

Declines and Deformities

*Amphibians are the caretakers of the earth.
They are the indicators, the messengers.*

Frogs, toads, newts and salamanders first appeared on earth about 400 million years ago, and adapted to occupy many different habitats – wetlands, forests, deserts and prairies. Over time, new species evolved to take the place of those that became extinct. Scientists estimate there are over 5000 species of amphibians on the planet today. Until recently, your chance of seeing a frog, toad or salamander was pretty high – they were everywhere! But now they appear to be big trouble. Amphibians are disappearing worldwide and no one is sure exactly why.

Amphibians are on the decline all over the world – in cities and rural areas, in rainforests and wetlands, in developed and undeveloped areas alike. Some areas that used to have healthy populations now have few if any amphibians. And some species, like Costa Rica’s Montaverde golden toad and Australia’s Gastric brooding frog are now believed to be extinct.

And while scientists study possible causes – habitat loss, global climate change, increased ultraviolet radiation, chemical and biological contaminants, and predation by invasive species – they still find more questions than answers. For example, amphibian declines are happening in surprising places – some of the biggest declines are happening in protected areas, like national parks and remote wilderness areas, rather than obvious places like cities or suburbs.

Scientists suspect declines are due to a variety of causes, rather than one big reason. For example, some scientists hypothesize that increased ultraviolet radiation may be weakening anurans’ immune systems, making them more vulnerable to parasites and disease. Researchers now believe that multiple causes like these and others may be responsible for a large number of worldwide declines.

**And if amphibians really are messengers, like canaries in the coal mine,
should we be paying closer attention? What message might they have for us?**

KIDS MAKE A DIFFERENCE!

When it comes to frogs, scientists owe a lot to kids! While on a field trip, a class of Minnesota 8th graders observed far fewer frogs than they expected, and noted many of the frogs they did see were deformed. They shared their observations with scientists, and spurred a world-wide investigation of amphibian populations!

You already have many of the tools you need to help amphibian populations – your curiosity, interest and enthusiasm will get you started. And by participating in activities in this curriculum, you’ll learn about what’s happening around the world.

In the meantime, here are some things you can do today!

1. Surf the web to find out more about amphibians in general, or in Southeast Alaska. Learn how to identify them by sight and sound. Then get outside and start looking, listening and learning!
2. Create frog-friendly gardens. Frogs like all sorts of plants and a well-watered yard – not a problem in southeast Alaska! Research the garden plants and products you use to make sure they are non-toxic and don't harm frogs or the foods they eat.
3. Don't pour oils or detergents down the drain, especially if they drain into local streams, rivers and wetlands. These are important amphibian habitats. Always dispose of chemicals correctly. If you aren't sure how to do this, call your local garbage hauler or city hall.
4. Keep ponds and stream litter free. Organize classmates or neighbors to clean up the waterways in your community to protect important amphibian habitat.
5. Share what you know. Teach others about amphibians and the trouble they might be in. The more we know, the more we can do to help.

A note about collecting live animals:

- Once an animal has been collected and kept in a classroom aquarium, it should NOT be released into the environment.
- Because many species require lots of space, confining them to a small aquarium for the rest of lives would be unfair.
- Toads and newts also contain glands that secrete poison. Rough-skinned newts are among the most poisonous animals in the world – be sure to wash your hands after handling.
- Finally, and most importantly, because there are so few frogs and toads in Juneau, collecting even a few could greatly impact an already declining population.

JSD AMPHIBIAN CURRICULUM

Science Activity: **Why do these amphibians look so weird?**

Introduction:

In this two part online activity, students will be introduced to the mystery of amphibian deformities. In the first part, students will learn about the scientific method. In the second, they will learn how scientists use the scientific method to discover potential causes for amphibian deformities. The websites you will use are full of information, including pictures of deformed frogs that will surely capture students' attention.

Objectives:

1. Students will be able to describe the scientific method.
2. Students will be able to name the four probable causes for frog deformities.

