

Weaving the Web of Life

Activity Information

Grade Level: Elementary / Intermediate

Subject Area: Sciences

Duration: 80 - 110 minutes

Group Size: Whole Class (with some individual work)

Purpose: To construct a model of a web of life representing a terrestrial community and illustrating the concept of interdependence.

Teacher's Notes: *This fun group activity demonstrates interdependence within a community. Each species is like a strand in the larger web of an ecosystem. It relies upon the health of that ecosystem for its survival and, in turn, contributes to ecosystem health. Whenever a strand weakens or breaks, the whole web of life becomes more fragile.*

Species at risk are a sign that we have put too much pressure on ecosystems, endangering the health of wild species and ourselves. To reverse this trend, we must give organisms the support they need to recover their numbers and bring their ecosystem back into balance.

Do not underplay the importance of the abiotic elements in this activity. Though rain, for example, may not 'die' due to the loss of trees in a forest it will change. With time it will become more acidic because the trees are not there to absorb the carbon dioxide in the air.

It may be useful to complete the activity "A Special Place" before doing Part III of this activity.

MATERIALS REQUIRED:

- Ball of Yarn
- Pencils
- Ecosystem Elements Identity Tags (BLM – one per class)
- Web of Life Worksheet (BLM – one per student)

LEARNING OUTCOMES:

At the end of this lesson students will be able to:

- Construct a food web
- Demonstrate how all natural things are dependent on one another in some way
- Define interdependence
- Describe organisms in terms of their roles as part of interconnected food webs
- Predict how the removal of a plant or animal population will affect the rest of the ecosystem

- Appreciate the importance of living and non-living elements in an ecosystem.

PROCEDURE:

Before you begin, prepare Ecosystem Elements Identity Tags to represent various elements in the environment. Each student will receive a tag and a pencil to start this activity.

Part I (Discuss) 10 minutes:

Ask Students:

"What do you think we mean when we say 'life'?"

Have students try to come up with a definition and write them on the board. As you proceed with this activity students can propose changes.

"What is a food chain? What is a food web? What might we mean by a web of life?"

A food chain shows the movement of energy through an ecosystem following a single line of the eaten and the eaters. A food web includes all of these lines and shows where they overlap and branch off. Both of these focus on the biotic factors of the environment, however a web of life also includes all those things that species need in order to survive. It considers the contribution of the abiotic factors, such as sun, rocks and water.

"Which are the biotic elements in the group? Which are the abiotic elements?" *Biotic elements are those things that are living or were alive. Abiotic elements were never alive.*

"Your tag is what you represent in our ecosystem. What you will need to survive, or what needs you in order to survive?" *This does not have to be discussed in full here. Students may look around at their neighbours to get some ideas about who else is sharing this environment.*

Part II (Activity) 20 – 40 minutes:

1) "Bring your pencil and your Ecosystem Elements Identity Tag into a large circle."

Explain to students that we are going to pass the ball of yarn around and across the circle to discover who is connected to whom in the circle. The leader can step into the centre of the circle and **play the role of the sun, the ultimate source of life for all things**. This allows the leader to pass the yarn around once the activity starts.

2) "Before we get started, can we make any predictions about what will happen as we start passing the yarn? Will anyone be left out? Will anyone make a lot of connections? Will anyone make only a few connections?" Note the different predictions so we can evaluate them afterwards.

3) "Well, let's see what happens." The leader begins by passing the ball of yarn to another ecosystem element that needs the sun to survive. The sun might say: "I am passing the yarn to the **flower** because **it needs my heat and light to survive**". Loop the string around the flower's pencil twice and have the students place their thumb on the string where it wraps around the pencil so it does not slip off. Ask the flower to pass the yarn to an ecosystem element only if it needs you in order to survive, or if you need it to survive. For an example, the flower could then pass the ball of yarn to a bee which needs the flower for nectar: "I am passing the yarn to the **bee** because **I need it to spread my pollen so there will be more flowers**". Continue passing the ball of yarn, ensuring that each time the yarn is passed, it is justified. Try to make all possible connections by challenging the students to make connections with everyone in the circle, so that no element is left out. As in nature, an element can be connected to more than two other elements.

4) "Let's try to predict what would happen if one of the ecosystem elements were removed!"

Discussion Points:

- Examine the pattern they have just created. This pattern of interconnections between the elements of the ecosystem represents the very complex pattern of interconnections that occurs in a natural ecosystem. Such connections show the **interdependence** in natural **communities**; what affects one **population** can affect all other populations. These patterns are called the web of life.
- It is impossible to predict exactly what will happen in an ecosystem because there are so many interconnections, many of which we cannot see.
- Consider the difference between the biotic and abiotic elements of the web.
- How does the web correspond with the students' predictions? If there are any differences, discuss why.
- Consider what might happen when there is a change in the environment. Imagine there is a pesticide introduced: have the bugs tug on their strings. Who might be affected?



