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# DRAGONFLY POND

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## OBJECTIVES

Students will be able to: 1) evaluate the effects of different kinds of land use on wetland habitats; and 2) discuss and evaluate lifestyle changes to minimize damaging effects on wetlands.

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## METHOD

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

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## BACKGROUND

Every human use of land affects wildlife habitat, positively or negatively. What humans do with land is a reflection of human priorities and lifestyles. The search for a modern day "good life" and all of its conveniences produces mixed results for wildlife and the natural environment. Sometimes people see undeveloped areas of natural environment as little more than raw material for human use. Others believe that the natural environment is to be preserved without regard for human needs. Still others yearn for a balance between economic growth and a healthy and vigorous natural environment. Very real differences of opinion regarding balance exist between well-meaning people.

At the core of land use issues is the concept of growth. Growth in natural systems has inherent limits, imposed by a dynamic balance of energy between all parts of the system. Energy in natural systems is translated into food, water, shelter, space and continued survival. This means that the vitality of natural systems is expressed by their ability to be self-regulating. This capacity for self-regulation makes it possible for all natural members of an ecosystem to live in harmony. All the life forms of any ecosystem 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. Human activities can often go beyond the natural limits of a setting. Humans have the ability to import energy sources that allow a system to exceed its natural limits—or to remove energy sources that are necessary for a system to stay in balance. For example, people can build dams to create power, water can be captured for irrigation, wetlands can be drained for homes and buildings. All of these activities affect wildlife habitat.

Wetlands, for example, are often seen as swampy wastelands, yet they are the nurseries for hundreds of forms of wildlife. Fish, frogs, toads, migrating birds, snakes, insects and a remarkable variety of plants all make a home of wetlands. Wetlands are highly vulnerable to development, pollution and a variety of forms of human interference with the natural flow of water. Hundreds of thousands of acres of valuable wetlands are lost each year—for example, to draining, dredging, filling and pollution.

Given the extensive impacts humans have already had and continue to have on the land, a major challenge now facing humans is how to have a more responsible impact. How can we develop the awareness, knowledge, skills and commitment that are necessary in order for humans to take responsible actions affecting the remaining areas of natural wildlife habitat? How can we develop the necessary understanding to restore a more natural dynamic balance in places where human disturbance has existed for centuries?

The major purpose of this activity is to encourage students to wrestle with these concerns. In this simulation, students use the "Dragonfly Pond" as a microcosm of environmental concerns involved in management decisions. They struggle with the arrangement of overlapping and conflicting land uses in an effort to preserve a wetlands habitat. When the students reach some kind of agreement about the local issues, the activity shifts to how what they have done affects other dragonfly ponds downstream. The activity ends with consideration of the idea that the planet is, in fact, a single "Dragonfly Pond."

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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; a large piece of paper (18" x 24") upon which to fasten the cutouts

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## PROCEDURE

1. Prepare copies of the two cutout sheets ahead of time. 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 aquatic area.

2. Divide the class into groups of three to five, with each group representing one of the interest groups. Students will stay in these groups until the end of the activity. Possible interest groups are:

- residents - want to live in the area
- farmers - want to use the land to raise food and livestock
- business interests - want to use the land for commerce and economic growth
- gas station owners - want to make a living in servicing and repairing cars
- parks department personnel - want people to have a place for recreation
- highway department personnel - want to maintain access in the area
- bleach factory representatives - want to preserve jobs and commerce

NOTE: Add others that you think may be locally important.

3. Pass out the land use materials. Pass out the 18" x 24" paper that will serve as the base for each group's pond and its associated land use activities. Have the students cut out the land use pieces and Dragonfly Pond. Tell them that all the land use cutouts must be used; park and farm land may be cut to smaller sizes, but all the pieces must be used. Parts may touch, but not overlap. The students may also create additional land uses of their choosing. When they fasten the cutouts to their large base sheet, suggest that they use small loops of tape. This will allow them to change their minds before pasting the pieces down.

