

# Turning the Tides

## Teacher Resources



Dear Teacher,

The resources in this packet are designed to enhance your museum program, *Turning the Tides*. The outlined concepts taught in the classroom will come to life during your visit as students engage in scientific inquiry with fascinating exhibits, artifacts and live specimens. Please keep in mind the following when preparing for your class visit to the museum:

- All students should wear nametags
- All programs start and end on schedule
- Please inform the museum of any special needs prior to the program
- Call (518)235-2120 for more information or visit [www.childrensmuseumonline.org](http://www.childrensmuseumonline.org)

**Age:** 6<sup>TH</sup> -12<sup>TH</sup>

**Program Description:** Take an in depth look at the Hudson River watershed and river ecology with this inquiry-based environmental education program.

**Part I** will give students a clear understanding of the geography, history and ecology of the Hudson River Watershed using discussion, images, artifacts and scientific equipment. Students will be prepared for environmental stewardship activities in a tributary or the Hudson River. Part I is a 60 minute program and can be done with or without Part II.

**Part II** is an outdoor environmental program that takes place along the shores of the Hudson River. This program can be offered at Riverfront Parks and other open spaces along the Hudson. Students will learn to use field equipment to collect and identifying fish, insects and other river species. We will test water quality, record our data and discuss how land use influences the health of the watershed. We will brainstorm ideas to keep turning the tides of the Hudson River into a healthy, productive ecosystem. Part II is a 2-3 hour program with a break for lunch. Part II can be scheduled from April 15 to October 15 and takes place regardless of the weather so dress for the outdoors.

### **NYS Learning Standards**

Intermediate Level Science/The Living Environment: Key Idea 7: Human decisions and activities have had a profound impact on the physical and living environment

Intermediate Level Science/The Living Environment: Performance Indicator 7.2: Describe the effects of environmental changes on humans and other populations

Intermediate Level Science/The Living Environment: Performance Indicator 7.2d: Since the Industrial Revolution, human activities have resulted in major pollution of air, water and soil. Pollution has cumulative ecology effects such as acid rain, global warming, or ozone depletion. The survival of living things on our planet depends on the conservation and protection of Earth's resources.

Intermediate Level Science/The Living Environment: Performance Indicator 5.1b: An organism's overall body plan and its environment determine the way that the organism carries out the life processes.

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### I. Pre and Post Visit Activities

#### A. Public Relations

Have students create public relations ads and newspaper articles in which they pretend to be ecologists, fisherman, property owner or other stakeholders who want to preserve the Hudson River Watershed. They should research the Hudson River and the current problems facing it. The ads should send a strong message in favor of protecting the watershed's ecosystems and should attempt to gather help and support from the public. Students should perform their ads in front of the class or record their ads with a video camera and play their ads for class. Have a group discussion on the ad messages and the role of the media.

#### B. Exploring Endangerment

Have each student research an endangered or threatened species that lives in your watershed. Write a report on its historic and current status and discuss causes of decline. Challenge the students to create a conservation management plan for protecting and reestablishing the species throughout its range. New York State's Department of Environmental Conservation provides current information on endangered, threatened and rare species throughout the state on their website:

<http://www.dec.state.ny.us/website/dfwmr/wildlife/endspec/>

The following book is a comprehensive resource on endangerment in the United States with accurate information on bald eagles, amphibians and other endangered species. Suggested classroom activities tie information together:

Nilsson, Greta, 1990. The Endangered Species Handbook. Animal Welfare Institute. Washington, D.C.

Invite an expert to speak in your class. Provide an agenda and a list of student generated-questions to the expert ahead of time so that they can prepare. Share your research on endangered species with the expert as well.

#### C. Watershed Watch

Develop community service projects to get your students involved in local watershed stewardship activities. Organize a community clean up along stream banks in your community. Call the press and invite them make the stream clean-up an annual event. Other stewardship activities include:

- Restore eroded stream banks with native plants
- Monitor water chemistry
- Monitor aquatic insects, amphibians and the living community in and along the stream
- Make a nature trail and work with scouts to build benches, kiosks and signs

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## Suggested Reading

Behar, S., Dates, G., Byrne, J., 1996. Testing the Waters. Riverwatch Network: Montpelier, VT.

