

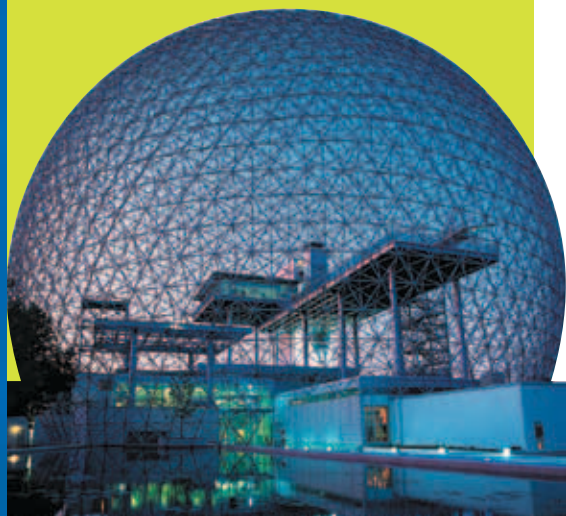
# Biosphere BioKits ACTIVITY GUIDE FOR EDUCATORS

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*Published by Environment Canada's Biosphere, in collaboration with its valuable partners, the BioKits serve as guides enabling participants to explore Canada's biodiversity in a fun and interactive manner at any time of year. They are among the education and awareness-raising products for various audiences developed by the Biosphere, environment museum. Explore more educational activities and products on the Biosphere website at [ec.gc.ca/biosphere](http://ec.gc.ca/biosphere).*

*Youth groups will get the most out of their explorations if they complete some of our suggested activities before leaving for their outing and upon their return.*



## BE CAPTIVATED!

Whether your starting point is school or the local cub scout hall, you are about to embark on an adventure that is "larger than life".

Young explorers (students grades 3 to 6, cub scouts, 4-H clubs, day camps, etc.) and their teachers will be awed by the nature that surrounds them!



## Links with school programs\*

Skills and attitudes	Topics
Critical thinking	<b>Life Science</b>
Scientific inquiry	<ul style="list-style-type: none"> <li>• Senses</li> <li>• Needs of living things</li> <li>• Animal growth and changes</li> <li>• Plant growth and changes</li> <li>• Habitats and communities</li> <li>• Diversity of life</li> <li>• Ecosystems and interactions within</li> </ul>
• Questioning	<b>Earth Science</b>
• Observing	<ul style="list-style-type: none"> <li>• Daily and seasonal changes</li> <li>• Weather</li> </ul>
• Classifying	<b>Humans, Environment and Society</b>
• Interpreting (observations and data)	<ul style="list-style-type: none"> <li>• Human-environment interactions</li> <li>• Interdependence of living things</li> <li>• Local environmental issues</li> <li>• Individual and community solutions and actions in favour of the environment</li> </ul>
Problem solving	
Creativity	
Citizenship	
Cooperation	

\* Given that Canadian education curriculums vary from province to province, teachers are invited to use this information as a general reference.



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## WHAT IS BIODIVERSITY?

Biodiversity loss is currently one of the major environmental issues facing us. Biodiversity, or biological diversity, is

- the variety of species (animals, plants, mushrooms, bacteria, etc.) living on Earth;
- the variety of individuals of the same species (differences in colour, size, shape, etc.);
- the variety of ecosystems (forest, marsh, desert, etc.) where these species evolve; and
- the interactions among the species of the same ecosystem.



## WHAT ABOUT US?

We are also part of biodiversity and our actions have major repercussions on ecosystems. Biodiversity is indispensable to our survival; without it, life on Earth would not exist as we know it. We use the products and services of biological diversity every day for food, clothing, shelter, to filter air and soil, in manufacturing our drugs, etc. Although we often take it for granted, biodiversity is seriously threatened, particularly by human activities.



## TIME FOR SOME ACTION!

The activities we propose will give your students a better understanding of

- the relationships among species within an ecosystem;
- the dangers threatening biodiversity; and
- the impacts that biodiversity loss can have on our way of life.

The young participants will be encouraged to think about simple actions they can take individually and collectively to protect nature's bounty.





