

NEW YORK STATE  
**Conservationist**

for  
**Kids!**

A  
Breath  
of  
Fresh Air

What's up with  
**AIR POLLUTION?**

Welcome  
to

NEW YORK STATE

# Conservationist

for  
Kids!



Want to receive  
**Conservationist  
for Kids**  
at home?

## In this issue:

### How clean is our air?

It's a lot cleaner than  
it used to be! In this  
issue, we'll learn  
about air pollution —  
what it is, where it  
comes from, and what  
you can do to help  
keep our air clean.

Send us a photo of yourself  
enjoying the outdoors.

#### Contact us at

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#### or e-mail us at

[cforkids@gw.dec.state.ny.us](mailto:cforkids@gw.dec.state.ny.us)

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# It's all around us.

We can't see it, but we can see what it does.

The wind blows gentle breezes and raging gales.

Air contains the oxygen we need to breathe, and the carbon dioxide that plants require for photosynthesis.

Puffy clouds carry moisture from one part of our world to another, watering the earth below.

## WE TAKE OUR AIR FOR GRANTED, UNTIL SOMETHING GOES WRONG.

When your bedroom is messy, you can see it, but when the air gets messy —polluted— we can't always see the mess. Air pollution may be particulate matter: tiny particles in the air that irritate our lungs and leave a fine dust on the things they land on. Air pollution may also be in the form of gas. Gasses can't be seen, but some in our air are harmful to us and to plants and animals around us.

Plants grow better when the air is clean.

Water and wildlife are healthier, too.

## Clean air is important for our health.

When the air is clean, we can breathe more easily and be more active, running and playing outdoors. (People with asthma sometimes have a great deal of trouble breathing when the air is polluted.)

# What's in the AIR gets Around!

Air pollution comes from many sources, both natural & manmade.

forest fires,  
volcanic emissions

vehicle exhaust,  
smokestack emissions

Air moves around when the wind blows.

Air pollution from one place can cause problems many miles from where it started.

Water falls from clouds that form in the air. Pollutants and tiny bits of soil are carried with it to the ground below.

**1** The air is in constant motion around the earth (wind). As it moves, it absorbs water from lakes, rivers and oceans, picks up soil from the land, and moves pollutants in the air.

## Earth's Air Cycle

**2** Plants use carbon dioxide from the air during photosynthesis, and release oxygen. They absorb water and pollutants carried in the air.

**4** People and animals breathe in air. We use oxygen and exhale carbon dioxide.

**3**

How many manmade sources of air pollution can you find here?  
Can you find people doing things to limit air pollution?



**OZONE (GOOD)** is a gas that occurs naturally in the upper atmosphere. It filters the sun's ultraviolet rays and protects life on the planet from the burning rays.

**AIR AWARENESS:**  
Our air contains a combination of different gasses:  
**78% nitrogen, 21% oxygen,**  
plus 1% from carbon dioxide, water vapor, and other gasses.

**ACID RAIN** forms when sulfur oxides and nitrogen oxides mix with water vapor in the air. Because wind moves the air, acid rain can fall hundreds of miles from its source. Acid rain can make lakes so acidic that plants and animals can't live in the water.

Forests can be harmed when nutrients are drained out of the soil by acid rain, and trees can't grow properly.

**AIR MONITORING:**  
Scientists check the quality of our air every day and grade it using the Air Quality Index (AQI). We can check the daily AQI on the Internet or from local news sources.

Greenhouse gases, sulfur oxides and nitrogen oxides are added to the air when coal, oil and natural gas are burned to provide energy.

Smoke from **FACTORIES and POWER PLANTS** adds particulate matter (tiny particles) to the air.

