POWERFUL POLLINATORS!

BACKGROUND

Bees and other pollinators are crucial to plants, and plants are crucial to life as we know it. Plants give us and our fellow species so much more than food. They create the oxygen we breathe, clean the water we drink, and provide us with medicines, fibre for clothing, materials for building and even some surprising things like adhesives! In a food chain, the energy from plants is passed up the chain from one organism to the next. As such, plants are like the first storey in a house of cards; remove that, and…

In order to create fruit and/or seeds that will grow into new plants, a plant's pollen has to be transferred from the male anther to the female stigma. Some plants have both of these parts and can pollinate themselves. Others have both parts but need pollinators to move the pollen from the male part to the female part. Still other plants are either male or female, so self-pollination is impossible. That's why bees and other pollinators are so essential.

Bees and other pollinators are under threat due to stressors such as loss of habitat, pesticides, and climate change.

Biodiversity refers to the variety of life on Earth. The more species there are in an ecosystem, the more biodiverse it is. And the more biodiverse an ecosystem is, the more resilient it is. For example, in a forest that contains only one tree species, a disease or pest that preys on that tree species could jeopardize the entire forest ecosystem. Conversely, a forest that has many different tree species is less likely to be wiped out by a single disease or pest.

CURRICULUM CONNECTIONS

Key concepts include:

- Identify what living things provide for other living things.
- Describe changes or problems that could result from the loss of some kinds of living things that are part of everyday life (e.g., if we lost all the insects, all the bats, all the trees, all the grasses).
- Describe the characteristics of a healthy environment, including nutritious food, clean air and water, and explain why it is important for all living things to have a healthy environment.
- Human activities can have both positive and negative impacts on the environment.

The activities below allow students to observe, compare, contrast, classify, record, evaluate, and use various communication skills.

Discussion Starter

Watch ClearWaterKids Challenge – Bees and Biodiversity (3:09)

Ava, Ari and Potato the Chicken try to solve this riddle: What do bees have to do your favourite jeans? Along the way, they look at how bees pollinate flowers so that plants can reproduce and suggest steps kids can take to ensure a healthy future for bees.

Pre-viewing Probes

- *Can you think of an insect that produces food that we eat? (Give clues to guide students' thinking.)*
- *Bees make honey. What else do you know about bees?*
- *What do you think bees might have to do with a pair of jeans? Let's watch the video to find out.*

Post-viewing Prompts

- *Did anything in the video surprise you? What and why?*
- *What do bees have to do with jeans? (Cotton plants actually can self-pollinate, but bees and other pollinators significantly increase the yield of the plants.)*
- *What other pollinators do you know of?*
- *How would the world be different without bees?*

Try This

Small but Mighty

Students will take on roles of plants, pollinators, herbivores, and carnivores to see how the whole Energy Pyramid is affected when pollinators are removed.

What You Need

- A circular tablecloth. Optional: large yellow cardboard or cloth sun in the centre
- Five or six small balls (e.g., marbles, golf balls, tennis balls)
- An indoor or outdoor space large enough to have the class circle around the cloth
- Large labels or headbands that students can illustrate/write on and wear
- Large diagram/slide of an Energy Pyramid (see first bullet, below)

What to Do

1. Referring to the Energy Pyramid graphic, ask the students to work with a partner or small group to explain:
    - Why it is shaped like a pyramid;
    - What role bees and pollinators play in the pyramid;
    - How the Energy Pyramid relates to the building blocks demo in the video.
2. Have small groups share their explanations with each other or the whole group.
3. Assign roles to the students: more than half the class will be plants; a quarter will be bees, butterflies, or other pollinators; one or two students will be top predators (e.g., wolf, hawk); the rest of the students will be herbivores that eat the plants and are eaten by the top predator (e.g., rabbit, chipmunk, squirrel, mouse, deer). Students can create labels or headbands to show their role.
4. Students form a circle around the tablecloth, with the different roles equally distributed. Ask the students to carefully lift the cloth while balancing all of the balls in the centre.
5. Give instructions for the class to follow:
    - None of the pollinators came to the garden this year. These students must let go of the cloth. (The other students need to keep the "energy" balanced in the middle of the cloth.)
    - Without pollinators, the plants did not make enough seeds to reproduce, so half of them must let go of the cloth. (Designate which "plants" leave. It should now become difficult to balance the balls.)
    - The herbivores did not have enough food because of the reduced number of plants to eat. Half of them must now let go of the cloth. (Designate which "herbivores" leave.)