# INTRODUCTORY ACTIVITY

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## THE WEB OF LIFE

### Goals:

- Facilitate participants' understanding of the concept of "ecosystem" and the relationship between species and their habitats.
- Make participants aware of the impacts of habitat modification on the survival of the species that live there.

**Time:** 40–50 minutes

### Materials (per team of four to six students):

- easily pierceable cardboard (e.g. cardboard box);
- 12 pointed wooden rods (e.g. skewers);
- 10–12 small light balls (e.g. ping pong or styrofoam), ideally of varied diameters (3 to 5 cm);
- sticky tack, paper, sculpting clay or alternative materials (to identify the rods, use whatever is available and a little creativity);
- coloured felt pens; and
- a transparent container, approximately 10–15 cm high (for example food storage containers). The surface must be large enough to serve as a base for the tower.



### Constructing the game

- **With the cardboard, make a square tower about 10 cm per side and 25 cm high.** Leave both ends open. This tower represents an ecosystem. The participants will be able to draw a natural landscape on it.
- **Turn the transparent container upside down.** Cut an opening at the top that is slightly smaller than the tower's base. Place the tower on the container base.
- **Take between 10 and 12 balls.** On each ball, draw a plant (flowers, trees, etc.) or an animal (fish, insects, birds, mammals, etc.).
- **Draw four representations for each of these habitat components** (water, food and shelter) on paper circles, for a total of 12. Fasten each circle on the unpointed ends of the rods.



*Suggestion: First build a prototype of the game to serve as a model.*

## HOME SWEET HOME

- Ask the participants if they know the words “**ecosystem**” and “**habitat**”.
- Explain the two words:
  - A **habitat** is the natural living environment of any living being. The beings that are found there must have access to water, food and shelter or space to live.
  - An **ecosystem** is a system of living organisms and their physical environment (soil, air, water, light). All elements of the system are in interaction.
- Ask the participants to give examples of ecosystems (ocean, forest, lake, city, dead tree, pond, etc.).



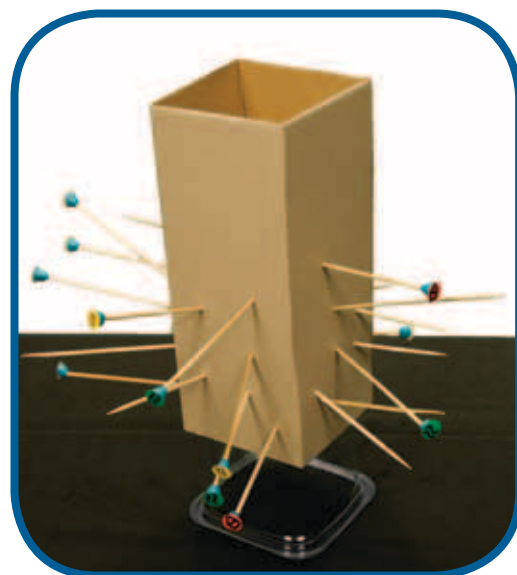
- **Explain the goal of the game:** understand the relationship between living beings and the environment in which they live.
- **Show the model** of the game.
- **Form groups** of four to six participants and give them the instructions to make the game.





## LET'S PLAY!

- **Show the participants how to pierce** the tower with the rods.
- **The young participants stick the rods** (water, shelter, food) into the **lower half** of the tower. The 12 rods must pass through the tower and cross one another in the middle in a random manner.
- **The compact trellis created** by the rods will support the balls.



*This “web” is the image of a rich environment, because water, food and shelter are abundant, so living organisms can survive there.*

- **Balls representing different organisms** are added from the top of the tower.

*Animals and plants begin to populate the ecosystem. When the ecosystem is healthy and the habitat components are abundant, the organisms reproduce. Everything is going well!*



## DANGER!

When the habitat undergoes changes, this has consequences on the species that live there. Here are some examples of changes and the consequences:

- There is a drought in the region and many plants have died – a **FOOD** rod is removed.
- Pesticides have been spread, contaminating the water – a **WATER** rod is removed.
- Many trees have been cut down to make way for construction – a **SHELTER** rod is removed.