**FIRES** can add particulate matter (ashes) and toxic gasses to the air.

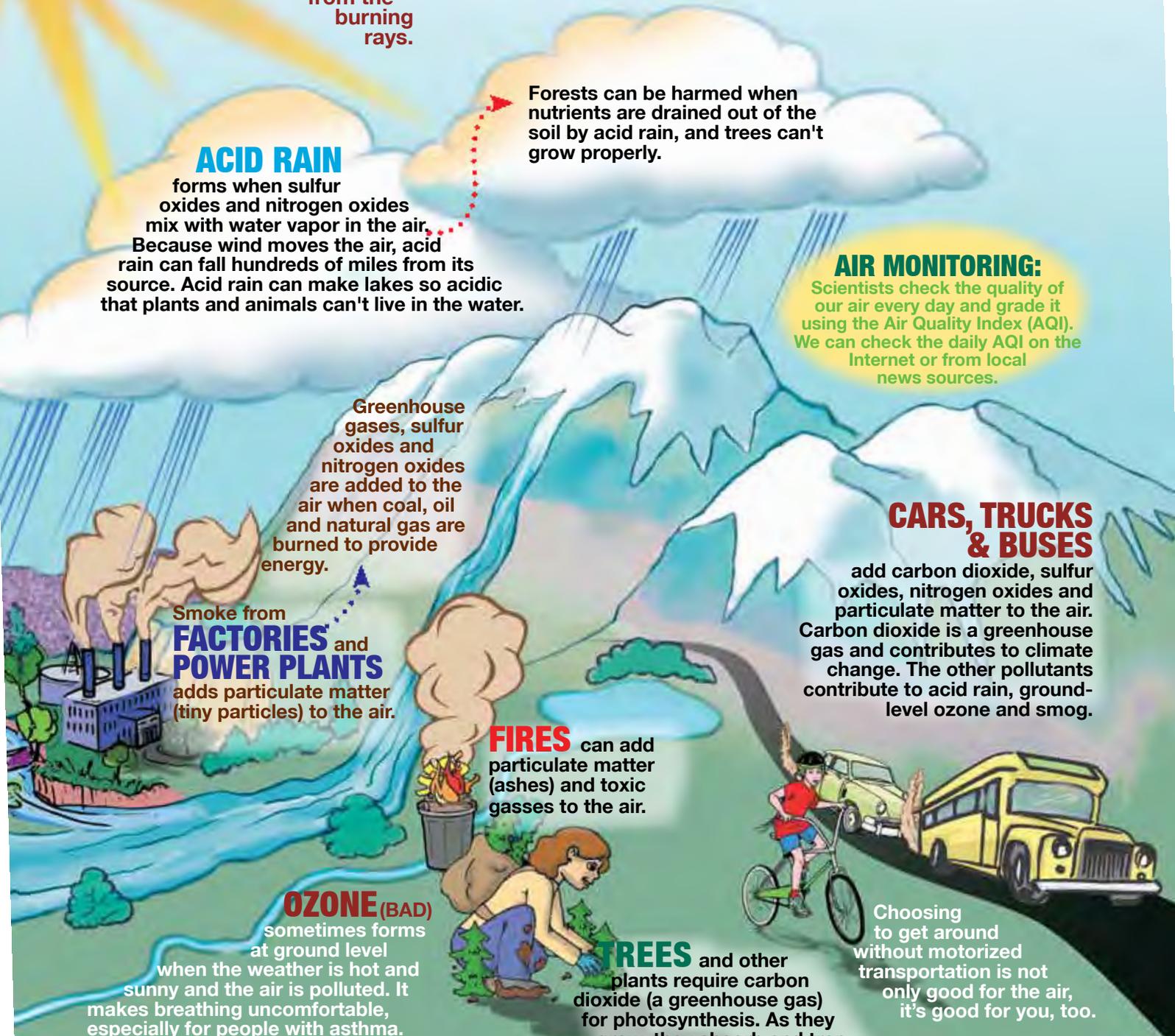
**CARS, TRUCKS & BUSES**

add carbon dioxide, sulfur oxides, nitrogen oxides and particulate matter to the air. Carbon dioxide is a greenhouse gas and contributes to climate change. The other pollutants contribute to acid rain, ground-level ozone and smog.

**OZONE (BAD)** sometimes forms at ground level when the weather is hot and sunny and the air is polluted. It makes breathing uncomfortable, especially for people with asthma.

**TREES** and other plants require carbon dioxide (a greenhouse gas) for photosynthesis. As they grow, they absorb and trap pollutants within their cells.

Choosing to get around without motorized transportation is not only good for the air, it's good for you, too.



# The Good News is...

## Our air is healthier today than it was 50 years ago.

We've learned a lot, including how to clean our air, and how to keep it from getting polluted. We've also made laws, like the **Clean Air Act**, that set limits on air pollution.

**Smog** is air that is visibly polluted. It looks brown and hazy, and occurs in the air over larger cities and towns. Most smog comes from vehicle exhaust and factory smokestack emissions.

**Power plants today have devices, known as "scrubbers," that limit what comes out of their smokestacks into the air.**

While still of concern, acid rain is no longer as serious a problem as it once was. Lakes and forests are recovering from the damage done by acid rain, but it will take a long time for them to fully recover.

