

water ecosystem. How are their adaptations for living in those ecosystems different?

- Where do you think it might be more difficult for a freshwater creature to live and survive: in a mountain stream, in a big river, in a pond, or near the ocean? Justify your answer.

### Follow-up Activities

- Have students research different types of water ecosystems and the different types of animals that live there. Students should then draw a picture of one type of water ecosystem that they have read about. The pictures could then be displayed on a bulletin board, while the teacher conducts a "guessing game," holding up pictures of various animals and asking the class to guess where each animal might live.
- Conduct an ongoing investigation with students, monitoring the health of a local stream or waterway. Identify any environmental problems associated with this particular water ecosystem, and what aquatic species might be affected by these problems. Finally, develop a plan of action, such as a community stream clean-up project, to clean up pollution and improve the conditions.
- Have students set up and maintain a classroom tropical aquarium, which would be a way for them to realize the special conditions required by creatures in a water ecosystem. Students can also visit a pet shop to interview a person who is knowledgeable about aquariums and can help guide them in maintaining the life of their plants, fish, snails and crayfish.

### Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at [www.LibraryVideo.com](http://www.LibraryVideo.com)

- [www.mbgnet.net](http://www.mbgnet.net)

This site from the Missouri Botanical Garden presents information on the biomes and ecosystems of the world, including freshwater and marine ecosystems, such as rivers, streams, ponds, wetlands and oceans.

- [www.epa.gov/kids/water.htm](http://www.epa.gov/kids/water.htm)

This Web page from the Environmental Protection Agency provides information about the water cycle and offers several downloadable activity books about water ecosystems around the world. The site also has descriptions of some of the plants and animals that call water their home.

### Suggested Print Resource

- Kalman, Bobbie. *Water Habitats*. Crabtree Publishing Company, New York, NY; 2006.
- Morrison, Gordon. *Pond*. Houghton Mifflin, New York; 2002.k
- Silverstein, Alvin and Virginia. *Life in a Tidal Pool*. Dover Publications, Mineola, NY; 2005
- Toupin, Laurie. *Freshwater Habitats: Life in Freshwater Ecosystems*. Scholastic, Inc., New York, NY; 2005.

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#### TEACHER'S GUIDE CONSULTANT

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## All About Water Ecosystems

Grades K-4

This guide is a supplement, designed for educators to use when presenting this program in an instructional setting.

**Before Viewing:** Research in learning suggests that it is important for the teacher to discover what the students know — or think they know — about a topic, at the start of a new unit, so that their accurate conceptions can be validated and reinforced, and their misconceptions identified and corrected. Therefore, after reviewing the pre-viewing discussion questions provided for your class, create an "Everything We Know About..." list. Preview key vocabulary words and have students raise additional questions they hope will be answered by this program. Most importantly, students should be told that as "science detectives" they must listen closely, so that after viewing the program, they will be able to tell whether or not the facts/beliefs they put on their list were scientifically accurate.

**After Viewing:** After a brief discussion about the program, challenge your "science detectives" to prove or disprove the accuracy of the facts they put on their "Everything We Know About..." list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.



## Program Summary

Ecosystems are places where plants and animals interact with each other, and with the non-living things around them. Water ecosystems are unique because many of the plants and animals actually live underwater!

There are two kinds of water ecosystems: marine and freshwater ecosystems. Though we have named the major oceans of the world, they are all connected into one large world ocean. Millions of years ago, all life began in the ocean, and much of our air came from microscopic plant plankton, which still make oxygen today through the process of photosynthesis. Plant and animal plankton are food for most of the animals that live in this environment. Small creatures eat plankton, larger creatures eat the smaller ones and so on, until we get up to the top predators, like the sharks. Marine organisms abound in and around coral reefs, which are found in warm, shallow, tropical ocean water. Some marine organisms live in icy cold arctic waters; some live in open oceans; some live deep on the ocean floor, while others live on coastlines. Each of the creatures that live in these marine ecosystems is well-adapted to those special conditions and to the niche, or job, that they fill in that habitat. Bays and gulfs are ecosystems where saltwater and freshwater mix when large rivers spill into the ocean. These nutrient-rich waters are optimal sites for many creatures to lay their eggs and raise their young, before they are large and strong enough to swim out into the open ocean. For that reason, these areas are called the “nurseries of ocean.”