## CHAIN REACTION

- Each group in turn gives other examples of habitat changes. If the educator validates the example, all the groups remove the corresponding rod.
- The rods that are removed represent habitat degradation. At first, removing one or two rods has no major consequences for the organisms, because the other rods maintain the support. As more rods are removed, we reach a critical point: the holes in the web get bigger and some balls start to slip through the trellis, falling into the transparent container below. These balls represent the organisms that have died. From that point on, the process speeds up and removing just a single rod causes a number of balls to drop. More and more organisms die; a large proportion of the species of this ecosystem are endangered.

- **The game continues** until all the balls have dropped into the container base.

- The educator confirms the participants' understanding of the relationship between habitat "richness" and species survival by asking them to explain it in their own words.





# MAIN ACTIVITY

## BIOKIT OUTING!

It is now time to explore your region's biodiversity!  
Here are some tips to make your outing a success:

- **Read the instructions on page three of your chosen BioKit.**
- **Promote teamwork** by forming small groups of four to six participants, ideally accompanied by one adult per group.



### Preparation:

- **Set a meeting place** for everyone (departure and return).
- **Complete the *It's a Go!* pages** with all the groups together.
- **Set a time limit** (the activities usually can be performed in 60 to 90 minutes).
- **If possible, to enrich your outing,** provide for accessories or additional images to discuss biodiversity (feathers, fur, nests, bones, pictures of other seasons, etc.).



### ENJOY YOUR DISCOVERIES!

- When each small group returns, it completes the **My Diagnosis** section.



### Before you leave:

- Make sure you have all the signed parental permission slips (if applicable).
- Introduce or review the notion of biodiversity.
- **Set a time and location for your return.**



## CHECKLIST

*In order not to forget anything, use this checklist to make sure you have everything you need for a memorable outing.*

### Necessary materials:

- ☐ BioKit of your choice (1 BioKit / 4 students + 1 copy / guide for each subgroup)
- ☐ Clipboard and pencils
- ☐ Watch (for each guide)
- ☐ Seasonal clothing (hat, tuques, mittens, closed footwear or boots, etc.)

### Optional materials:

- ☐ Camera
- ☐ Binoculars
- ☐ Magnifying glass
- ☐ Pocket mirror
- ☐ Chronometer
- ☐ Headband
- ☐ First aid kit
- ☐ Sunscreen
- ☐ GPS or compass
- ☐ Accessories that could enhance your experience (feathers, nests, bones, photos, etc.)
- ☐ Identification guides (birds, mammals, invertebrates, plants, etc.)

### When you get back:

- Complete the **My Diagnosis** page at the end of the BioKit.
- Discuss your outing (encouraging elements, "less" encouraging elements, etc.).



# CONCLUDING ACTIVITIES

When the participants return to the main group, have them discuss their experiences.

- **Did the students make surprising discoveries?**
- **What did they prefer** – what was their “favourite”?
- **What didn’t they like at all?** What worries them?

Each small group gives a presentation to everyone on their diagnosis of the environment they explored. The educator encourages them to give specific examples that explain their diagnosis.

Ask them what they would change if they had a magic wand.



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## POLLINATORS AND ME!



- **Goals:** Have the participants understand that biodiversity loss has very specific impacts that could change their way of life.
- **Time:** 15–20 minutes
- **Materials:**
  - tray;
  - typical breakfast foods (it is important to include fruit juices, fruit yogourt, honey, various fruits, coffee in a cup, milk, cheese, bread). Some foods can be simulated by putting only the packaging on the tray (juice bottle, empty yogourt container, coffee cup, etc.).



## BIODIVERSITY AT YOUR SERVICE

Begin a discussion on the impacts of biodiversity loss.

In **The Web of Life** activity, you learned that species are at risk for different reasons.

- Do you believe this is important?
- How does this change things in YOUR life?
- Give examples of things we could no longer do if certain plant or animal species disappeared.  
For example:
  - With no trees, we would have no paper.
  - With no sheep, we would have no natural wool.
  - With no birds, we wouldn't hear and enjoy their songs.

