

Caring for the Land

The Dust Bowl Is Not Played on New Years Day

Objectives

Students will be able to explain how people can have different opinions on soil management.

Students will identify cause and effect relationships in issues relating to agriculture and the environment.

Materials

- Worksheet copies

Time

Activity 1: 60 minutes

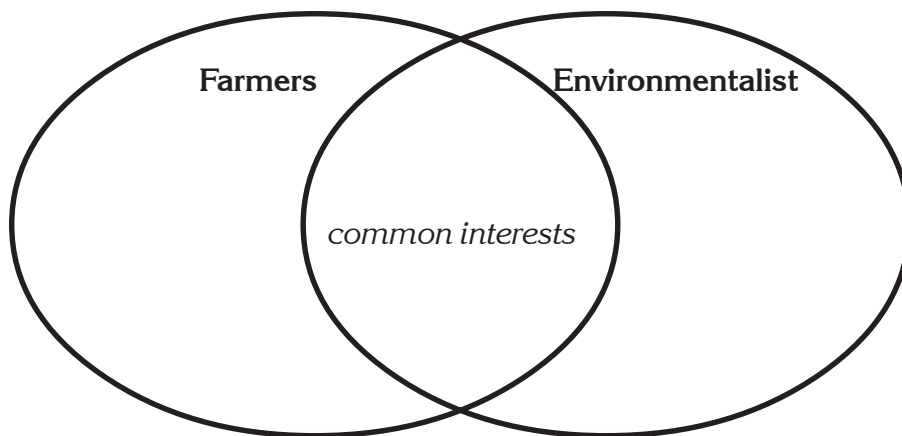
Getting Started

Make the necessary copies.

Procedures

Activity 1 - Soil Stories

1. Begin the lesson by asking students to describe and define in their own terms; “farmer,” “environmentalist,” and “environmental activist.”
2. Ask students if they have heard any news reports about conflicts between farmers and environmental activists (endangered species, grazing on public lands, wetlands, etc.).
3. Draw Venn diagram on the chalkboard (see the example below), and ask students to list things on which farmers and environmental activists disagree and things they have in common. (Both care about the land, both need food to eat. You may have to make very large circles.)
4. Share the background material and discuss problem/solution and cause/effect relationships.
5. Divide your class into three groups, and hand out copies of one of the worksheets to each group.
6. Students should read the situations on the student worksheet and identify the cause and effect and the problem and solution in each one. Students should also identify the alternatives and their effects.



Adapted from materials provided by Oklahoma Agriculture in the Classroom.



Discussion

1. Why do we need farmers? (food, clothes, shelter, for other manufacturing goods)
2. Who should decide how to use the land?
3. How should we decide how to use the land?

Background

The land is the livelihood of farmers. Most people, farmers included, try to avoid practices which might harm or destroy their way of life. Despite this fact, agriculture is blamed for many environmental problems.

People began polluting long before they knew that was what they were doing. Early settlers in this country dumped their trash into rivers and streams without considering the harm it might do. Before gasoline-powered tractors began releasing exhaust fumes into the rural countryside, work horses were creating pollution problems of their own. The average farm horse produced 35 pounds of manure or solid waste and 2 gallons of liquid waste each day. Although horse manure can be an excellent fertilizer when spread across a field, large amounts in small areas can create high concentrations of nitrogen and bacteria which may filter through the soil into the underground water supply.

Thousands of years ago people began to farm because they found they could produce more food that way than they could by hunting and gathering. Over the years people discovered that some farming practices hurt the land. Cutting down trees, clearing away vegetation and letting animals overgraze left topsoil unprotected so winds and water could erode it away. Planting the same crop on the same field year after year used up all the soil's nutrients. As a result, the fields lost their ability to produce good crops.

Early farmers learned from their mistakes and developed better farming methods. They learned to farm on the contour and build terraces—ridges of soil built across the slope to slow the runoff of water. They learned to rotate their crops—move them from one field to another to let the land rest. They learned how to spread animal manure on their fields to restore organic matter and nutrients.

When European settlers came to the New World, they were dazzled by what seemed like endless *resources* —acres and acres of rich soil which had never been used for farming. Many farmers abandoned the methods their ancestors had learned for protecting the land. When one field began to produce poor crops, the farmer would simply abandon it and move farther into the wilderness.