4. Once the students have cut out the necessary materials and are ready to begin the process of making land use decisions, have them first create a list of pros and cons for each land use. Guide the class discussion so that they consider the consequences of each land use. Record these on the chalkboard. The following are only a few of the many possible examples:

PRO

CON

Farms:

- produce food
- economic value
- provide jobs through seasonal employment

- use pesticides - (herbicides, insecticides) that may damage people and environment
- source of natural soil erosion
- sometimes drain wetlands for farm lands
- use chemical fertilizers that may damage water supplies

Businesses:

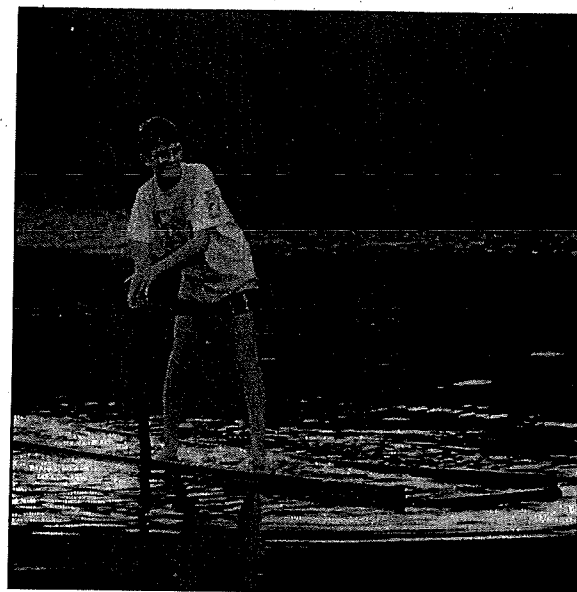
- produce employment
- provide commerce
- create economic stability

- produce wastes and sewage
- may contaminate water water (detergents, pesticides)
- use chemical fertilizers (lawns, etc.)

Homes:

- provide a sense of place
- develop a sense of community

- generate wastes and sewage
- use water
- contribute to loss of wildlife habitat



5. Have the students work in their teams for a long enough period of time to begin to seriously grapple with the challenge.

6. Invite each group to volunteer to display and describe their work in progress. Encourage discussion of their choices. In the discussions emphasize that:

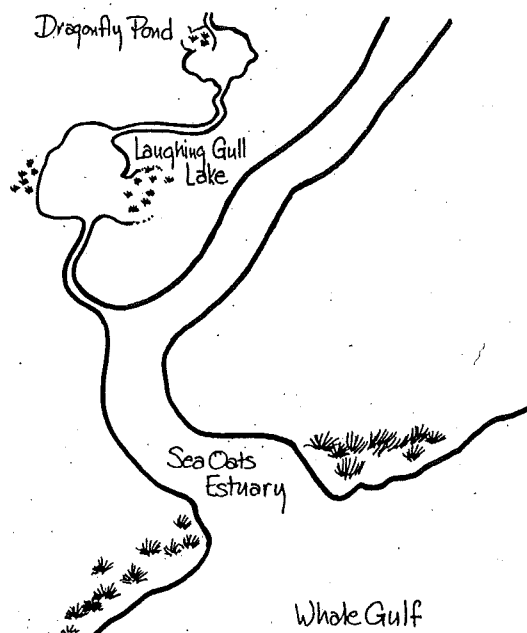
- no land use can be excluded;
- wildlife habitat must be preserved; and
- everyone must agree.

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 similarly. 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.

7. 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 will be likely to destroy the economic base of Dragonfly Town. Abandoning the farm affects food supplies and employment. Farmlands provide habitat for some wildlife. However, if wetlands are drained to create farm land, that results in a loss of habitat for some wildlife as well as a loss of other important values of wetlands.

8. 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. Being sensitive to their frustrations, display all the final land use plans above a chalkboard for all to see and discuss. Analyze and 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.

9. Choose one of the students' images above the chalkboard. Next, on the chalkboard, continue Dragonfly Creek downstream. Many students tend to dump effluent below Dragonfly Pond and let it flow downstream. Show the route the stream might travel. On the chalkboard drawing, have the downstream part of Dragonfly Creek become another pond and wetland and label the new area Laughing Gull Lake. Continue the drawing to Sea Oats Estuary and finally into Grey Whale Gulf.



10. 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. Make inferences and predictions about the potential consequences of these activities. For example, you could emphasize the effluent from the bleach factory. How will it be treated? Where? By whom? Where will it go? With what effects?

