Hazardous Links, Possible Solutions

Study Units

Iowa's Wildlife Resource Base; *People and Wildlife*

Supplemental Information

Pesticides are used almost everywhere. Some 136 million pounds of synthetic pesticides are applied annually to homes, home lawns, schools, school lawns, and golf courses in the U.S. (three times more pesticide per acre than the average farmer uses). More than 67 million wild birds die each year from pesticide poisoning. Most of these wildlife deaths can be traced to home pesticide use. Over 100,000 cases of human pesticide poisoning are reported each year. Some pesticides are useful and necessary, but statistics indicate that we need to examine our use of pesticides and to integrate other, safer methods of pest control.

Peregrine falcons, bald eagles, and ospreys began to disappear in the 1960s. Their populations dwindled. These indicator species alerted us to a serious problem in the environment. The insecticide DDT was persistent (didn't break down in the environment). These birds ate animals that ate insects killed by the pesticide. It accumulated in their bodies and caused them to lay eggs with soft shells or to not even reproduce. DDT is an example of a **bioaccumulative toxin**. When a chemical like DDT that doesn't break down is used to kill pest like insects, the chemical is passed to the animal that eats the insects (like a songbird) and the pesticide accumulates in that animal's body (usually in fat). When a top-of-the-food-chain predator, like a peregrine falcon, eats songbirds, the DDT accumulated in the songbirds' bodies from infected insects accumulates in the body of the peregrine. This is an example of **biomagnification**.

As a result of issues caused by persistent pesticides, many government agencies and private organizations are now involved with pesticide management. The US Environmental Protection Agency (EPA) requires manufacturers to test pesticides and monitors pesticide use.

Currently, EPA works with landowners and farmers to protect bees and other pollinators from pesticides.

The EPA imposes restrictions on pesticide use near locations of endangered animals. Check out the maps on their website.

See the **Additional Materials** section for a list of web sites for more information about pesticide use and impacts on wildlife.

Teaching Suggestions

Use the ***Hazards Score Card*** to tally results from the game and for reference in the follow-up discussion. Have students develop other food chains that could be susceptible to biomagnification of a pesticide. Investigate how a pesticide could enter an aquatic system. How might humans be involved in a food chain where biomagnification occurs? Research wildlife species in these food chains. Use ***An Iowa Food Pyramid*** to aid in this research.

One species of interest is the Swainson's hawk. Most of these raptors migrate to a limited area in Argentina. Thousands of them died from eating grasshoppers in recently sprayed fields. The pesticide company, farmers, biologists, and local people all agreed on a plan of action to prevent further hawk deaths. Farmers now welcome hawks as a natural control of grasshoppers.

Have students investigate pesticides used by their school (types and amounts). Investigate impacts they may have on human health. Does an exterminator spray the building regularly? What pesticide(s) is used? Are there alternatives to current pesticide use in the school?

This investigation could turn into an action project. EPA has a grant program to encourage integrated pest management (IPM) in schools. IPM uses a combination of methods to control pests. Explore economic benefits of reducing pesticide use. A school in Arkansas saved enough money by using alternative pest controls to hire more much-needed staff.

Have students investigate and make lists of safe alternatives to pesticides. Some examples include:

- rotating crops to reduce corn borer larvae
- herbal treatments to kill head lice
- organic pesticides (derived from natural sources) instead of synthetic ones
- mosquito hormones that inhibit wing development in larvae to treat stagnant water areas
- lady bugs to eat aphids
- hawk perches and owl nesting boxes to attract these predators to fields to control rodents

For more information about disposing of hazardous materials, check out the Iowa Department of Natural Resources (DNR) household hazardous materials page that lists regional collection centers and information about toxic cleanup days in Iowa.

Evaluation

See the activity. Ask the following questions: How do humans fit into the food pyramid? How can we prevent the DDT catastrophe from occurring again? What safe alternatives are there to a pesticide that kills lawn-eating grubs? Mosquitoes? Head lice? Corn root worms?

Student Materials

Hazards Score Card

Teacher Aids

An Iowa Food Pyramid

Additional Materials

- Carson, R. 1962. *Silent Spring*. New York: Oxford University Press Inc. (Excerpts are also available on several web sites.)

- American Bird Conservancy Swainson's hawk and pesticide use and a section on birds and pesticides.
- Information from Audubon on reducing pesticides, home pesticide use, alternatives, and resources.
- EPA learning and teaching about the environment and pesticides – this page includes has resources for use in the classroom and at home. Information about how EPA regulates and review pesticides and other programs can be found on this page.
- EPA tips on reducing pesticide impacts on wildlife
- Learn about threats to birds of prey including pesticides from The Peregrine Fund

Hazards Score Card

	grasshoppers	shrews	hawks
number at start			
number remaining uneaten			
number dying from pesticides			

Food Bag Contents

animal	number of plain pieces	number of colored pieces
grasshopper		
shrew		
hawk		

An Iowa Food Pyramid