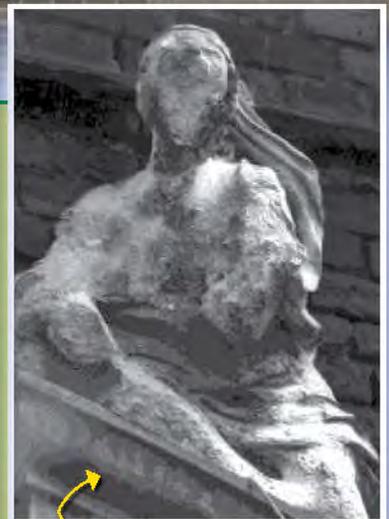


photo by Herr Schmidt-Thomsen

**1908**

**1968**

The first photo, taken in 1908, shows a 200-year-old statue at a castle in Germany. There were few changes during its first 200 years. After 1908, the amount of acid rain components emitted from human activities increased.

In just 60 years, the statue showed the effects of acid rain. What changes do you notice?



photo by Julia Goren

Can you spot the trees killed by the effects of acid rain?

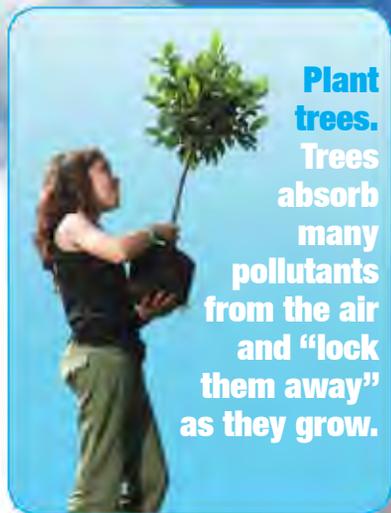


photo courtesy of NARA, photo by Gene Daniels/U.S. EPA

Ozone-damaged plant (left)  
normal plant (right)

# Keep the **Good News** coming...

There are lots of things you can do to keep our air clean and keep yourself healthy. They're pretty simple, too.



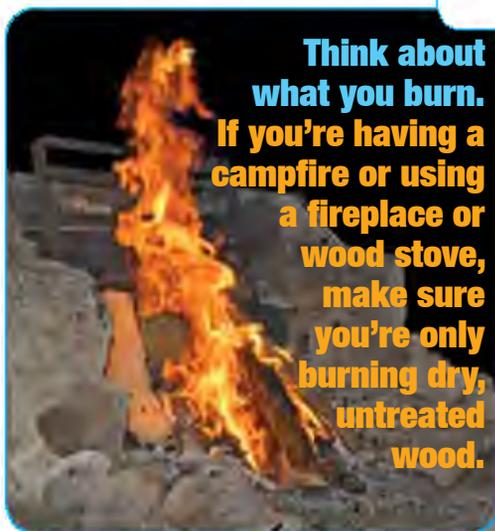
**Plant trees.** Trees absorb many pollutants from the air and “lock them away” as they grow.



**Use less electricity.** Turn off electrical devices when they're not in use.



**Check the Air Quality Index each day in the summer.** When the levels are safe, enjoy playing outside.



**Think about what you burn.** If you're having a campfire or using a fireplace or wood stove, make sure you're only burning dry, untreated wood.



**Drive less.** Walk, ride your bike or take public transportation to get around.

## For more information:

*Air Pollution* by Heather C. Hudak (Weigl Publishers Inc., New York, 2007)

*Air Pollution: A True Book* by Rhonda L. Donald (Children's Press/Scholastic, Inc., New York, 2001)

*Clean Air* by Rufus Bellamy (Smart Apple Media, North Mankato, MN, 2006)

DEC's Teaching Children About Air Pollution [www.dec.ny.gov/education/52185.html](http://www.dec.ny.gov/education/52185.html)

DEC's Clean Air Starts at Home [www.dec.ny.gov/chemical/49263.html](http://www.dec.ny.gov/chemical/49263.html)

EPA Environmental Kids Club–Air (for grades PreK–4) [www.epa.gov/kids/air.htm](http://www.epa.gov/kids/air.htm)

EPA Student Center–Air (for grades 5–8) [www.epa.gov/students/air.html](http://www.epa.gov/students/air.html)

EPA's AirNow page for kids [www.airnow.gov/index.cfm?action=student.main](http://www.airnow.gov/index.cfm?action=student.main) (links to Air Quality Index page for kids)

## How **CLEAN** is Your Air?

You can check the amount of particulate matter (dust) in the air around home with some simple items you probably already have.