*Note to the educator: this refers to "ecological services." See the information on this subject in the **For more information** section.*

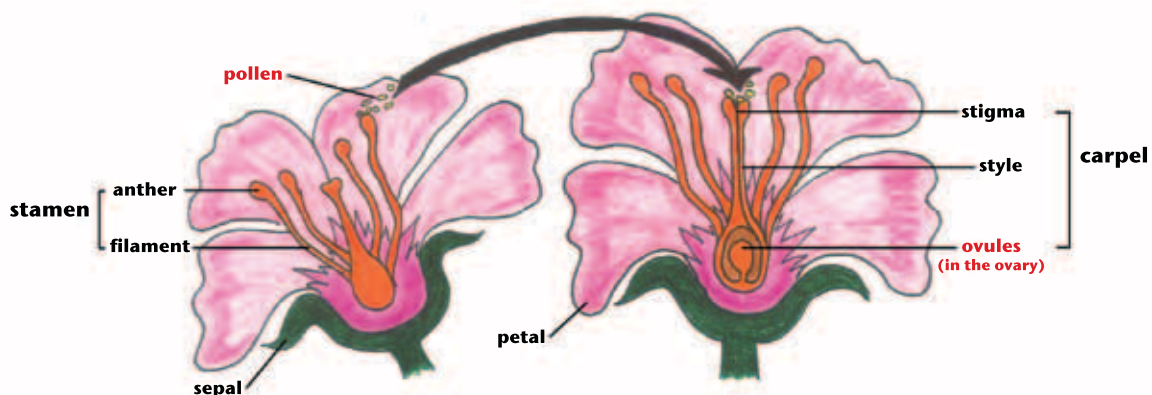


## THE BIRDS AND THE BEES...

- Have you ever heard the words "**pollination**" or "**pollinators**"?
- What is pollination?
- What are pollinators? Name some of them.



Pollinators (e.g. bees, wasps, butterflies, flies, birds and even bats) transport pollen from flower to flower; the result is that the pollen comes into contact with the flower's ovule. Thanks to pollinators, flowers are fertilized and can produce seeds and fruit.





## FROM BLOOM TO BOWL...

Imagine what would happen to our farms and food if the pollinators disappeared.

**Present the breakfast tray.** Ask the children to find the individual foods in this meal that would no longer exist or would be different if the pollinators disappeared. Take the foods off the tray as the children name them. Here are some of the answers:

- **Honey** (naturally!) along with all the fruits, fruit juices, fruit yogourts.
- **Coffee** (coffee plant flower – see picture at the bottom of page): there would be less of it without pollinators.
- **Milk** and **cheese** would taste different (cows need to feed on a variety of plants to be healthy and produce rich and tasty milk – many of those plants need pollinators).
- **Bread** would not be affected since grass pollen travels by wind!



## LITTLE CRITTERS, HARD WORKERS!

Around the world, pollinators are responsible for 70% of our crops; this is huge, as you have clearly seen in the breakfast game.

Currently, pollinators are threatened by

- **habitat loss;**
- **pesticide use;**
- **competition with other species** (often alien);
- **monoculture;**
- **diseases and parasites;** and
- **light pollution.**



## WAVING MY MAGIC WAND!

It's time to take action!

What could you do to prevent biodiversity loss?

Around school? At home?

### GET YOUR HANDS DIRTY!

- **Plant native plants** around the school.
- **Organize a cleanup event** in your neighbourhood to get rid of waste that is harmful to animals and that pollutes ecosystems (plastic bags, glass, cans, etc.).
- **Put flower boxes** around your home.
- **Plant a garden at home** (even on a balcony).



### LIVING WITH YOUR WILD NEIGHBOURS

- **When camping, leave dead wood in place**; this wood is a natural refuge.
- **Don't bring firewood when camping**, to avoid spreading harmful insects.
- **For outdoor lighting, choose non-dazzling lamps** or simply switch them off when lighting is unnecessary; artificial light disturbs many species (migratory birds, owls, nocturnal butterflies, fireflies, etc.).
- **Build shelters for animals** (bug hotels, bee houses, bat boxes, etc.).