Kenney, Leo P. and Matthew R. Burne, 2000. A Field Guide to the animals of Vernal Pools. Massachusetts Division of Fisheries and Wildlife, Westborough MA

Lippson, Alice and Robert, 1997. Life in the Chesapeake Bay. John Hopkins University Press.

Michell, Joseph C. 2000. Amphibian Monitoring Methods and Field Guide. Smithsonian National Zoological Park Conservation and Research Center, Fort Royal, VA

Murdoch, Tom and Martha Cheo, 1999. Streamkeeper's Field Guide. Watershed Inventory and Stream Monitoring Methods. The Adopt a Stream Foundation, Everett, WA

Niering, William A. 1998. National Audubon Society Nature Guide Wetlands. Chanticleer Press, NY, NY

Smith, C. Lavett, 1995. The Inland Fishes of New York State. New York State of Environmental Conservation, Albany, NY

Voshell, J. Reese, 2002. A Guide to Common Freshwater Invertebrates of North America. McDonald & Woodward Publishing Co.

## Website Resources

<http://waterontheweb.org/curricula/bs/teacher/html>

Innovative lesson plans use an inquiry-based classroom approach to teach concepts such as pH, respiration, properties of water and data interpretation. Also is a great resource on current research and technology.

<http://epa.gov/owow/wetlands/restore>

This site provides a comprehensive manual on stream corridor restoration and many other great resources and links.

<http://www.ncsu.edu/sciencejunction/depot/experiments/water>

This site provides inquiry-based water quality lesson plans and resources for classroom teachers.

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[http://www.creekconnections.allegheny.edu/classroom\\_resources.html](http://www.creekconnections.allegheny.edu/classroom_resources.html)

A great resource for classroom activities related to stream insect life cycles and identification, water testing procedures and more.

<http://nfwf.org/programs/5star-rfp.htm>

National Fish and Wildlife Foundation offer grants to support community based restoration projects. Teachers and students build partnerships with scientific experts to restore, monitor and protect wetlands and streams.

## Vocabulary

Benthic: of or pertaining to the bottom, or bed of the water.

Bioaccumulation: an organism's accumulation of a harmful substance such as a radioactive element, a heavy metal or an organochlorine, that develops by being a part of the food chain

Buffer: something that chemically or physically dampens changes in an ecosystem; a protective barrier

Buffering Capacity: the ability of a solution to resist or dampen changes in pH upon the addition of acids or bases.

Catchment area: the area of land drained within a watershed.

Degradation: a decrease in quality

Dissolved Oxygen (DO): oxygen dissolved in water and available for living organisms to use for respiration

Eutrophication: the natural and artificial addition of nutrients to a waterbody, which may lead to depleted oxygen concentrations.

Indicator Species: the presence or absence of certain organisms can be used to reveal the overall ecological quality of the ecosystem.

Non-source point pollution: a pollutant that cannot be traced back to one specific source, but instead comes from a general area, such as runoff from a parking lot.

Parts per million (ppm) unit of measure most often used to describe the amount of a particular gas or compound in air or water. It is the proportion of the number of molecules of the gas or compound out of a million (1,000,000,000) molecules of air or water.

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pH: a logarithmic scale ranging from 1 to 14 that identifies the acidity of a solution as a negative logarithm of the concentrations of hydrogen ions in a solution:  $\text{pH} = -\log [\text{H}^+]$ . Because the pH scale is logarithmic, each unit change represents a ten-fold change in H ion concentrations.

Point source pollution: a pollution that can be traced back to one specific source, such as sewage from a pipe.

PCB's: Polychlorinated biphenyls

Runoff: precipitation that has drained through or over an area of land.

Substrate: the materials, such as sand, gravel or cobble that make up the bottom, or bed, of a water body.

Tributary: a stream that flows into or feeds another stream.

Turbidity: murkiness or cloudiness of water, indicating the presence of some suspended sediments, dissolved solids, natural or unnatural chemicals, algae, etc.

Watershed: an area of land that drains into a common reservoir such as a stream, river, lake or ocean; also referred to as a drainage basin.