- 👉 paper plates (one for each test site)
- 👉 petroleum jelly (e.g., Vaseline®)
- 👉 magnifying lens

Spread a very thin layer of petroleum jelly on the paper plates. Set the plates in the areas you want to test. Choose one indoor site, and several outdoor sites. You'll need to leave the plates there for a week. Choose your sites carefully so the plates won't blow away or be disturbed, and so they're sheltered from rain and snow. Use clothespins to hold them in place, if you need to. Using the magnifying lens, take a close look at each plate after two days. What's stuck in the petroleum jelly? Return each plate to the study site and look at them again after two more days. How do they compare with the first time you looked at them? Leave the plates for three days this time, so they are out for a total of one week. What do they look like now?

The dust on the plates fell there from the surrounding air. How clean is your air?



## What's Your AQI?

The Air Quality Index (AQI) is a scoring system for outdoor air quality. Go to <http://airnow.gov/> and enter your zip code. The website will then provide you with a map and give the AQI for your area. Look for the overall score, from good (0 to 50) through hazardous (201 to 300). Look, too, for specific information about levels of ozone and particulates. Is it safe to be outside today? If not, what are the major pollutants? If the AQI is in a safe range, turn off your computer and head outdoors to enjoy yourself!



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### NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

New York State *CONSERVATIONIST FOR KIDS* Volume 5, Number 1, Fall 2011

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Special thanks to Ona Papageorgiou, Environmental Engineer, Division of Air Resources



## Conservationist for Kids

### Supplement for Classroom Teachers – Air Pollution

#### Air Pollution

We understand that we must be stewards of our land and water resources, but we often forget about our air. It's invisible, and out of sight is out of mind. Clean air is essential to the health of plants and animals, including people. If you have students in your class with asthma, it's something you see first-hand. With better understanding of the causes of air pollution, we can take action to improve air quality through simple measures like using less electricity and driving less. Doing so limits our consumption of fossil fuels and reduces the associated emissions of pollutants. Understanding the Air Quality Index (AQI) is helpful, too, especially for individuals who are sensitive to ozone and particulate matter, the key components measured when determining the AQI.

When we're looking at the causes and effects of air pollution, it's helpful to consider some of the successes we've seen in recent years. We need look no further than acid rain for a good news story. While the problem of acid rain has not gone away, the emissions which cause acid rain are much reduced from where they once stood and, as a result, many of the affected natural spaces—lakes and forests—are recovering.

#### This Issue's "Outside Page"

Both activities on the Outside Page (page 8) of this issue of *Conservationist for Kids* relate to monitoring outdoor air pollution, allowing us to make informed decisions when planning outdoor activities. Understanding that there are things in the air which can be harmful to us, including things we cannot see, opens the door to taking personal action and making changes in our behavior to limit our effects on the environment.

#### Teacher Workshops

For teachers who have participated in a Project Learning Tree or Project WILD workshop, the activities listed below complement the fall 2011 issue of *Conservationist for Kids*. Visit [www.dec.ny.gov/education/1913.html](http://www.dec.ny.gov/education/1913.html) for information about workshops and about how to obtain curriculum and activity guides.

**Project Learning Tree:** Pollution Search, Waste Watchers, In the Driver's Seat

**Project WILD:** What Did Your Lunch Cost Wildlife?

*Conservationist for Kids* (C4K) and an accompanying teacher supplement are distributed to public school fourth-grade classes three times each school year (fall, winter and spring). If you would like to be added or removed from the distribution list, if your contact information needs to be changed or if you have questions or comments, please e-mail the editor at [cforkids@gw.dec.state.ny.us](mailto:cforkids@gw.dec.state.ny.us)

Printable activity sheets and links to other resources are on DEC's website. You will also find back issues of C4K and the activity sheets and teacher supplements associated with each of them. Visit [www.dec.ny.gov/education/40248.html](http://www.dec.ny.gov/education/40248.html)

Subscribers to our e-mail list receive messages from the editor about the magazine, plus supplementary materials for educators who use the magazine in classrooms and non-traditional settings. Subscribers also receive information about resources and notification of training opportunities for connecting youth to the outdoors and to environmental issues. Visit [http://lists.dec.state.ny.us/mailman/listinfo/conservationist\\_for\\_kids](http://lists.dec.state.ny.us/mailman/listinfo/conservationist_for_kids) to subscribe to our e-mail list.

