



***Dedicated
to Reducing
Pesticides***

Unit 5 Section 2 Lesson 1: DDT - Doing Deadly Things

Focus Areas: Pest Control: Chemical; Science, Biodiversity, Language Arts, Math, Graphic Design

Focus Skills: thinking critically, determining cause and effect, organizing data, researching, taking notes, writing to persuade, graphing

Objectives

- To determine the impact of chemical pesticides in a habitat
- To visually demonstrate an understanding of the negative effects pesticides have on the ecosystem

Essential Questions

- How does the use of a chemical control impact an ecosystem?
- How is the food chain affected by the use of chemical pesticides?
- How does the human need to survive create complex environmental issues regarding threatened and endangered species?

Essential Understandings

- Chemical pesticides such as DDT and dieldrin persist in the environment and become concentrated in unexpected, undesirable places. They can have unpredictable results by interfering with an ecosystem.
- Predator/prey relationships can be permanently disrupted when the food chain is impacted by toxic poisons building up.
- It is important to understand and appreciate the complexity of environmental issues. Chemicals that have been developed to control “pests,” although useful to humans when used properly, frequently end up having far-reaching negative effects in the environment.



University of
Connecticut

College of Agriculture
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Background

When populations of birds of prey decline, it is a signal to human populations that there is something seriously wrong in the environment. Birds of prey, such as the osprey and peregrine falcons, are indicator species. As such, they provide critical signals about the ecological health of an area. Because they feed at the top of the food chain, they are killed by the concentration of chemicals and other contaminants in water. These contaminants collect and become concentrated in the tissues of fish and other aquatic creatures that they eat in order to survive.

Chemicals, while they have enriched our lives and made them safer, impact the habitat around us as well. We are often unaware of the effects that chemical substances can have on natural ecosystems. While a variety of chemicals produced by humans have caused ecological problems, organic chlorine compounds caused the most serious problems.

Insecticides such as DDT are made of chlorine that attaches to molecules containing chains of carbon. These dangerous chemicals damage living systems. They were used widely in the 1950's and 1960's, and later research proved they caused various forms of cancer in humans. Thereafter, their use was banned in the United States and most industrialized nations. Unfortunately, other countries continue their use.

When chemicals such as DDT filter into the environment, frequently from the run-off of farms and agricultural business, they are absorbed by all living things. What makes them particularly dangerous is that they collect in the fatty tissues of the body where they last a long time. The organochlorine compounds increase with each step of the food chain. As the concentrations build up, a creature such as an osprey can have one million times as much DDT as there is in the water. It can have one hundred times more DDT than would be found in the fish on which it feeds.

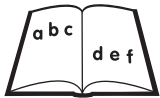




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DDT is especially dangerous for birds of prey when nesting season arrives. DDT causes the females to produce thinner shells that crack from the weight of the incubating parent bird. In addition, the chick inside can die from poisoning if the shell is improperly formed. Shells have tiny holes in them that allow oxygen and carbon dioxide to pass between the embryo and the world outside. DDT causes birds to produce a chemical that prevents these pores from forming and suffocates the embryo.

It took scientists like Rachel Carson to figure out why bird populations such as osprey, peregrine falcons, pelicans, and bald eagles were disappearing at an alarming rate. By the time DDT was determined to be the cause, 50% to 90% of some bird populations had been decimated and some became extinct. As the danger of pesticides became known and their use was banned, some populations slowly recovered.



Vocabulary

biomagnification	the process where chemicals accumulate in organisms in increasing concentrations at successive levels in the food chain
DDT	a fat-soluble pesticide sprayed on crops to kill insects
dieldrin	a pesticide similar to DDT
endangered	a population, that with increasing losses could be come extinct
fat-soluble	anything that stays in the body fat of animals
herbicide	a chemical used to eliminate weeds and other undesirable plants



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insecticide	a chemical used to eliminate insect pests
pesticide	a chemical used to kill pests
threatened	a population that is close to becoming endangered
toxic pyramid	the increasing amounts of poisons that concentrate from tiny plants to small fish, and on to the bigger fish that eat them (Example: An eagle has 1,000 times more DDT in its body than the plants at the bottom of the food chain.)