Debrief

- Ask the students to explain what happened in the "garden."
- Discuss how different life would be without bees or other pollinators.
- Discuss ways pollinators have an impact on us and ways we have an impact on them.
- Brainstorm and record:
    - Questions for further research
    - What can we do to protect pollinators?

Explore Outdoors

Prowling for Pollinators

Students will investigate flowers and pollinators in a local habitat.

Before You Go

- Build interest by reading a picture book about how bees pollinate flowers (see page five).
- Students brainstorm:

- What they think they might see
- What to look for and how to look (e.g. use magnifiers to look at pollen and plant parts; notice the colours, shapes and smells of flowers; notice which flowers pollinators seem to prefer, etc.)
- How to record observations
- How to to keep themselves, flowers and pollinators safe
- What they are wondering about

What You Need

- Magnifiers
- A way to record observations (e.g., clipboards, paper and drawing tools, and or camera/s)
- Optional: flower and insect ID guides

Note: Follow school protocol for students with bee allergies.

What To Do

- Head out to the schoolyard, garden, or park where a variety of flowers are growing to explore, observe, and record.
- Back in the classroom, share observations and compare them with predictions.
- Brainstorm questions for further research.

Follow-up: Design a Bee-friendly Garden

- In pairs or small groups, students refer to their observations, books, and websites to research native perennial flowers that attract bees and other pollinators. Each group could research a particular flower or flowers. Using sticky notes and a large chart, groups record information about their flower under headings such as: Height, Space Needed, Type of Soil, Amount of Sunlight, Watering, Bloom Time, Fun Facts.
- To plan the garden layout, students can draw or paint and cut out pictures of plants they have researched and place them on mural paper. Don't forget to include pollinators!
- If your schoolyard has a vacant area for planting, use the mural as a guide to plant a garden and bring the design to life.

Take Action

Be a Bee Protector

- Brainstorm more ways to help protect bees. For example:
  - Avoid using pesticides and other chemicals that harm insects.
  - Give bees a resting place where they can quench their thirst after a hard day pollinating. Arrange pebbles in a shallow dish or birdbath and add enough water to almost cover the pebbles. (As shown in the Bees and Biodiversity video.)
  - Protect and/or plant trees. Bees get most of their nectar from tree blossoms and often make their homes in trees.
  - Learn more about bees and spread the word by telling friends and family about the importance of these tiny but powerful insects.
  - Become a citizen scientist at BumbleBeeWatch.org.

More to Explore

- Check out this ClearWater Kids activity sheet for fun facts about bees and ideas for exploring nature: Nature Notes.
- Look for these theme-related books:
  - ***Big City Bees*** *by Maggie De Vries and Renné Benoit, Greystone Books, 2013.*
  - ***Buzz About Bees*** by Kari-Lyn Winters, Fitzhenry and Whiteside, 2013.
  - ***Daphne's Bees*** by Catherine Dempsey and Veselina Tomova, Running the Goat Books, 2022.
  - ***Follow That Bee! A First Book of Bees in the City*** by Scot Ritchie, Kids Can Press, 2019.
  - ***What's the Buzz: Keeping Bees in Flight*** by Merrie-Ellen Wilcox, Orca Book Publishers, 2015.
  - *ClearWater Kids Booklist* for more great Canadian books on nature and science.
- Visit Science North for more hands-on, curriculum-linked learning resources and lesson plans