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Frogs As Bioindicators

Written By: Joan Chadde Edited By: Phil Bergquist

Learning Objectives:

Students will be able to:

1. List the four essential parts of a habitat: food, water, shelter, and space.
2. Describe the frog food chain - one thing that a frog eats and one animal that eats frogs.
3. Give two examples of environmental changes (air and water pollution, dry weather, filling or paving a wetland, etc.) that can hurt frogs.
4. Explain why frogs are good indicators of environmental health (bio-indicators).

Materials Needed:

- Hard-boiled egg - Coke
- Green jelly - Leather purse
- Coffee filter - Party blow-outs (one per participant)
- 4 Different Colors of Paper

Cut each piece of paper into 4 squares. Each color should be marked with a letter (D, P, T or X). Each participant needs 6 squares of each color.

Frogs Tell Us If Our Environment is Healthy

Frogs are amphibians because they live part of their life in water and part of their life on land.

Describe the life cycle of a frog: Egg - Tadpole - Mature Frog.

Frogs are very important to us because they tell us how healthy our air, water, and soil are.

Frogs are like a thermometer that tells us when we have a fever; they tell us if there is pollution in the environment.

Demonstration

Why are frogs good indicators of environmental health (*Bio-Indicators*)?

- 1) Lay soft, jelly-like eggs in water that is much less protected than birds' eggs or reptiles' eggs. Show chicken egg and frog egg (jelly floating in water).

Ask: “Which egg would be more sensitive to water pollution?”

- 2) Have thin, moist, permeable skin. “Which one is tougher— a LEATHER (cow skin) or FROG SKIN (coffee filter)? Permeable means that things such as water, chemicals, food, etc. can pass through the skin). Hold up coffee filter, pour clean water through it and have students watch what comes out the bottom. Then pour coke through the filter. Tell students, “This is like the frog’s skin. What is it absorbing now?” Repeat with leather.
- 3) Different species require different habitats, and frogs live in both water and on land.
Bullfrogs are very large, as big as a fist! Bullfrogs and green frogs require a whole year to grow from a tadpole into a frog. Bullfrogs need a permanent lake or pond for breeding. Spring peeper are very small--- the size of a fingernail. Peepers require only 6-8 weeks to grow from a tadpole into a frog. Peepers can breed in small puddles or ponds (vernal pools), as long as they don’t dry up before the tadpoles mature into frogs.

Frog Survival Game

Each participant will be a frog. *What do frogs need to survive?*
Food, water, shelter = habitat.

The four characteristics of habitat are:

Food: How do frogs get their food? They use their tongue to catch mosquitoes, flies, fish, birds, water insects (algae and aquatic plants at tadpole stage)

Water: Clean water for breeding, keeping skin moist, wintering over.

Shelter: Places to hide from predators, i.e. burrow into mud, lily pads, grasses)

Space: Only a certain density of frogs per pond, need travel corridors between breeding sites and living areas in the forest).

FOOD	WATER	SHELTER	SPACE
orange cards	blue cards	yellow cards	green cards
(mark 1/2 with D)	(mark 1/2 with P)	(mark 1/2 with T)	(mark 1/2 with X)

- Party favor blow-outs with small piece of velcro attached to end; one per participant.

Directions: Give each student a party favor (blow-out) with velcro on the end (optional – perhaps students can help you make these). Spread out colored cards on blanket or table top, velcro side up (if using velcro). Tell the students, “Each of you is a

frog. Frogs don't use their legs to capture food, so you cannot use your hands. Use the party favor (with velcro on the end) to capture as many bugs as you can. Remember, frogs need to eat a lot of bugs to survive, so catch as many bugs as quickly as you can." Allow 3-5 minutes for students to catch bugs. After all the cards are taken, ask why some cards are left over. (Those bugs got away.) Have students sit in a circle.

EACH FROG MUST HAVE AT LEAST 5 BUG CARDS TO SURVIVE!!

(If not, have the player step into the middle of the circle and sit down.)

Turn Orange Food cards over. "Every one with an orange card, stand up! If your orange card has a D you've just become someone else's dinner! What eats frogs? (muskrat, heron, snake, fish, turtles, humans, hawks, minks, and otters.) (Have them step into the middle of the circle and sit down.)

Turn Green Space Cards over. "Green stands for the space you need! If your green card has a X, your puddle was filled in by someone wanting to build a house or shopping center there. (Have them step into the middle of the circle and sit down.)

Turn Blue Water Cards over. "Blue is the water you need. If your blue card had a P; P is for Pollution—what pollutants might affect frogs? Fertilizers, pesticides (to kill insects), toxic chemicals, acid rain.... (Have them step into the middle of the circle and sit down.)

Turn Yellow Space Cards over. "Yellow is the shelter that you need. If your yellow card had a T; T means that the tree or bush shading your pond was cut down and all of the water dried up before you could go from the tadpole stage to the adult frog stage.... (Have them step into the middle of the circle and sit down.)

Ask the remaining students which students got at least one card of each color— orange, green, yellow, blue, AND at least five cards with insects? Tell students, "If you are missing any one of these colors, you've croaked. You just disappeared." Have them step out from the circle. The remaining frogs SURVIVED!! "How many of you got lucky and survived?" Reiterate what frogs need to survive—food, water, shelter, and space in a certain arrangement.

Why did some frogs die?

- Habitat loss due to new house or shopping center in their home pond.
- Poisons/pollution in the environment got into their pond water.
- Got eaten by other animals (predators).
- Shade trees and bushes next to pond were cut down.

Test What You Learned!**1. Why are frogs important?**

- Frogs are part of the food chain.
- Frogs are a natural insecticide— without frogs the insect population would be much greater. (1 cricket frog = 4800 bugs/year). How many bugs could 100 frogs eat?
 - Frogs are sensitive to pollution and can be bio-indicators of environmental quality/health — their thin permeable skin is sensitive to poor water and air quality that would also affect humans--- may be first warning sign for humans.

Other Activities

1. Make a *Frog Food Chain mobile* - use animal pictures, construction paper, markers, glue, and yarn.
2. Make *Habitat for a Frog*: use clay, stickers, styrofoam trays or paper plates, Q-tips, markers, blue paper, glue to create food, space, water, and shelter for a frog.

FROG FOOD CHAIN

Fish	Snakes	Turtles	Hawks	Herons	Raccoons
		Mink	Otter	Humans	

EAT:

FROGS and TOADS

ARE EATEN BY:

Smaller Frogs	Insects	Spiders
Mites	Worms	Insect Larvae
Snails		

Bull Frogs/Green Frogs: crayfish, fish, mice, birds, turtles

One Cricket Frog: eats 4,800 insects each year.

One Toad: eats 3,200 insects each year.