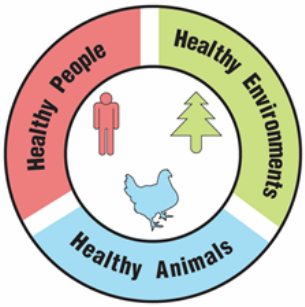
Bees and Biodiversity

Activity Guide



Overview:

Participants will explore the role of bees in biodiversity and learn how different species in an ecosystem rely on bees. This activity can be used on its own, or to provide context for another bee-friendly activity such as a native plant giveaway/planting, insect crafts such as bug hotels/bee baths, pesticide awareness/integrated pest management education, events showcasing local food or honey, and more!

Time Needed:

30-45 minutes

Audience:

This activity is recommended for ages 6-adult and for groups of up to 20. It can be adapted for different sized groups and ages.

Objectives: Participants will…

- Organize plants and animals by constructing a model of an ecosystem.
- Identify the role of bees in an ecosystem.
- Define biodiversity.
- Discuss how bees support biodiversity.
- Recognize the connected nature of the health and well-being of humans, animals and the environment.

Materials:

- Supplies for activity methods A, B or C:
    - *For Method A: Yarn Web*
        - A set of plant and animal cards for an ecosystem (at least one card per participant) – see Note below
        - A ball of yarn
    - *For Method B: Food Web*
        - A set of plant and animal cards for any ecosystem (at least one card per participant) – see Note below

 This activity was developed with support from the National Institutes of Health under Award Number R25GM132758. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

        - Small pieces of string, sticks, or other similar items
    - *For Method C: Ecological Jenga* (see Eco-Jenga game)
        - Jenga blocks (https://www.jenga.com/)
        - Painter's tape or masking tape
        - Marker
- *Optional*: Copies of the ***Bees and Biodiversity*** handout – 1 for each participant

Note: For methods A and B, you can use any set of plant and animal cards. We have included a set of cards that you can use. Many different types of cards are available online (such as Coniferous Forest Flashcards, Food Web Cards, or Web of Life Washington State Flashcards) or you can make your own. Your group could also choose an ecosystem and then have participants choose their own organism from that ecosystem and write it on a sticky note or index card.

Preparation:

- Review the ***Bees and Biodiversity*** handout, as background information.
- Decide which method (A, B, or C) you will use with your group.
    - For methods A and B, gather or create your ecosystem's plant and animal cards.
    - If you are using method C, you may want to label the Jenga blocks in advance to save time. Make sure to label the end of the Jenga block so it is visible while the block is in the tower.
- *Optional:* Print copies of the ***Bees and Biodiversity*** handout for participants.
- **Note:** This activity assumes that participants have a general understanding of food webs and energy flow through an ecosystem. **Method C requires more background knowledge (e.g., producers and consumers) than Methods A and B.** You may need to prepare your group with background knowledge on food webs or plan for more time for the activity. **Method A is recommended for groups with minimal background knowledge.**
- **Adaptations for different age groups: Younger** participants may need to spend more time on the creation and discussion of the food web (Steps 1-4), while **older** participants may spend more time on an in-depth discussion of biodiversity (Step 5).

Optional assessment opportunity:

The ***One Health as a Tool for Informal Assessment*** activity can be easily integrated into this activity to provide an informal assessment opportunity. Check out the "One Health Connection" boxes throughout for related discussion prompts.

Description of Activity and Suggested Procedure:

1. Follow the steps below for the method that you selected (A, B, or C).

   Method A - Yarn Web (Recommended for groups larger than 10, younger participants, and older adults)

   i. Gather in a circle and give each participant a card.

   ii. Starting with one participant, have them hold onto the end of a ball of yarn and say the plant or animal on their card.

   iii. Ask other participants to raise their hand if they can identify a connection between that plant/animal and the plant/animal on their card.

   iv. The starting participant tosses the ball of yarn (still holding onto the end of the string) to a participant that has a connection to the original card. The second participant then shares what the connection is. (Example: *My animal eats your plant*.)

   v. Continue passing the ball of yarn as connections are identified between the plants/animals on the cards, with each person holding onto a strand of yarn when they throw the ball. Eventually you will build a web of yarn crisscrossing the circle.

   Adaptation for limited mobility: Attach the cards to a surface (such as a wall, corkboard, or whiteboard) and use tape to build the yarn web between cards.

   Method B - Food Web

   i. Work collaboratively to arrange the cards into a food web on a table or the floor.

   ii. Lay down small pieces of string, sticks, or other markers to demonstrate which cards are connected. Try to include every plant/animal card in the web.