To Do:

1) “The local government has granted permission to a logging company to cut down all the trees in this area.”

Other scenarios could be used. Do nothing to the yarn yet.

2) “What other ecosystem elements would be affected by this scenario?”

For each element that is affected directly by the loss of trees, have the students remove the string from their pencil. Ask those students affected by the loss to explain how they were effected.

*You can see how the web of life becomes unstable as each affected **population** in turn affects another **population**. New or unexpected changes may be seen in the process. Students will notice that although elements directly connected to the tree are affected first, it will eventually affect the entire web.*

Ask Students:

“How do you think the scenario would affect humans?”

We have much more invested in the environment than we often realize. Consider the economic, health, recreational and spiritual affects.

“How can such things be avoided?” What do you think we could do to prevent this from happening?”

Students may talk about things that individuals can do and changes to government policies. Emphasize that education and knowledge is key, and that citizens sometimes need to remind government to watch out for the environment we live in.

Discussion Points:

- Note that there are some connections to abiotic elements, these items may not be affected by changes in the same way that living things are, but they still may change.
- After a few strings were removed much of the web should have collapsed onto itself. Discuss what happened and who else has been affected.
- Consider how the results would have varied if a different element was destroyed first.
- It is impossible to predict how such destruction can change an ecosystem. If an individual animal is removed, there may not be the same short term devastation; however the balance of the ecosystem will change permanently and in unpredictable ways. Students may be able to come up with elaborate connections that may be very valid in a real world situation.
- Students should appreciate that the destruction of a web of life can occur in the natural world.

Part III (Ideas) 15-25 minutes:

“Let’s make an action list of all the things we can do at our school and home with our families to protect and support the web of life that makes up the whole province of Newfoundland and Labrador.”

This list can range from reusing and recycling to doing river clean-ups and choosing alternate transportation. Encourage students to come up with ideas for many different aspects of their daily lives and for a variety of concerns that affect the web of life. Encourage them to choose at least one idea to try for a week. You may wish to have students make a poster for the school about small changes that can make a big difference.

Part IV (Activity) 20 minutes:

You may find it useful to complete the “A Special Place” lesson prior to starting this section. Each student will need the “Web of Life Activity Sheet.”

Ask Students:

“What is your favourite natural place to visit? What makes up the natural community in that place?”

This might be their backyard, the school yard or a campsite they like to visit. Continue to ask the next few questions to help the students to develop a full list of natural elements found in their special place for when they start the activity sheet.

“Have you seen animals catch and eat other animals in that place (**predator, prey**)? What do the different **populations** of animals eat (**decomposers, herbivores, carnivores, omnivores**)?”

*Some examples of what the students might be able to identify: **decomposers** that break down dead organic matter (such as earthworms and mushrooms); **herbivores** that eat only plants (such as butterflies); **carnivores** that eat only other animals (such as hawks), **omnivores** that eat meat and plants (such as many song birds).*

To Do:

Now let’s consider the different populations of plants and animals in the special place that make up the natural community. “Using your activity sheet, draw a web of life that describes the **community** in your special place. As you are drawing consider all the different **populations** of **producers**, that make food from sunlight, and **consumers**, that need to eat plants or animals for nutrients. What are the predators and prey in your place?”

“Label the plants and animals as decomposers, herbivores, carnivores or omnivores.”

“Use arrows to show as many different food chains as you can make in your web.”

Once students answer the questions about the relationships they have drawn, display the webs.

Part V (Evaluate) 15 minutes:

“Are there similarities between our webs? What features are similar or different? What kinds of habitats are represented in this collection?”

“What about our definition for the word ‘life’?”

Finalize a concise definition that everyone agrees with.

Discussion Points:

- Identify the sun as source of energy for all of the webs.
- Each sheet will probably have plants and insects.
- The highest predator in most cases might be birds or some students might put domestic cats into the web. This could introduce the concept of human’s effect on their web of life.

Extension Activities:

1. Students can construct a web of life that includes all the ecosystem elements that exist in a nearby natural area or in your school yard.
2. Choose a marine species and think about how it meets its needs in its habitat. Find out what the organism eats, and how it gets its food. Construct a food chain for that species, and classify the organisms according to their role in the food chain (predator, prey, etc).
3. Further explore this topic with the “Going Gone” activity.
4. Take a nature walk near your school to analyze the natural community there. Identify: biotic and abiotic features, different plant and animal populations in the area, micro-environments that exist (small pools of water, the world under a rock), and how humans have affected this area.
5. Consider how invasive or introduced species might affect the web by using the string or revisiting the webs the class designed. When a new species is introduced it may take over the niche, or specific placement in the web, that a natural species already occupies changing the ability for that original species to meet its needs. How might this change the web of life in the community?