Logistics

Time: one hour sessions for the **Introduction** and **Involvement**
one hour for the **Follow Up:** Hazardous Links-Possible Solutions
one week for the **Follow Through** research project

Group Size: 5 to 30

Space: an area with comfortable seating



Materials

Handout 1 “Raining Cats” *
Handout 2 “DDT and Birds” *
Handout 3 “Citizen Scientist: Going, Going, Almost Gone” *
Handout 4 “Questions to Explore” *
Raining Cats Picture Card Set *
set of dominoes
Project WILD: Hazardous Links, Possible Solutions *
Assessment for a Graph *
Alternative Assessment with Answer Key *
art supplies
graph paper

* single copy provided



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Preparation



1. Make copies of Handout 1, “Raining Cats.” (one per child)
2. Display Raining Cats Picture Card Set. (DDT atomizer, mosquito, house fly, cockroach, cat, lizard, rat, flea, caterpillar)
3. Make copies of Handout 2, “DDT and Birds,” Handout 3, “Citizen Scientist: Going, Going, Almost Gone,” and Handout 4, “Questions to Explore.” (one per child)



Activity

Challenge: Discover the dangers of careless chemical control.
(*Display for group viewing*)

Introduction

1. Ask the children why they think animal species are threatened or endangered. (wildlife trade, pollution, habitat loss, etc.).
2. Explain that while human greed (elephants being illegally killed to make ivory trinkets, stealing young parrots from nests and selling them to pet stores, and insensitively destroying valuable rainforests to create grazing fields and farmland) accounts for many of the reasons that animals and environments are threatened, there is much more to the problem:
 - a. Humans’ need to survive plays a big part.
 - b. Poverty and hunger cause people to become desperate, so they clear the land in an effort to grow crops. When the soil is robbed of nutrients, they are forced to move in and clear **more** land. In most cases, the poor of the world have **no** choice.
 - c. As human populations expand into areas where animals once lived, conflicts occur as humans and other animals compete to live in the same space. Animals begin to invade spaces that humans use to grow food. They destroy the farms, villages, and forests the people depend on for survival.



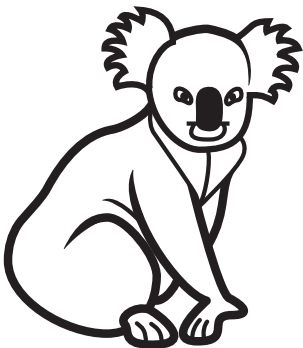
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3. Continue the discussion by having children share examples of conflicts their families may have with local wildlife (deer eating shrubs, rabbits destroying gardens, woodchucks, skunks, raccoons invading garbage pails)
4. Brainstorm solutions to these problems that do **not** require the use of chemicals.

Involvement

1. Provide each child with a copy of Handout 1, "Raining Cats." Read the article together.
2. Discuss the "domino effect" that spraying the chemical pesticide dieldrin had on the people of the island of Borneo. Use a set of real dominoes to demonstrate the physical action of one domino falling and causing the others to fall.
3. How was the food chain affected?
4. Using the pictures from the Raining Cats Picture Card Set or ones that you draw yourself, create a visual display to illustrate the multiple domino effects of spraying dieldrin on the island of Borneo.
5. Use the story events in "Raining Cats" to create a billboard to raise awareness about the harmful effects of using chemical pesticides in a local ecosystem.

Follow Up



1. Citizen Scientist: Going, Going, Almost Gone

Directions: Select an animal from Handout 3. Use reference books and the Internet to answer the "Questions to Explore" on Handout 4.



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2. Make a graph to record how many of the animals are threatened or endangered due to

- a) **H**abitat loss
- b) **I**ntroduced species
- c) **P**ollution
- d) **P**opulation growth
- e) **O**ver-consumption
(**HIPPO** DILEMMA)

Or

Complete activities in *Project WILD: Hazardous Links, Possible Solutions*. (Children become hawks, shrews, and grasshoppers in a physical activity.)

Assessment

An Assessment for a Graph is included with the lesson, or use the Alternative Assessment for an evaluation of a more cognitive nature.

Follow Through

- 1. Provide news articles such as Handout 2, “DDT and Birds” along with communications from Nancy Alderman’s Environment and Human Health Inc., such as “Breaking the Lawn-Care Pesticide Cycle.” Children could also collect editorials, etc. for this activity.
- 2. Debate the pros and cons of organic versus chemical insect controls.



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Notes

