wetland value. Try using some of the cards next time the game is played.

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**Evaluation**

Ask students to research the newspapers to find an example of proposed or actual impacts on wetlands. What mitigation actions are proposed or being taken. How well do they think the mitigation will work?

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**Resources**

This activity was adapted by Bridget O'Malley from "The Puget Sound Game" from [The Puget Sound Project](#), by Poulsbo Marine Science Center.

## Wetlands Decision Cards

**1.**

My family has farmed corn in the same 120 acres for 75 years. Recently, I've been pressured to stop using pesticides and herbicides on my corn. Some people think the pesticides get into the nearby stream and hurt the animals in the swamp downstream. If I stop using chemicals I will harvest less corn and earn less money.

*To protect the animals in the wetland give up \$5 in corn profits. To continue using chemicals take two birds off the map.*

**3.**

I am a salmon fisherman. There have been several new large stores built near a salmon stream. There is a lot more runoff into the stream than there used to be, mostly from the new store's parking lot. I am worried that this runoff will hurt the salmon runs.

*Pay \$2 for a stream monitoring project.*

**2.**

My restaurant is located next to the wetland. Business was so good last year that I would like to expand the dining area and increase the size of the parking lot. City ordinances say that I cannot build that close to the wetland.

*Pay \$2 for the possible loss of revenue.*

**4.**

The city airport is having traffic jams. They would like to build a new runway on part of a wetland so more flights can be scheduled. They will create a new wetland somewhere else in exchange for destroying this one. This will cost the taxpayers money to have better service at the airport.

*Every student pays \$1; and add a piece of fill to the wetland map.*

## Wetlands Decision Cards

**5.**

A forested wetland runs through a large piece of private property. The owner is willing to sell the property to the city for a park. The city will have to temporarily raise taxes to pay for the property. If the city cannot raise money the owner will sell the property to a developer who will build affordable houses around the wetland.

*Take a class vote to determine if the majority of students are willing to pay \$3 in taxes for the property. If the vote is No, take 2 birds and 2 animals off the map.*

**7.**

I just changed the oil in my car. I am not sure what to do with the used motor oil I drained from my car.

*Pay \$1 for a phone call to find out where to properly dispose of the oil or tell the class if you know where to recycle used motor oil and add a fish to the map.*

**6.**

All the rain from the new mall's parking lot enters the nearby wetland by way of a small creek. Water runoff picks up oil and litter which is deposited in the wetland.

*Take one plant off the wetland map.*

**8.**

I operate a salmon hatchery located on a stream not far from a wetland. There is a new housing development planned next to the wetland. I am concerned that the wetland will not be able to catch all the sediment from the development's construction. If the wetland cannot trap all the sediment, the salmon eggs are in danger of being smothered by it.

*Give \$2 for construction sediment buffers or take 3 fish off the map.*

## Wetlands Decision Cards

**9.**

There is a great variety of plants in a wetland. I work at a University as a wetland researcher. Research helps in educating people on the value of wetlands.

*Add 2 wetland plants to the map.*

**11.**

Twenty-five years ago our school was built on a wetland. That wetland used to allow water to seep through the soil and recharge the aquifer. Now the school's well is going dry. We will have to pay more money for water that is supplied by the city.

*Every student pays \$1 for city water; and remove one wetland plant.*

**10.**

I thought I built the perfect river-front house – 3 bedrooms, 2 baths, garage, and even a patio that goes to the river's edge. After the first winter storm my living room was under water; my neighbors' houses were flooded too. A real estate agent had assured me that this area never flooded. Now that there are houses on the property it seems to flood whenever we have a big storm. Why does this happen?

*Pay \$4 to relocate. The houses were built on wetlands that used to aid in flood control. Remove 1 wetland plant.*

**12.**

I love to go duck hunting. I pay a fee for hunting ducks in this state. Some of the money goes towards the preservation of duck habitat.

*Pay \$1 for hunting and add one bird to the wetland and 1 other animal.*

## Wetlands Decision Cards

**13.**

My seventh grade class is studying how Native Americans used wetland plants as medicine and food. Did you know you can eat cattails?

*Add 1 plant to the map.*

**15.**

My neighbor and I noticed an unfamiliar plant growing in our wetlands. It looks like purple loosestrife, a non-native plant that can destroy wetlands by pushing out native wetland plants. We decided to get help in identifying the plant and then try to remove it.