There are two kinds of freshwater ecosystems. Flowing water ecosystems, such as streams and rivers, usually begin high in mountains, where melting ice and snow create tiny streams, which run downhill, combine and turn into large rivers. Standing water ecosystems, such as ponds, lakes and wetlands, do not flow at all. They usually begin as hollows in the ground, which fill up from rainfall, melting ice and snow, or as parts of streams or rivers that are closed-off. Flat wetlands may only be wet part of the year and dry up at other times. Many different kinds of plants and animals live in or near all kinds of standing water ecosystems. Migrating birds frequently search for lakes and ponds as a resting place on their long spring or autumn journeys. For this reason, lakes are described as magnets for wildlife.

Over the years, humans have been responsible for introducing pollution into many water ecosystems. Oil spills and trash have been dumped into oceans, and industrial wastes have been poured into rivers. Run-off from fertilizers and pesticides from nearby farms, and even detergents and sewage from homes affects marine and freshwater ecosystems.

## Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

**ecosystems** — Places where living things interact with each other and with nonliving components, such as soil and water.

**freshwater ecosystems** — Water ecosystems that contain fresh water, which is not as salty as ocean or marine water. *(Continued)*

**standing water ecosystems** — Bodies of water, such as ponds, lakes, swamps and bogs, in which the water is completely surrounded by land and does not flow.

**flowing water ecosystems** — Bodies of water, such as streams and rivers, in which the water flows from high areas to low areas, usually ending up in the ocean.

**marine ecosystems** — Water ecosystems that have salty water and creatures who are adapted to living in salty water.

**habitat** — The area where a plant or animal lives.

**niche** — The job of a plant or animal, or its place within the habitat.

**ocean** — The huge salt water body that covers much of the Earth’s surface.

**plankton** — Tiny plants and animals of the ocean that serve as a food source for ocean creatures and provide the Earth with oxygen.

**photosynthesis** — The process by which a plant produces its food, using energy from sunlight, carbon dioxide from the air and water from the soil.

**food chain** — The path that material and energy take as they move from the sun and pass from organism to organism in an ecosystem.

**coral reefs** — A marine ecosystem located in warm tropical waters that is based on structures built by coral and contains abundant marine life.

**camouflage** — A coloring adaptation that helps creatures to blend in with their surroundings so that they appear less obvious to their predators.

**predators** — Animals that hunt and eat other animals, called their prey.

**migration** — When animals change locations during certain times of the year to seek a better food supply and find a safe place to raise a family.

**gulf, bay** — Mineral-rich ecosystems located where freshwater rivers empty into salty ocean waters.

**streams, rivers** — Flowing freshwater ecosystems. As streams meet and combine, they form larger bodies of water, called rivers, which usually empty into the ocean.

**ponds, lakes** — Standing freshwater ecosystems. Ponds are usually shallow and small; lakes can be very large and deep.

**pollution** — Harmful chemicals that human activities put into the air, land and water, like smog and oil spills.

**wetland** — An ecosystem that is covered by water for part of the year and is somewhere between standing and flowing water, including swamps and bogs.

## Pre-viewing Discussion

Before students generate their list of “Everything We Know About...” this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show: *(Continued)*

- What is a water ecosystem?

- What different types of water ecosystems are there?
- What types of plants and animals live in these ecosystems?

After the class has completed their “Everything We Know About...” list, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

## Focus Questions

1. Why is the Earth sometimes called “the water planet”?
2. Name the different types of marine ecosystems. Where would we find each of them?
3. What types of plants and animals might we find on a coral reef that we might never find in a bay? Why?
4. What kind of fish can live in both marine and freshwater ecosystems? Why does that fish swim as much as 2,000 miles back to freshwater after living most of its life in the ocean?
5. What are two types of freshwater ecosystems? Give examples of each type.
6. How do rivers usually start out? How different do they look by the time they empty into the ocean?
7. Why are biologists working on ways to stop the spread of the zebra mussel? What caused the problem?
8. What different things can cause water pollution?
9. How are wetlands different from ponds and lakes? What is the largest wetland in the world?
10. Why are swamps considered to be good places for many different types of creatures to live?

## Follow-up Discussion

The most important part of this segment is to examine both the facts and beliefs generated by the class in their “Everything We Know About...” list. Research indicates that students will retain their previous misconceptions — in preference to the new information — until they actively recognize and correct their own errors. Because of this, it is important to lead students to the correct ideas while identifying and correcting any misconceptions from the class list. After reviewing the list, encourage students to share the answers they got to the questions raised, before viewing the program.

Raising a thought-provoking question is a good way to assess the overall depth of student understanding. A couple of suggestions are listed below: *(Continued)*

- Compare animals that live in a land ecosystem with those living in a