11. Ask the students to look again at all of the land uses in this activity. If they had been considering any of them as inherently bad, have them consider a different question. What could the people who are actually in charge of these various land uses do in their practices to minimize the damage to Dragonfly Pond? 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 effluents through "scrubbers" to extract wastes as profitable resources. (Perhaps the students need to make a "scrubbing filter" for the bleach factory.) Agricultural practices are changing so as to reduce the use of potentially lethal agents. Petroleum wastes are

being recycled and domestic awareness regarding uses of pesticides and detergents is evolving.

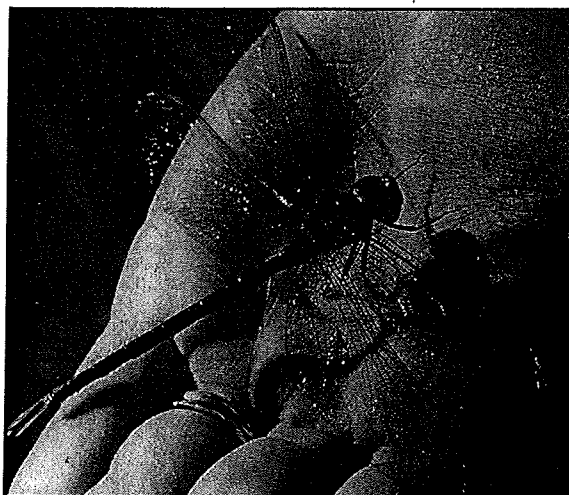
12. Ask the students to create a list of things they think they personally can do to begin to reduce the potentially damaging effects of their own lifestyles on the "downstream" habitats they may never have thought about. If possible, invite them to periodically, throughout the school year, report on their progress in carrying out these new practices. Consider with them in discussion the idea that all the waters of the planet are, in fact, part of a single "Dragonfly Pond."

### EXTENSIONS

1. Do the activity again up to step 6. After each interest group has presented its plan, form new groups with each of the new groups having a representative from each interest group. Have the new groups devise plans that all of the interests can agree on. Discuss how, if at all, this is a realistic experience in working to balance various community interests.
2. 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.
3. Trace any stream or river system that passes through your community from its source to its final entrance into the seas. 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.
4. Collect newspaper articles for local water-related and land use issues as a current events activity.
5. Learn more about environmental impact statements. Try to obtain actual copies of statements about wetlands in your area. See what concerns are addressed in these documents.
6. Learn about the national wildlife refuge system. Are there any wildlife refuges in your area? What animals find refuge in them? Visit a national wildlife refuge.
7. Find out about private organizations that work to protect wetlands. Two examples are The Nature Conservancy and Ducks Unlimited. Find out about what they do and how they do it.
8. Find out about zoning laws and land use regulations in your area. Would the plan your group proposed for Dragonfly Pond be allowed in your community?

### EVALUATION

1. Name three things that people can do to reduce or prevent damage to wetlands. Under what conditions, if any, do you think actions to reduce damage to wetlands would be **appropriate**?
2. Under what conditions, if any, do you think actions to reduce damage to wetlands would be **inappropriate**? Select any action that you personally think would be appropriate and that you could take to reduce or prevent damage to wetlands. Describe what you would do.



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**Age:** Grades 4-12

**Subjects:** Science, Social Studies

**Skills:** analysis, application, classification, communication, comparing similarities and differences, description, discussion, drawing, evaluation, generalization, inference, interpretation, invention, listening, listing, mapping, media construction, prediction, problem solving, psychomotor development, small group work, synthesis, using time and space, visualization

**Duration:** one to three 45 to 60-minute periods

**Group Size:** designed for a classroom of several small groups; can be modified to be an individual activity

**Setting:** indoors

**Conceptual Framework Reference:** VII.A., VII.A.1., VII.A.2., VII.A.3., VII.A.4., VII.B., VII.B.1., VII.B.2., VII.B.3., VII.B.4., VII.B.5., VII.B.6., VII.B.7., VI.A., VI.A.2., VI.A.3., VI.A.4., VI.A.5., VI.B., VI.B.1., VI.B.2., VI.B.3., VI.B.4., VI.B.5., VI.B.6., VI.C., VI.C.2., VI.C.12., VI.C.15., VI.C.16., VI.D., VI.D.1.

**Key Vocabulary:** land use planning, wetlands, trade offs, lifestyle

**Appendices:** Local Resources, Ecosystem, Observations and Inferences, Simulations