*Remove 1 piece of wetland fill or add 2 wetland plants.*

**14.**

There is a wetland that is walking distance from my house. In the spring I try to walk there once a week to photograph the variety of flowering wild plants and birds. Hopefully, I'll get a chance to see some of the newborn animals. Last year I saw a baby muskrat. I plan to create a slideshow to teach students about the wildlife habitat provided by the wetlands.

*Add 2 animals and one bird.*

**16.**

My family has created a small wetland in our backyard by diverting a small part of a stream. Now we see many different kinds of birds everyday and in the winter we even have ducks.

*Add 2 birds to the map.*

## Wetlands Decision Cards

**17.**

I am a tourist from Arizona. I travel to Washington in December to see all the waterfowl that winter in wetlands here. I return in the spring to see migrating shorebirds near the coastal wetlands.

*If there are more than 6 birds on the map you will visit Washington again - add 1 more bird, your tourist dollars help in protecting bird habitat. If there are less than 6 birds, take \$2 from the money jar - you are taking your tourist dollars elsewhere.*

**19.**

Wetlands can be useful in filtering out pollutants from water. Too many pollutants can harm or destroy a wetland.

*Count the number of wetland plants that are left on the map. If there are less than 4, take 1 bird and 1 fish off the map.*

**18.**

My neighborhood has been very active in protecting a wetland that touches each of our properties. We do not use chemical fertilizers on our lawns and we make sure that we dispose of our used motor oil properly.

*Add 1 fish to the wetland map.*

**20.**

The city council is having a meeting to determine the fate of a local wetland. Some citizens would like to see more development in the community. Unfortunately, the only land left is located near a wetland.

*This decision involves the entire community (entire class). Students can show their support for the wetland by paying \$1 for the Save the Wetlands Fund or can choose to do 5 jumping jacks that represent the effort it takes to go to public hearings and meetings.*





## Topic D: Land Use Planning

### Activity 4: Loon Lake

<b>Grade Level:</b>	6-12
<b>Time range:</b>	60 - 120 minutes
<b>Setting:</b>	indoors
<b>Subject Area:</b>	Environmental Education and Issues, Civics, Communication, Debate, Social Studies
<b>Vocabulary:</b>	aesthetic, consensus

Students will be able to evaluate various potential impacts from human uses of wetlands.

#### Objectives

Students will develop land use proposals, evaluate the costs of these proposals, and participate in a consensus planning meeting.

Students will research and develop proposals in a land use simulation, then participate in a consensus meeting.

#### Methods

one copy per student of Loon Lake Dilemma and Loon Lake Map (in this activity)

#### Materials

Note: This is an advanced decision-making simulation that needs to be closely guided by the facilitator/teacher. You may want to do the “Dragonfly Pond” or “Wetland Controversy” activity first.

#### Procedures

This simulation is an opportunity for students to get a feel for the complexity of land use issues. It allows students to learn many of the skills necessary to become active and responsible citizens in the process of deciding the best uses of the land in our communities. It also reinforces their learning about wetlands.

This activity is designed to involve students in examining an issue with enough depth to get beyond the stage of polarization and on to solutions that allow all parties to benefit to some degree.

Review the teacher background at the beginning of this unit. Students may need to know about the laws and agencies involved in this process as they develop their rationale.

Read the information on Loonville and the various players in the process to students.

Place students into heterogeneous, random groups. It is critical that students are in mixed groups. Even if they disagree with their role, they need to work with that group. This will help them see that all groups have valid interests.

They are to prepare all the information they will need to send a well-informed representative to sit at the roundtable. This will most likely take a class period. Encourage them to seek additional information: allow access to the library, to make phone calls, etc.

The next class period have a circle of tables and chairs or desks arranged in front of the room. There should be 6 seats, one for each representative and one for a facilitator. The teacher could be the facilitator, or a guest from outside the classroom, or a designated student. The facilitator's job is to help the group follow the format and work toward agreement on a plan. The facilitator doesn't express an opinion on the committee.

Committee rules:

1. One person speaks at a time, loudly enough for the audience to hear;
2. Everyone is treated respectfully;
3. The committee has until \_\_\_\_\_ (teacher determines time limit) to develop a plan to submit to the city council.

The rest of the class acts as an audience to this public meeting. It may also be the facilitator's job to ensure they don't interfere with the committee's work, or another person may help out.