### ONE STEP FURTHER...

- **Reduce paper consumption** by reusing paper printed on one side.
- **Make decision-makers more aware** by presenting them with your diagnosis of the section you explored and include your suggestions for giving biodiversity a helping hand.
- **Take photographs of your achievements** and show them to the people around you. Your actions may inspire others to take action!





## FOR MORE INFORMATION

### EDUCATIONAL ACTIVITIES

- Biodiversity Education and Awareness Network (BEAN – Ontario Biodiversity Council)  
[biodiversityeducation.ca](http://biodiversityeducation.ca)
- Canadian Museum of Nature – Teacher Zone  
[nature.ca/education/index\\_e.cfm](http://nature.ca/education/index_e.cfm)
- Canadian Wildlife Federation – Get Out!  
[cwf-fcf.org/en/action/how-to/outside](http://cwf-fcf.org/en/action/how-to/outside)
- Ducks Unlimited – Project Webfoot  
[ducks.ca/resource/teachers/index.html](http://ducks.ca/resource/teachers/index.html)
- Frédéric Back  
[fredericback.com/ateliers/index.en.shtml](http://fredericback.com/ateliers/index.en.shtml)
- Hinterland Who's Who – Action and Awareness  
[hww.ca/en/things-you-can-do/action-awareness](http://hww.ca/en/things-you-can-do/action-awareness)
- Ministère des ressources naturelles et de la faune (Quebec's department of natural resources and wildlife)  
[education.mrnf.gouv.qc.ca/chronique/nouvelle/trouvez-rapidement-les-outils-educatifs-mrnf-33.html](http://education.mrnf.gouv.qc.ca/chronique/nouvelle/trouvez-rapidement-les-outils-educatifs-mrnf-33.html)  
(in French only)
- Parks Canada – Teacher Resource Centre  
[pc.gc.ca/apprendre-learn/prof/index\\_e.asp](http://pc.gc.ca/apprendre-learn/prof/index_e.asp)
- Pollination Canada  
[pollinationcanada.ca](http://pollinationcanada.ca)
- Project WILD  
[projectwild.org/educatorresources.htm](http://projectwild.org/educatorresources.htm)
- The Rooftop Garden Project – Roots Around The World  
[rooftopgardens.ca/?q=en/node/1530](http://rooftopgardens.ca/?q=en/node/1530)
- Tree Canada – Resources for children and teachers  
[treecanada.ca/site/?page=home\\_kids&lang=en](http://treecanada.ca/site/?page=home_kids&lang=en)



## ECOLOGICAL SERVICES

- Ducks Unlimited Canada – Ecological Goods and Services fact sheet series  
[ducks.ca/conserve/wetland\\_values/conserve.html](https://ducks.ca/conserve/wetland_values/conserve.html)
- Développement durable, Environnement et Parcs Québec  
(Quebec's department of sustainable development, environment and parks)  
[mddep.gouv.qc.ca/biodiversite/capsules/index.htm](https://mddep.gouv.qc.ca/biodiversite/capsules/index.htm)  
*Fact sheets on ecological services (in French only)*

## WAVING MY MAGIC WAND

- Bat box  
[gardenersworld.com/how-to/projects/bat-box](https://gardenersworld.com/how-to/projects/bat-box)
- Bee house  
[familyfun.go.com/crafts/crafts-by-age/preschool-crafts/bee-house-876193](https://familyfun.go.com/crafts/crafts-by-age/preschool-crafts/bee-house-876193)
- Bug hotel  
[gardenersworld.com/how-to/projects/insects-bug-box](https://gardenersworld.com/how-to/projects/insects-bug-box)
- Native plants  
[nature.ca/discover/ntvplnts/ntvplnts\\_e.cfm](https://nature.ca/discover/ntvplnts/ntvplnts_e.cfm)
- Urban gardening  
[rooftopgardens.ca/?q=en](https://rooftopgardens.ca/?q=en)



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