# Supplemental Activities for the Classroom

## Earth's Air Cycle

Go to DEC's "Teaching About Air Pollution" web page at [www.dec.ny.gov/education/52185.html](http://www.dec.ny.gov/education/52185.html) to find a variety of activities to help students better understand air pollution. Among them is a PDF of pages 4 and 5 of this issue of *Conservationist for Kids*, "Earth's Air Cycle," restyled as a small poster. In addition, a version of the poster is available with selected words replaced with fill-in-the-blank lines for in-class review.

## Understanding the AQI

At [www.airnow.gov/index.cfm?action=resources.aqi\\_toolkit](http://www.airnow.gov/index.cfm?action=resources.aqi_toolkit), the U.S. EPA has lesson plans for teachers of grades K-8 to help their students better understand the AQI, ozone, and particle pollution.

## Erosion of Statuary

Look on page 6 of this issue of C4K for the two photos of the same figure, taken in 1908 and 1968. After reading and talking about the caption, take a walk in a local cemetery to look for similar signs of deterioration among the statuary. Consider what factors might affect the amount of deterioration (e.g., age, type of stone, amount of acid rain, acidity).

## Dust in the Rain?

Collect rainwater during a rainstorm by leaving a clean wide-mouthed jar out in an open area where rain can fall into it directly (i.e. don't put it under a downspout). Alternately, if there is a new blanket of snow, collect some fresh snow in a jar and allow the snow to melt indoors. In both cases, pour the water through a coffee filter. What remains on the filter? It's the dust (particulate matter) that was in the air and was carried to the Earth's surface by the rain and snow.

## Share a Story

- Dr. Seuss's classic *The Lorax* introduces the idea of stewardship and personal responsibility. The animated version, released in 1972 and narrated by Eddie Albert, is lively and engaging.
- In *The Magic School Bus Gets Cleaned Up*, Miss Frizzle's students travel through the diesel engine of a school bus and learn how particulate matter is filtered out. Along the way, they learn about air pollution and end by installing a filter on their bus.
- EPA's Air Quality Index (AQI) is explained in *Why is Coco Orange?*, a story that discusses not only air monitoring, but also the effect of poor air quality on human health. The story will be especially relevant for classrooms with students affected by asthma.

## Resources

*Conserving the Atmosphere* by John Baines (Steck-Vaughn Library, Austin, TX, 1990)

*Hazy Skies: Weather and the Environment* by Jonathan Kahl (Lerner Publications Company, Minneapolis, MN, 1998)

*The Lorax* by Dr. Seuss/Theodor Geisel (Random House, New York, 1971);

Also available as an animated program on DVD and VHS, and on YouTube.

*The Magic School Bus Gets Cleaned Up* by Kristin Earhart (Scholastic Inc., New York, 2007);

Available for free from EPA <http://epa.gov/cleanschoolbus/msb-book.htm>

*Pollution: Problems and Solutions* (Ranger Rick's NatureScope series) edited by Judy Braus (National Wildlife Federation, Washington, DC, 1990)

*Why is Coco Orange?* by USEPA (Publication No. EPA-456/K-10-00, May 2010);

PDF and hardcover available for free from EPA [www.airnow.gov/index.cfm?action=picture\\_book.index](http://www.airnow.gov/index.cfm?action=picture_book.index)

DEC's Teaching Children About Air Pollution [www.dec.ny.gov/education/52185.html](http://www.dec.ny.gov/education/52185.html)

DEC's Clean Air Starts at Home [www.dec.ny.gov/chemical/49263.html](http://www.dec.ny.gov/chemical/49263.html)

DEC's air pollution page [www.dec.ny.gov/chemical/281.html](http://www.dec.ny.gov/chemical/281.html)

DEC's acid rain page [www.dec.ny.gov/chemical/283.html](http://www.dec.ny.gov/chemical/283.html)

EPA's acid rain page for kids and teachers [www.epa.gov/acidrain/education/index.html](http://www.epa.gov/acidrain/education/index.html)

EPA's AQI Toolkit for teachers [www.airnow.gov/index.cfm?action=resources.aqi\\_toolkit](http://www.airnow.gov/index.cfm?action=resources.aqi_toolkit)

EPA's *Plain English Guide to the Clean Air Act* [www.epa.gov/air/caa/peg/peg.pdf](http://www.epa.gov/air/caa/peg/peg.pdf)

NYSERDA's DVD "Clean Energy Across New York: A Virtual Field Trip," available for free to New York State educators. Go to [www.getenergysmart.org](http://www.getenergysmart.org) and click on "Energy Education." From there, look for the DVD icon on the right-hand side of the page.

*Additional websites and books for children are listed in Conservationist for Kids magazine.*