The consensus decision-making process begins by describing and defining the situation that needs a decision. Since each group already had the basic proposal of the other groups, it isn't necessary to go through each word for word. Next, a list of ideas is brainstormed

without judging, discussing or rejecting any of the ideas. To encourage participation, take only one or two ideas from each person.

Now, the group begins to discuss, following the rules at all times. Reviewing, changing, consolidating, rewriting and priority setting are all part of this step.

When a solution appears to be reached, write it down for all to see. All members must state that they are in consensus with the solution. This means that even though this may not fully agree with the decision, they agree to support the decision.

If the committee is still in disagreement, have each member state what it would take for them to support the decision. Adjust, as needed.

Adjourn the whole committee and discuss what they have just seen. Refer to evaluation for possible questions.

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If you have the space, you could have a number of consensus committees going on at the same time. Just make sure each consensus committee has a representative from each organization. When finished, each consensus committee could report their proposal for the city council to the class.

### **Grade Level Variations**

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Students can research an issue in their own community. Many of the skills they've practiced here would help them identify the many sides of an issue, research the information and impacts, and decide an action they can support or take themselves.

### **Extensions**

Take students to a planning commission meeting or a city/county council hearing, perhaps to give testimony if an issue of discussion involves a wetland.

Write letters to lawmakers and organizations that could protect wetlands. Focus on specific issues.

Study ways to influence laws and ordinances through public participation.

Research the value of wetlands in preventing flooding or their importance in maintaining a healthy and profitable commercial fishing industry.

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**Evaluation**

Discussion questions can focus on the process in which the students just participated. These questions may also be used in a written evaluation completed individually.

1. How did it feel to work with your group?
2. How did it feel to work within the consensus committee?
3. What do you think about the committee's proposal?
4. Did the proposal meet at least part of your groups needs? How?
5. What sorts of nonverbal communication did the audience observe in the committee? Did it help them work toward their plan? Did it hinder their progress?
6. Did you change your mind about something during this process? What was it and what caused the change?
7. What do you think are the advantages and disadvantages of coming to consensus compared to voting and having the majority rule?

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**Resources**

“Investigating and Evaluating Environmental Issues and Actions” skill development modules by Hungerford, Litherland and Peyton; listed in Appendix A

Thanks to Katherine Baril, W.S.U. Jefferson County Cooperative Extension, for her review and additions to this activity.

## Loon Lake Dilemma

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Loonville is a small community that surrounds Loon Lake. This community has a small business district that provides most of its daily needs, including a grocery store, gas station, video outlet, variety store that stocks sporting goods, hardware store, gift store, and a few other small businesses. The town has an elementary school and secondary students are bused to a nearby city. Most of the townspeople work in industry in the city or work in the seasonal tourist trade. Loon Lake supports a fine variety of fish and is a popular fishing lake for tourists. The town has one very small hotel and many fisherman stay at private cabins that dot the shorelines. At one end of the lake there is land, managed by the Department of Fish and Wildlife, that is open to duck hunting. So, the community also draws bird hunters during hunting season. (The teacher can determine how many cabins are around the lake, how many acres were given and other information such as size of town, if students ask.)

The City Council was recently saddened and surprised by the passing of one of Loonville's oldest citizens. George Grove left a large parcel of land at the west end of Loon Lake to the city with a request that the land be used to serve the best interests of the community. The City Council has been charged with deciding the fate of the land.

So, a town meeting was called to request community input on the subject. Everyone seemed to have an opinion. Heated arguments ensued between the various factions. The City Council decide to appoint a committee to study the issue and develop a recommendation that would best serve the community. Each faction was given one spot on the council. They were ordered to work out a solution in which everyone agreed.

You and your group represent \_\_\_\_\_ interests. You are to research your position. Consider all the following concerns:

conservation	flood damage prevention	safety
economics	fish & wildlife values	energy needs
aesthetics	environmental	navigation
historic values	recreation	land use
water supply	water quality	
food production	welfare of the general public	

You will elect one of your group to sit in on a roundtable committee. The committee will look at all the issues and will have to come to agreement on the fate of the land.

Here are the "players:"

### Loon Lake Recreation Association

This group is made up of citizens whose livelihood is tied to recreation, by and large from tourists. They propose that the city keep the land and build a boat launch, fishing pier, and park area at the east end of the property. Their plan includes a small kiddy park, play field, and parking lot for about 25 cars. They would build a bathroom/barbecue kitchen facility.