As more people moved in, they began farming sloping lands that could easily wash away and soils that could easily blow away. In the early 20th Century, farmers began plowing up the native grasses of the Southern Plains to plant wheat. Since that land had never been farmed before, farmers had no way of knowing that their hard work would be the first step toward creating what came to be known as the *Dust Bowl*. A severe *drought* dried up the exposed soil. With no grass roots to hold the sandy soil in place, it simply blew away with the strong summer winds.



Recognizing a problem is the first step toward solving it. Farmers didn't know plowing up the Plains would cause the soil to blow away. Once they saw what had happened, they did what farmers have been doing for thousands of years. They began thinking of different farming methods they could use that would protect the soil.

One method involved using chemicals on weeds instead of turning the soil with a plow. For many years, this method seemed like an excellent way to keep the soil in place while producing the food people needed. Then scientists discovered the chemicals were getting into the water supply and making birds, fish, animals and people sick. Today farmers and agricultural researchers are working on ways to solve that problem and many more.

Vocabulary

chemical (inorganic) fertilizers: synthetic materials, including nitrogen, phosphorus and potassium compounds, spread on or worked into soil to increase its fertility.

contaminate: to make impure by contact or mixture with harmful bacteria, fungi, or dangerous chemicals.

farmer: an individual who works with the land, plants and animals to produce raw materials for food, clothing, shelter, and other products that are used in industry and manufacturing.

decompose: to decay or break down into small pieces.

environmental activist: a person who cares about the environment, involved in shaping public perceptions and making policy. May or may not have educational training in environmental science.

environmentalist: a person who cares about the environment and the relationships in the environment. Usually has studied environmental science.

legume: a family of plants which, with the aid of symbiotic bacteria, convert nitrogen from the air to build up nitrogen in the soil. Legumes include many valuable food and forage species, including peas, beans, peanuts, clover, and alfalfa.

organisms: any living individual, plant or animal.

pesticides: word used to describe a variety of substances used to control insects (insecticide), plants (herbicide), or animals (rodenticide for mice, etc.).

rotating crops: to plant or grow crops in a fixed order of succession.



Answers to cause and effect relationship worksheets.

Soil Erosion

Problem: soil erosion
Cause: overgrazing, clearing vegetation from soil
Solution: rotational grazing, no-till farming
Effect(s): soil washes or blows away
New Problem: use of the wrong amount of pesticides and fertilizers may cause water pollution.

Chemical Fertilizers and Pesticides

Problem: overuse of chemicals
Cause: using chemical fertilizers and pesticides
Solution: Integrated Pest Management
Effect(s): increase production, pollutes water
New Problem: none identified in text

Wetlands

Problem: loss of wetlands
Cause: draining or filling in wetlands
Solution: passing laws to protect wetlands
Cause: draining or filling in wetlands
Effect(s): flooding, loss of habitat for wildlife, loss of natural water purification
New Problem: people are unable to use their property as they wish

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Identify the problem and the solution and the main cause and effect relationship in the information below.

Soil Erosion

Soil erosion is what happens when soil is washed or blown away. In most places, trees, grass and other plants hold soil in place. In Utah annual rainfall is low, the state average is 14 inches a year. Erosion in our state is primarily caused by wind. During the 1930's livestock in Tooele County were allowed to overgraze the range and farmers plowed up some of the remaining land and planted **grains** (wheat, barley, etc.). Between 1933 and 1935, the area had even less rainfall than usual. With large areas of land having no grass root system to anchor it, much of the soil blew away. The dust storms and sand storms buried roads and houses. During this same period of time the Great Plains were also experiencing a dust bowl. Clouds of dust from this area reached as far east as Washington, D.C.

In response to the disaster, the federal government created the Soil Erosion Service and the Civilian Conservation Corps to find ways to recover the land. Workers replanted grass, planted trees and showed farmers better agricultural methods to help them protect the soil. As time has progressed, the Soil Erosion Service became the Soil Conservation Service, and in 1996 changed its name to the Natural Resource Conservation Service. Citizens of a local area, in each state, that concern themselves with the conservation of soils belong to a governing board called the Soil Conservation District. Today in Utah, with the help of Conservation Districts and Utah State University Extension, farmers and ranchers learn how to better manage the land.

One method of grazing livestock is to place large numbers of animals out to graze on one piece of land for a short period of time and then move them to a new pasture. This allows the animals to get the nutrition they needed while cutting down on overgrazing and erosion. This practice is known as rotation grazing. Another method being used by farmers is no-till farming. A farmer using this method plants seeds directly into a field that still has last years plant stems, stalks and leaves on or in the ground. For this method to work, the farmer must use herbicides to kill unwanted grass and weeds. This method helps stop soil erosion, but some people worry that the herbicides used might pollute the underground water supply.

