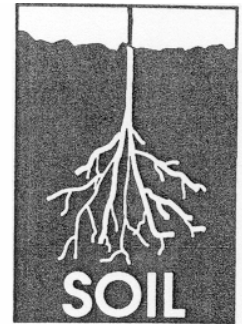


# Food and Soil

Source: Minnesota's Ag-stravaganza



**Description:** Students will become aware of the inter-relationships between food and the use of the land through a simulation and creative writing.

**Learner Outcomes:** Students will participate in a simulation in which they will "be" a member of an ecological community. Using information learned, students will be able to explain the relationship between protecting agricultural land and providing food for the world through a chosen means of creative expression.

**Subjects:** Science, Social Studies, Agricultural Education  
**Suggested Time:** One class period.  
**Group Size:** Any  
**Site:** Indoors or outdoors

**Materials:** Four different colors of three to five foot lengths of yarn for each student - for a class of 25, you would need at least 25 lengths of blue yarn, 25 lengths of green yarn, 25 lengths of yellow yarn, and 25 lengths of red yarn. Name tags for each student with names of organisms found in the community (see #4 under the Procedure). "Alarming Trends" for each student. Writing paper and pens for each student.

**"When we try to pick out anything by itself, we find it hitched to everything else in the universe."**

**John Muir, American naturalist, explorer, and conservationist**

## Teacher Background

The first quotation is taken from a recent publication of the "Cornucopia Project":

A loaf of bread cost \$7.66.  
Tomatoes, three large ones, \$5.24.  
A ten-ounce jar of instant coffee comes to \$45.06.

Based on a recent report to the White House, those are some of the food prices you may be paying at the end of the century. But if you believe only inflation is to blame, think about this:

Each day of the coming decades, there will be 5,000 new people to feed in the United States. And the food they'll need will have to be grown on less and less land because millions of acres of agricultural land are being lost annually - half to developers, half to the ravages of erosion and irresponsible agricultural practices.

Soon the growing number of consumers will converge with a declining farmland base - and America can then expect periodic food crises. Prices will skyrocket. Shortages will be a fact of life. And our food system will cease to be a major source of America's strength.<sup>1</sup>

As the American food system is affected, so will the world's hungry be affected, for everything is related to everything else. Neglect of agriculture and abuse of resources are two fundamental factors contributing to world hunger.

"The loss of topsoil through erosion has two effects on farmer's ability to grow food: it robs the land of nutrients, and it degrades physical properties of the soil, such as its ability to absorb water. A survey of independent studies of soil erosion in the U.S. Corn Belt found that the loss of an inch of topsoil reduced corn yields by three to six bushels per acre . . . The loss of soil means lower inherent productivity and costlier food. Uncontrolled soil erosion will eventually lead to higher food prices, hunger, and quite possibly, persistent pockets of famine . . .

The immediate effects of soil erosion are economic, but the ultimate effects are social."<sup>2</sup>

<sup>1</sup> Robert Rodale. "Join our Conspiracy". The Cornucopia Papers. (Rodale Press: Emmaus, PA.).

<sup>2</sup> Edward C. Wolf. "State of the Earth". Natural History, April, 1985.

# Procedure

1. This web of life exercise will help remind students that soil erosion and loss of agricultural land directly affects our ability to meet four of the basic needs of all living things - including the need for food.

2. Show four different colored bunches of yarn lengths. Explain to the students that each color represents one of four basic needs of all living things: food, air, water, and shelter. Establish a color for each: red for food, green for air, blue for water, and yellow for shelter. You might want this information written on the chalkboard for all students to refer to as they do the activity.

3. Pass out a minimum of four lengths of colored yarn to each student, one of each color. Additional lengths could be needed as an organism could provide the same basic need for more than one organism in the group.

4. Divide the class into groups of eight to ten students. The students should sit in circles, separate from each other. Each player will be assigned a role, predetermined, so that the proper diversity exists to represent an ecological community of interdependent organisms.