### **Loon Lake Economic Development Council**

This is a fairly new group that would like to provide more local jobs for the citizens of Loonville. They have located a buyer, a Mr. T. Miller, who will purchase the tract for \$500,000. T. Miller plans to build the Fisherman's Paradise Resort. This would entail channeling the small stream and filling the marsh to the channel's edge. This placement would allow fishermen to fish right off the back porch, which would overhang the water. There would be a parking lot for 40 cars and a service building with laundry facilities and a kitchen/dining area for gatherings of up to 50 people.

### **Fowl Friends**

This group is a nationally recognized organization with an active local chapter. They purchased the north end of the marsh years ago, and have left the land protected as waterfowl habitat. The national organization has offered the local chapter a \$225,000 grant to purchase the land for protection. The parcel would be annexed to the north parcel and provide nearly twice the habitat in one continuous piece.

### **Department of Wildlife**

This state agency feels it would be in everyone's best interest for the city to hold the land for the future and open it for duck hunting during hunting season. They have offered to provide "porta-potties" and personnel to regulate hunting. They also propose 10 camping sites with fire pits at the south end and a dirt road for access. They would charge a small user fee to offset costs.

### **Loon Lake Business Association**

This organization includes most of the store and shop owners in Loonville. They would like the city to sell the southern portion of the land for housing. They propose that the land be divided into 1/2 acre lots and that utilities be brought into the area. The lots would each have to have their own septic system, since Loonville has no sewage treatment facility. They feel that the increase in population would provide their businesses with more year-round customers and would stabilize the local economy.

## Consensus Decision Making

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Consensus is a method for making group decisions that all members will be able to support. Unlike traditional voting, consensus leads to “win-win” solutions to complex problems. While this method will not give all individual’s their preferred outcome, it will lead to an outcome that all can support.

Consensus provides for open discussion and generates more creative solutions. It requires members to listen to all sides and clearly identify the issues. The participants are more likely to feel ownership in the process and, therefore, more likely to support it.

Consensus takes more time than simply voting, but the outcome is usually worth it. It also requires a leader to become a facilitator who is willing to share control.

The consensus process begins by clearly defining the problem or situation that needs a decision. Then, members brainstorm solutions without judging any of the ideas.

The discussion that follows brainstorming must allow each participant to express their feelings while discussing the pros and cons of each idea. As possible solutions are developed, they should be reviewed, changed, consolidated and rewritten according to the group’s wishes.

When a recommendation is reached, it should be restated and each representative should be asked if they are in consensus with the decision. Stating you are in consensus doesn’t mean you agree the decision is best, but that you agree to support the decision.

If all members are not in agreement, those that don’t agree are asked what it would take for them to live with the proposal. Discussion is reopened until consensus can be reached.