Problem

Cause

Solution

Effect(s)

Does the solution create another problem? If so, what is it?

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Identify the problem and the solution and the main cause and effect relationship in the information below.

Chemical Pesticides and Fertilizers

In the natural plant cycle, plants take nutrients from the soil and return them when leaves and other plant parts die and *decompose*. When people take plant matter (grains and hay) from the soil, they are also removing *nutrients*. Over time, if the nutrients aren't replaced, the soil can no longer provide enough nutrients for plants to grow. In early years, farmers replaced these nutrients by adding animal manure, growing a *legume* crop, resting fields or *rotating crops* from year to year so fields could restore some of their nutrients through natural processes.

In the 1920s, farmers began using tractors instead of horses and mules. They began using *inorganic* nitrogen fertilizers to replace the organic nitrogen the fields had been getting from animal manure. Nitrogen is one of the major nutrients plants need to grow. In the 1940s, farmers learned to use chemicals to kill insects and weeds. These chemicals now help one American farmer provide food and fabric for 130 non-farmers.

Chemicals have caused some problems, too. Chemical *pesticides* can kill other *organisms* besides the ones for which they are intended. Some of the organisms they kill are useful ones that help crops grow. *Chemical fertilizers* also cause reactions in the soil that, over time, can make the soil less desirable for plant growth. Chemicals used in agriculture can also *contaminate* the water we drink. Sometimes they move through the soil and enter the underground water supply, and sometimes they are carried by rainwater into lakes, rivers and streams. Farmers are concerned about these problems. They are trying new methods that will help them grow enough food for all the people to eat without damaging their land and water supplies. These methods help farmers use fewer chemicals on their fields. One method is *Integrated Pest Management*. Under this method, farmers first find out how many and what kinds of pests they have. They don't use chemical pesticides unless there are enough pests to cause economic crop damage. They often choose environmentally-friendly pesticides or beneficial insects to control the pests.

Another method makes use of a computer installed in the farmer's tractor. The farmer takes soil samples from his or her fields and has them chemically tested at a laboratory. The computer receives mapping information from a satellite in space and then uses the results of the soil tests to tell the fertilizer spreader where to place the fertilizer and how much to use. This is called "precision farming."

Problem

Cause

Solution

Effect(s)

Does the solution create another problem? If so, what is it?

Caring for the Land

Identify the problem and the solution and the main cause and effect relationship in the information below.

Wetlands

Wetlands are low areas that are saturated with water. Marshes and swamps are wetlands. Wetlands cover only a small part of Utah but provide critical aquatic habitat in an arid environment as well as economic and other benefits. Utah wetlands include the shallows of small lakes, reservoirs, ponds, and streams; riparian wetlands; marshes and wet meadows; mud and salt flats; and playas. The largest wetlands in the State surround Great Salt Lake. Because of the importance of Great Salt Lake and its associated wetlands to migratory waterfowl and shorebirds, in 1991 the lake was designated a Hemispheric Reserve in the Western Hemisphere Shorebird Reserve Network.

Wetlands are an important part of the earth's ecosystem. They act like sponges to store water during the wet times of the year and release it into the aquifers and underground streams where we get most of our drinking water. When there are no wetlands to soak up the water, rains are more likely to turn into floods which destroy homes, businesses and farms. Plants that grow in wetlands hold the soil and help keep it from being washed away.

Wetlands also help purify water. They filter out harmful chemicals and wastes. Dirty water gets a good cleaning when it flows through a wetlands

Wetlands provide homes for many birds and animals that need wet places to grow and reproduce. They are important rest and food stops for many migrating birds. Many endangered plants and over 1/3 of our endangered animals live in or use wetlands.

At the time of European settlement, there were about 215 million acres of wetlands in the lower 48 states. In the last 200 years over 54 percent of these wetlands have been lost. Most were converted to agricultural uses. For many years people thought of wetlands as obstacles to farming and breeding grounds for mosquitoes. The government even encouraged landowners to turn wetlands into dry lands.

Now we know more about wetlands. We realize how much they help the environment, wildlife and humans. Federal laws have been passed to protect and preserve them. Some people don't like the wetland laws. People who have wetlands on their property think they should be able to use their property to earn money to support their families.

Problem

Cause

Solution

Effect(s)

Does the solution create another problem? If so, what is it?