Materials:

1. Website: www.frogweb.gov
2. computer and computer projector

Procedure:

1. Before sharing with students, preview the www.frogweb.gov website and follow links to Deformed Amphibian Research at Hartwick College. You may find this site directly by going to http://info.hartwick.edu/biology/def_frogs/index.html.
2. Open www.frogweb.gov with students to introduce them to the scientific method, as well as research related to amphibian deformities.
3. Follow links to Deformed Amphibian Research at Hartwick College.

Assessment:

1. Students identify a simple problem and apply the scientific method to solve it.
2. Students choose one of the four causes for frog deformities and explore, verbally or in writing, whether that may be responsible for amphibian declines in southeast Alaska.

National Science Education Standards:

Content Standard A:

- Develop abilities necessary to do scientific inquiry
- Develop understandings about scientific inquiry

Content Standard G:

- Develop understanding of the nature of science

Alaska Content Standards:

Science A(1)

Science E(1)

Juneau School District Core Content:

Inquiry (5th):

How can we gather data to provide us with an explanation to our questions?

Life and Human Biology (6th – 8th):

Human Impacts: How do human activities affect our environment?

References:

Deformed Amphibian Research at Hartwick College. Sessions, Stanley K. Hartwick College. 16 March 2004 <http://info.hartwick.edu/biology/def_frogs/index.html>.

FrogWeb: Amphibian Declines and Deformities. National Biological Information Infrastructure. Center for Biological Informatics for the US Geological Survey. 16 March 2004 <www.frogweb.gov/>.

JSD AMPHIBIAN CURRICULUM

Science Activity: **The Case of the Missing Anurans**

Introduction:

This activity was adapted from the Center for Global Environmental Education. Visit their website at www.cgee.hamline.edu/frogs/teacher/index.html.

Objectives:

1. Students will be able to describe the environmental changes that may affect anurans.
2. Students will be able to state at least one hypothesis to explain the large change in anuran population size.

Materials:

1. paper
2. pencils
3. copies of CLUE sheets for each group (worksheets provided)
4. presentation materials

Procedure:

1. Split students into small groups, representing a team of herpetologists and other scientists gathered to discuss declining anuran populations around the world.
2. Read “BACKGROUND: The Case of the Missing Anurans” to class.
3. Give each a team a CLUE to read, research and form the basis of a ***hypothesis*** designed to explain potential causes of anuran declines. A hypothesis is a credible idea to be tested in an experiment, as opposed to a ***theory***, which is a concept established and supported by experimentation.
4. Encourage each team in designing a controlled experiment which could be done by scientists in a laboratory or in the field to tests their hypothesis.
5. Allow each team presents their hypothesis and experimental design to the group. Presentations should be creative and serve as a basis for comparing ideas, noting similarities and differences in data, hypotheses and experimental design.

Assessment:

1. Students examine the information presented in their CLUE.
2. Students research and critically evaluate additional information by exploring books, journals, and internet sources.
3. Students develop and present their ideas to class.

Extensions:

1. Research local amphibian populations to determine whether they are steady, declining or increasing. Encourage students to interview parents, grandparents and other adults to see if they've noticed a change in amphibian populations. Ask them to hypothesize why.
2. Help migrating amphibians as they cross roads and other obstacles on their way from wintering grounds to spring breeding ponds. Consider organizing your class to help critters cross the road.
3. Look for amphibians in myths, legends, fairytales and folklore. Why do they appear in so much art and literature? Are they portrayed in a positive or negative way? Are the characteristics attributed to them based on fact or fiction? See if you can write your own myth, legend or fairytale about amphibians.

National Science Education Standards:

Content Standard A:

- Develop abilities necessary to do scientific inquiry
- Develop understandings about scientific inquiry

Content Standard G:

- Develop understanding of the nature of science

Alaska Content Standards:

Science A(1)

Science E(1)

Language Arts A(1, 4,6), C(5)

Juneau School District Core Content:

Science:

Inquiry (5th): How can we gather data to provide us with an explanation to our questions?

Life and Human Biology (6th – 8th):

Human Impacts: How do human activities affect our environment?

References:

A Thousand Friends of Frogs. 1999. Center for Global Environmental Education. Hamline University Graduate School of Education. 16 March 2004 <www.cgee.hamline.edu/frogs/teacher/index.html>.

Note: This website contains an extensive, though possibly dated, bibliography.