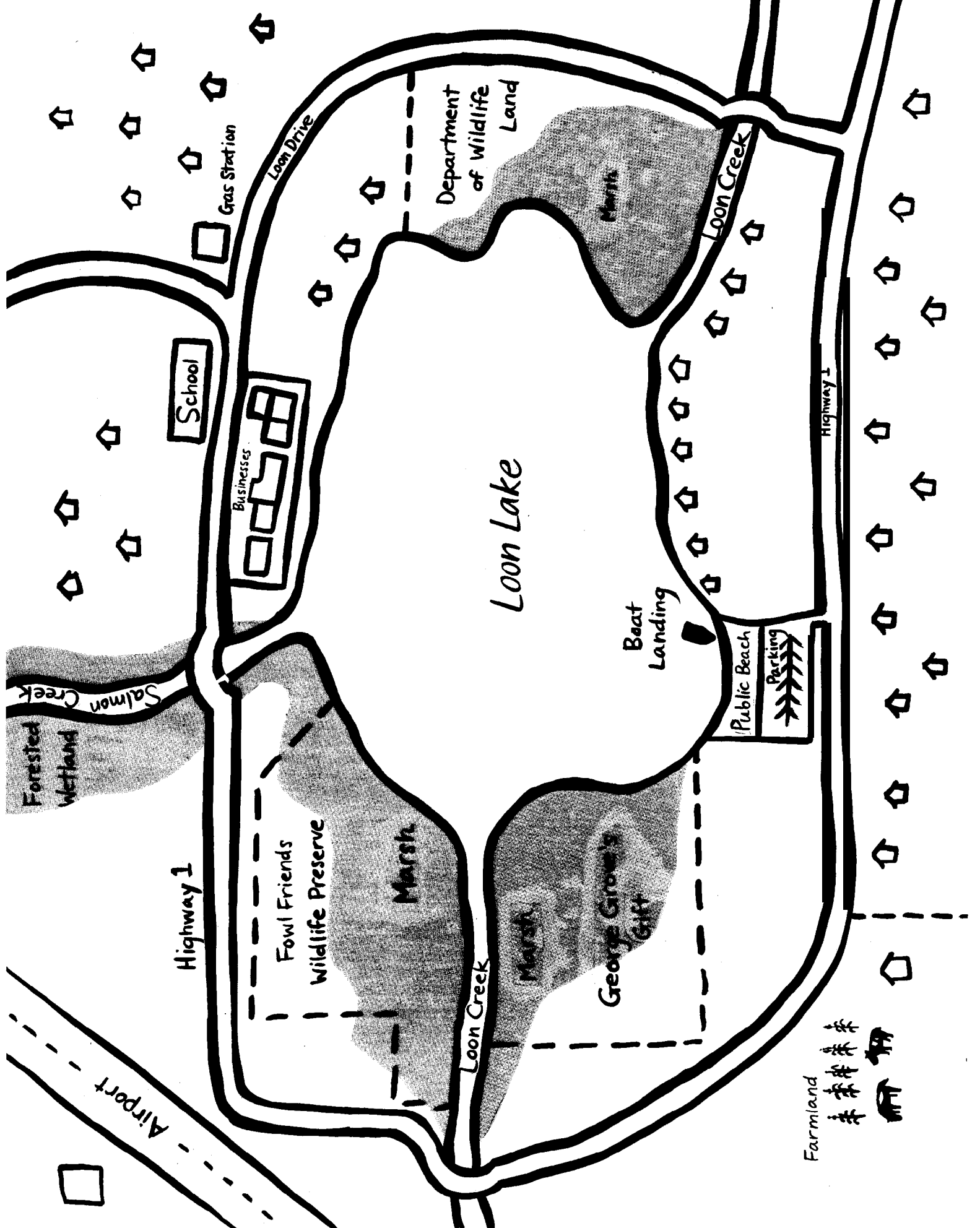
Many behaviors can surface that will disrupt negotiations and stop progress towards a solution. Some of these are getting off the subject, reverting to the past, name calling, talking without listening, threatening retaliation, and interrupting. Incomplete information or misinformation also can lead to poor assumptions or solutions.

To avoid these pitfalls, it is critical to establish firm ground rules that include common courtesy and respect. Everyone must agree to share all information and negotiate honestly. Active listening skills must be practiced by all members. Apologizing to and validating another person’s position also strengthens the process.

Many of us have no experience using consensus to solve problems. This powerful process may be very uncomfortable, at first. With experience, it can become the preferred format for negotiating solutions in one’s family, on the job, and in the community.







Highway 1

School

Businesses

Fowl Friends  
Wildlife Preserve

Marsh

Department  
of Wildlife  
Land

Loon Lake

Loon Creek

George Giroux's  
Gift

Marsh

Boat  
Landing

Public Beach

Parking

Loon Creek

Forested  
Wetland  
Salmon  
Creek

Gas Station

Loon Drive

Highway 1

Farmland

Airport



## Topic E: Where Have All The Frogs Gone?

### Activity 1: Frogs in Trouble

<b>Grade Level:</b>	3-12
<b>Time range:</b>	120 minutes
<b>Setting:</b>	indoors
<b>Subject Area:</b>	Environmental issues, Drama, Communication, Life Science, Biology, Reading
<b>Vocabulary:</b>	biomonitors

Students will understand that frogs are disappearing worldwide and will brainstorm ways they can be part of a solution to this problem. Students will get involved in problem-solving.

#### Objectives

Students will read news articles and discuss possible reasons why populations of frogs are declining. They will then brainstorm ideas on what they can do to help solve this problem, choose a viable project, and develop an action plan.

#### Method

Amphibians are declining. At least 16 countries covering every continent have recorded dramatic drops in populations of frogs, toads, salamanders and their relatives. Though no one reason has been identified, it is agreed that in most instances the population decline is caused by human activities.