**GROUP 1** - trout, deer, human, oak tree, bald eagle, topsoil, corn, stream, dead stump, milkweed.

**GROUP 2** - cattail, river, wheat, topsoil, gull squirrel, pine tree, human, fly, frog.

**GROUP 3** - human, cow, sparrow, topsoil, soybeans, creek, lilypad, frog, gnat, fallen tree.

5. Pass out name tags with an organism's name on it to each student. These should be worn so they are visible to other members of the group. It is important that soil and humans always be used in each group.

6. It might be helpful to use Group 1 as a demonstration while giving directions. The task of the web game is for each player to identify another player (organism) in the group to whom he/she is related by one or more of his/her basic needs: air, food, water and shelter. The player must explain why, then be given one end of the length of yarn to hold, thus connecting him/her to the other.

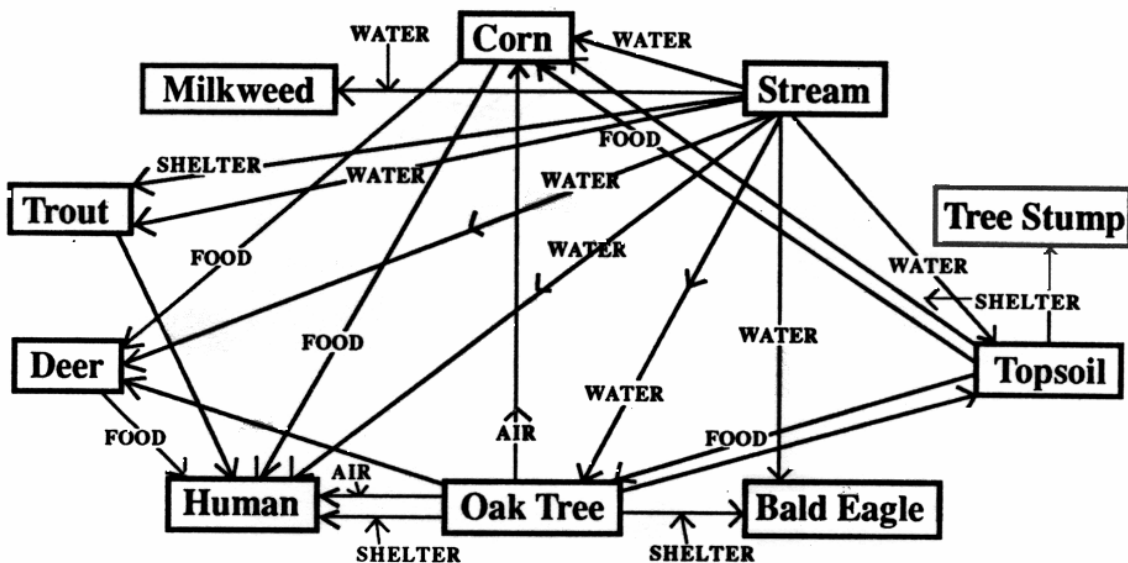
To help distinguish between what needs are being provided and what needs are being met by other organisms, have the students hold their original yarn lengths in their right hands (those needs they provide) and the yarn lengths coming to them from the other organisms should be held in their left hands (those needs that are being met).

Several rounds of this will produce a distinctive colorful web of living relationships. See diagram below.

In this community, because soil erosion has gone unchecked, water in the form of rain has washed soil particles, organic matter, and nutrients off the cropland, leaving exposed subsoil instead of the rich topsoil of previous years. Eliminate topsoil from the web.

(When topsoil is removed from the web, the oak tree and corn no longer have food, thus they must pull out their yarn lengths. When the oak tree and corn are removed, the human, bald eagle, and deer no longer have the air they need to survive. Topsoil fills the stream, affecting the trout and milkweed. The only remaining member of this community is the tree stump.)