   Method C - Ecological Jenga (Recommended for ages 11+)

   i. Play Ecological Jenga following the instructions at: https://discoveryplace.org/stay-at-home-science/explore-what-causes-an-ecosystem-to-collapse/

   ii. In Step 1, make sure to label the ends of the Jenga blocks so the labels are visible when they are in the tower.

   iii. Follow the directions at the Ecological Jenga link through Step 4, but do not yet remove any blocks.

2. Work as a group to identify which plants and animals depend on bees. If you identify that an organism that depends on bees, remove its card or Jenga block following the instructions below for the method you are using. Facilitators may need to ask questions to help identify connections or provide fun facts from the ***Bees and Biodiversity*** handout if participants are stuck. Encourage participants to think creatively and consider asking questions like: “How does this plant reproduce?”, “What does this animal eat?”, “What might this animal rely on flowering plants for?”, “Where does this animal live?”, “What do you think might eat a bee?”. It is OK if you do not identify every connection or if you do not know if some

suggestions are correct. The goal is to think about how bees might play a role in the ecosystem.

A. If you are using yarn (method A), ask the participant who is holding the identified organism's card to drop the yarn and step out of the circle. Keep going until you have tried to identify a connection to bees for each plant/animal card. If using the adaptation for limited mobility, remove the cards from the wall when a connection is identified.

B. If you made a food web (method B), remove the card for the identified organism. Keep going until you have discussed each card.

C. If you are playing Ecological Jenga (method C), remove the block for the identified organism and set it aside. Keep going until the tower falls or you have discussed each block.

4. Look at the organisms remaining in your yarn/card web or Jenga tower and discuss. Ask your participants if there are any more organisms that the group would like to remove. New connections may have arisen later during the activity, so revisiting the organisms you discussed first may lead to new realizations. Look for patterns in the organisms that you removed and that remain. Ask participants what they notice.

One Health Connection:
How might humans fit into your ecosystem model?

- **Remember**, the goal of this activity is to understand that bees support biodiversity in numerous ways within an ecosystem; it is OK if your group did not remove all of the organisms that may depend on bees.
- You should find that many groups of organisms are affected, such as flowering plants (including trees), insects, birds, and mammals. All levels of the ecosystem are affected (producers, primary consumers, secondary consumers, etc.).

5. Ask participants if they have heard of the term "biodiversity", and what they think it is. Explain that biodiversity, or biological diversity, refers to having a variety of different organisms with different interactions. Ask participants if they think bees are important for biodiversity and why. Your group should have found that a variety of organisms depend on bees through many different interactions, such as pollination, shelter in pollinated plants, eating bees or honey, eating flowering plants, and eating animals that eat pollinated plants.

One Health Connection:
How might having many different species lead to a healthier environment? How do humans depend on biodiversity?

6. **Wrap-up**: As an "exit ticket" or closing discussion prompt, ask participants to share the most surprising thing they learned about how bees support biodiversity.

7. **Optional**: Send participants home with the ***Bees and Biodiversity*** handout.

Looking for more ideas?

- Learn about the food system and meet some of the bees that feed us with the ***Meet the Billion Dollar Bees*** activity.
- Explore the role of bees in your own diet with the ***Do Bees Feed You?*** activity.
- Experience the ups and downs of life as a bee by playing the game ***A Bee's Life***.
- Deepen your understanding of how bees are important for the health of humans, animals, and the environment with ***The "One Health" Approach: An Activity Tool***.

Bees and Biodiversity

Biodiversity is the word used to describe the different species in a region or ecosystem. This includes plants, animals, bacteria...all the living things in an area. These living things interact in many ways to make up an ecosystem.

Bees, and other pollinators, are essential for biodiversity.

About **2 out of every 3 plants on earth need pollinators** to make seeds and reproduce. Crops, wildflowers, and plants from clover to goldenrod and blueberry bushes to willow trees are all pollinated by bees.

Bees are the most common pollinators. There are over 20,000 species of bees in the world, and over 4,000 species native to the United States. **Some bees**, like bumble bees, **pollinate many different** plants. Others, like squash bees, **specialize in certain types of plants** – squash bees only visit squashes, pumpkins, other gourds and melons.

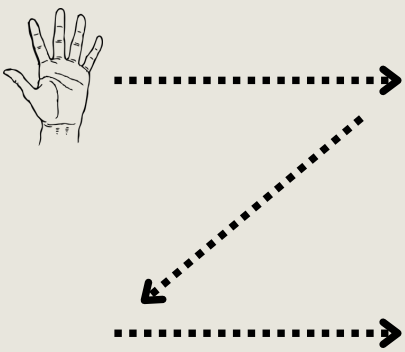
Animals rely on bees for food and shelter.