#### Teacher Background

Amphibians have some characteristics that make them especially sensitive, and therefore very good indicators of the health of the environment.

1) **They live in both the aquatic and terrestrial worlds.** “Amphibian” means “double” (amphi) “life” (bios). Living where land and water meet, they are sensitive to the quality of both aquatic and land habitats.

2) **They absorb oxygen through their skin.** In order to absorb oxygen, remove carbon dioxide and “drink” water, amphibians have permeable skin making them susceptible to air and water pollutants including acid rain.

**3) They eat insects.** Insects are the main targets of pesticides and carriers of pesticide residue in the environment. These toxins may accumulate in the food chain.

**4) They live in habitats highly abused by people.** Wetlands are some of the most disturbed habitats on this planet. Pressures from increased urbanization infringe upon these environments, squeezing amphibians into ever smaller life zones.

**5) They are vulnerable to “introduced” predators.** Introduced species such as bullfrogs, spiny ray fish, and pet cats prey on native species of frogs. The harvesting of frogs by humans for consumption has also reduced populations.

The spotted frog, once abundant in western Washington, is now almost totally gone (a population was discovered in Thurston County in 1990). The cause is not totally understood, but may be due in part to wetland habitat loss, pesticides, and the introduction of the exotic bullfrog which preys on spotted frogs.

Washington biologists have singled out the northwest salamander, red-legged frog and the Pacific tree frog for intensive studies to learn about the relationships of water quality, land use and species populations. These three species have been chosen because they are easy to monitor and prefer distinct habitats for breeding. The hope is that by studying frogs as sensitive of environmental health, we can learn how our actions affect the natural world.

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**Materials**

copies of relevant news articles (*two are included in Appendix E*)  
globe

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**Procedure**

Introduce the fact that people all over the world are noticing that frogs are disappearing. Ask students why they would guess this is happening. List their reasons on the blackboard. Let them know that no one knows for sure. Ask them if they care, and if so, why.

Have them read the news articles in Appendix E.

Discuss the statement, “Everything is connected to everything else.” What does this mean? How does it relate to frogs? See if you can create a web of interdependency within a wetland ecosystem, with frogs as a central point. Imagine what happens to the community when frogs disappear.

Summarize the underlying problem of this issue.

Talk of possible actions that they, as individuals or as a class, can do to make a difference.

Set up priorities for choosing a viable action (ease, money, time, urgency), decide on one (or more!) and carry it out, if desired. Examples include: creating an informative leaflet or flyer; raising native species of tadpoles and returning developed frogs to the wild; writing letters to the editor of a local paper to inform others; raising money to buy up critical rain forest habitat.

## Problem Solving Matrix

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**Situation:**

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**Define the Problem:**

<b>Invent Alternatives:</b>		<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>
<b>Critique Alternatives:</b>	<b>pros</b>			
	<b>cons</b>			
<b>Execute the Plan:</b>	<b>Proposed Solution and Plan:</b>			

**Reasons:**

**Throw the DICE and solve the problem!**

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**Grade Level Variations**

Older students may want to research the topic at the library or research electronic databases via Internet connections.

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**Extensions**

Design logos, cartoons, bumper stickers, leaflets or bus advertisements to save wetlands for frogs.

Put on a skit or play to help teach others about the issue.

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**Evaluation**

Identify three possible reasons why frogs are disappearing. For each reason, describe how we can act differently to prevent further loss. These three might be the basis for making a pamphlet as a performance evaluation.

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**Related Activities**

“Frogs in Washington’s Wetlands,” Unit I, Topic C, Activity 1; “Food Webs and Nutrient Cycles,” Unit II, Topic C, Activity 3; “Toad is Heaven’s Uncle,” Unit II, Topic D, Activity 5; “Dragonfly Pond,” Unit III, Topic D, Activity 1; “Loon Lake,” Unit III, Topic D, Activity 2

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**Resources**

The following articles are reprinted in Appendix E:  
*“Where Have All the Amphibians Gone?” and “Amphibians: Biomonitorers of Environmental Health.”*

The following articles are referenced in Appendix A:  
*“Frogs in Trouble,” “Spotted Frogs: Indicators of the Health of Our Wetlands?,” “Where Have All the Frogs and Toads Gone?,” “Silence of the Frogs,” and “Where Have All the Froggies Gone?”*