## A WEB OF LIFE EXAMPLE



air ↗ From which organism the yarn originates and to which organism it is going to satisfy a need.

□ Students representing different organisms

7. After the web is as complete, as time permits, remind everyone they've learned about soil erosion and loss of agricultural land. Then "enter" the web of each community by presenting the following scenarios - a different one for each group.

**GROUP 1** - In this community, because soil erosion has gone unchecked, water, in the form of rain, has washed soil particles, organic matter, and nutrients off the cropland, leaving exposed subsoil instead of the rich topsoil of previous years. Eliminate topsoil from the web.

**GROUP 2** - In this community, a new highway is being built, requiring the removal of the pine tree. Remove the pine tree from the web.

**GROUP 3** - In this community, soil from heavily fertilized fields has washed into the local creek, filling it with sediment and chemicals. Remove the creek from the web.

If there is time, other members of the ecosystem could be removed to see the effect they would have on this interdependent community.

8. As the chosen member of the community has been eliminated, the lengths of yarn originating from that member should be carefully pulled away from the others. For example, as the topsoil is removed from group 1, the lengths of yarn representing the needs that the topsoil provided to other organisms should be pulled from the others. So if the topsoil provided food for the corn, the red length of yarn would be removed from the corn, for the soil is no longer meeting the need of food for the corn. See diagram.

9. Ask the remaining group members if they can now continue to exist. Are all four needs still satisfied? If not, pull the lengths of yarn out of the web.

10. The human need for food in each community will no longer be met. Summarize the experience by discussing the following questions:

- a. How could soil erosion affect your ability to meet your need for food?
- b. How could the conversion of farmland to nonagricultural uses affect your ability to meet your need for food?
- c. How could pollution of a water supply affect your ability to meet your need for food?

11. Using the Teacher Background and the sheet entitled "Alarming Trends", examine other relationships between hunger and agricultural neglect and resource abuse. Then have the students respond to one of the four phrases below by writing an essay, short play, or speech, or by constructing a collage.

- 1) LET'S STOP TREATING OUR SOIL LIKE DIRT.  
(taken from the Land Stewardship Project)
- 2) IF YOU EAT, YOU'RE INVOLVED IN AGRICULTURE.
- 3) FOOD FOR THE FUTURE?
- 4) DISAPPEARING FARMLAND - WHAT WILL IT MEAN?

## Extensions

After being given an opportunity to participate in a web of life simulation, a student will creatively express (essay, play, speech, or collage) the information learned to describe the relationship between the use of agricultural land and our ability to feed the world.

Create posters, placemats, or bumper stickers alerting the public to the need for soil conservation and agricultural land protection in Minnesota. Display or distribute them during a community event (county fair, shopping mall display, etc.).

### Alarming Trends

Every day in the U.S. 4 square miles of prime farm lands are shifted to uses other than agriculture. ("Where Have the Farm Lands Gone?," published by the National Agricultural Lands Study with support from the U.S. Department of Agriculture.)

It is estimated that in Iowa two bushels of topsoil are lost for each bushel of corn produced. Approximately 4 billion tons of topsoil are eroded from our farms each year. ("Farming for Profit in a Hungry World," Michael Perelman; *New York Times*, 10/26/80.)

According to U.S. Dept. of Agriculture projections, a farmer will need \$2 million to start a medium sized dairy, grain, or livestock farm in the year 2000. (U.S.D.A., Projections to the Year 2000.)

Minnesota is losing ground - literally. Over 100 million tons of topsoil erode yearly from the state's cropland. That's enough soil to bury both sides of I-94 twelve feet under from Minneapolis to Miles City, Montana.

Annually, 49,000 acres of farmland are lost to urban encroachment. Daily, an average of 134 acres of cropland is bulldozed for highways, housing developments, and other non-agricultural uses.

Total land in U.S. farms for 1988 is 999 million acres, down from the 1,003 million in 1987. Land in farm use has declined every year since its peak at 1,206 million acres in 1954.