Animals also need bees and pollination to survive. **Herbivores**, like deer, rabbits, mice, squirrels, and some species of birds and insects **eat plants pollinated by bees**. Some animals need plants for **shelter** as well as food.

Don't forget about **carnivores** and **omnivores**! Without their plant-eating prey, animals like coyotes, foxes, bobcats, snakes, and owls would go hungry.

Bees also have a natural role in the food chain. Some birds, wasps, and spiders **eat bees**. Bears, racoons, and skunks will **raid bee nests** to eat honey, larvae and adult bees.

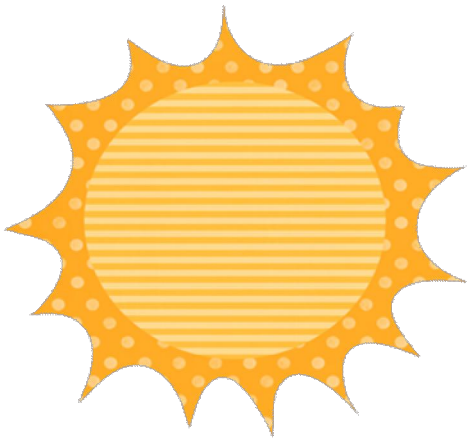
Bees also depend on biodiversity. Bees need to visit many different plant species to find **flowers and nectar across the seasons**.



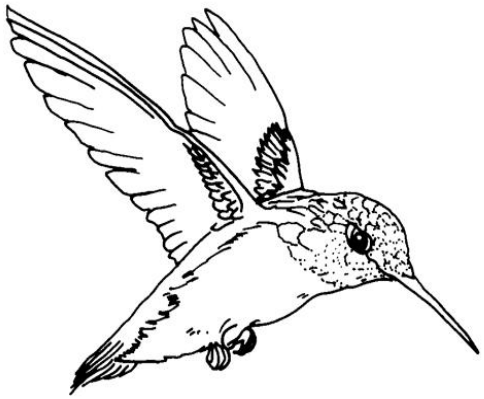
Bee safety tip:

The next time you see a bee buzzing around, remember it may be carrying pollen from one flower to another! Stay calm and still, and the bee will likely pass you by. If you want to help it along faster, slowly move your hand in a large "Z" shape in front of you. The breeze will encourage the bee to continue on.

Plant and Animal Cards



ENERGY=
SUN



HUMMINGBIRD

RED FLOWER

RABBIT

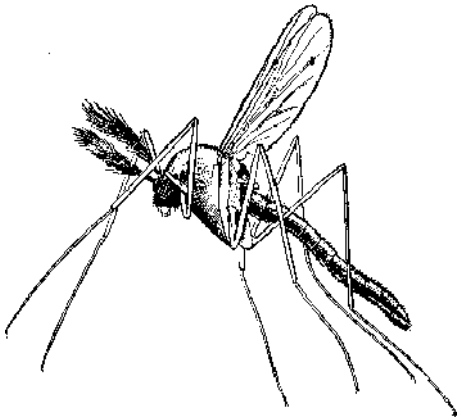
SKUNK

SQUIRREL

Food Web Cards for Greeting—Eat Up
Created by Lindsay Comstock, 2008-2009, ISD #719

FIELD MOUSE

GOPHER SNAKE



MOSQUITTO

DEER

COYOTE

RED-TAILED HAWK

Food Web Cards for Greeting—Eat Up
Created by Lindsay Comstock, 2008-2009, ISD #719

POISON OAK

WALNUT TREE

ACORN

GRASS

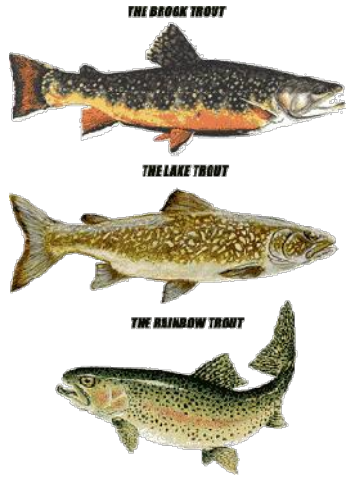
WHEAT

BERRIES

Food Web Cards for Greeting—Eat Up
Created by Lindsay Comstock, 2008-2009, ISD #719

BEE

BROWN BEAR



TROUT

GREAT-HORNED OWL

BOBCAT

RACCOON

Food Web Cards for Greeting—Eat Up
Created by Lindsay Comstock, 2008-2009, ISD #719

ALGAE

WILDFLOWERS

MONARCH BUTTEFLY

VOLE

CHICKADEE

WORM

Food Web Cards for Greeting—Eat Up
Created by Lindsay Comstock, 2008-2009, ISD #719