



## Microorganisms and the Environment



When we were kids, we thought of “germs” as disgusting without knowing or understanding the world of microorganisms.

The recent tour of the BioBus (biobus.org) by members of EEAC, allowed us to see the way this mobile science lab uses research-grade microscopes to show visiting kids the world of microorganisms. In my view, such an experience provides an important point of awakening for children. It directs them toward understanding the critical role microbes play in the environment and overall health of individuals, ecosystems and the planet.

### Microbes are everywhere!

We may only know about a fraction of the microbes that exist just about everywhere on earth. However, we are learning more about how they survive. They have been found in the depths of Arctic and Antarctic ice, by volcanic vents in the deep ocean, in battery acid, in the coolant water of nuclear reactors and were recently shown to survive the cold, harsh vacuum of space after a rock with microorganisms was attached to the outside of the International Space Station for a year and a half. Even our bodies, which contain trillions of cells, have, at least ten times that many microbes.

### Microbes were here first. Every other life form, including us, evolved with them, not separately from them.

As Teruo Higa, Professor of Horticulture at the Meio University in Japan, puts it, “We live in a sea of microbes.” He identified three types of microorganisms beneficial to life. He named these specific combinations of microbes as Effective Microorganisms or EM. He showed that EM are not only good at making nutrients available from organic matter, but they are also good at converting waste into useful and beneficial substances.

In nature, microorganisms are intricately involved in the maintenance of a healthy environment and the cycle of life. Microbes break down organic matter from dead plants and animals, making nutrients available in a useful, absorbable form for living plants. In soils and water, microorganisms represent critical links in the food chain; they produce the nutrients other organisms need, either within the body of the organism itself, or in their environment. Microorganisms break down dead organisms and they themselves serve as food for other organisms, such as plankton, worms, insects and other microbes. It is important to care for the environment — and for the microorganisms, especially those that occur naturally.

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## EEAC NEWS.....

### Steering Committee Meetings

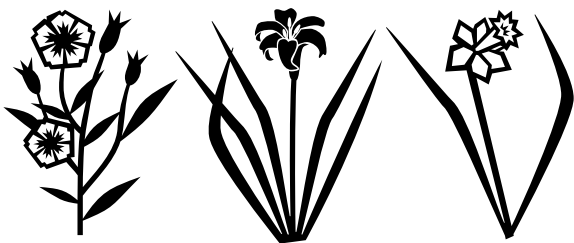
EEAC Steering Committee members meet on the third Wednesday of every other month (except August). Upcoming EEAC Steering Committee meeting is July 20, 2011. Steering Committee meetings are held at New York University (NYU) and at sites throughout New York City. When we are at NYU, meetings are held in the fifth floor conference room, Pless Building, 32 Washington Square Park East and Washington Place. Meetings are also held at facilities associated with EEAC members. Please visit the EEAC website at [www.eeac-nyc.org](http://www.eeac-nyc.org) for meeting location or contact an EEAC Steering Committee member. All steering committee meetings are open to anyone interested in learning about environmental education in New York City and sharing information about special programs and projects.

### Newsletter Deadlines

If you would like to submit an article for the newsletter, please email it as a Microsoft Word attachment to [lmiller296@aol.com](mailto:lmiller296@aol.com). The newsletter deadlines are the first Monday in April, July, October and January. We would love your ideas!

### Newsletter Committee & Contributors

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## ENVIRONMENTAL EDUCATION ADVISORY COUNCIL

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This newsletter is a publication of the Environmental Education Advisory Council (EEAC), a voluntary organization of educators, classroom teachers, administrators and other professionals in active support of quality environmental education.

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Michelle Fufaro Beach, Secretary  
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Mike Zamm, GrowNYC

### GET CONNECTED!

If you are a member of EEAC and want to be part of information sharing and on-line discussion on the EEAC listserv, contact:

[cfranken@nyc.rr.com](mailto:cfranken@nyc.rr.com)

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## CHAIR'S MESSAGE

### Happy Spring, EEAC!

This year some changes for EEAC will be introduced. Some will say they will be for the better, others won't agree, but the discussions will be in full swing for the July and September meetings, so please attend! Two things in the discussion stage are: 1) moving from a PDF newsletter to a true e-newsletter that would come embedded in email (with a potential savings of \$1400 per year), and 2) moving back to monthly meetings instead of bi-monthly meetings.

In this issue, I have included a very small selection of blogs and RSS feeds (explained in the EE Resources section!) I frequent so I can keep up on Science & Nature News, Education News & Tips, and Kids in Nature/Science. In today's technology-driven age, there is so much out there for educators and scientists, it can get overwhelming, I say "a very small selection" because I follow over 45 blogs and RSS feeds on the above three topics along with interpretation, writing, photography, and a few fun ones. The ones I picked out are the ones I tend to get the most from and I hope you enjoy them—but they are not, by any means, the only ones out there!

So, this spring get yourself outside and breathe in nature. Not only will it help reduce the stress you feel with all the Earth Day and Arbor Day events going on, it will remind you of why you do what you do. Enjoy the erratic weather and Happy Earth Day and Arbor Day!

-Bets

## Make Earth Day Every Day

Michelle Fufaro Beach

### Fun Summer Green Projects for Everyone

Looking for something to do this summer that will get you outdoors and will be good for the environment? Become a citizen scientist! Anyone can do it and it's a great way to get more involved in your community and have fun! Below is a list of just a few of the citizen scientist projects that people of all ages can participate in:

**Project BudBurst** – How do trees “know” when to lose their leaves or when to flower? Phenology (the study of plant and animal life cycles in relationship to climate) helps answer these questions. In Project BudBurst, citizen scientists study native trees and flowers to observe their responses to environmental changes such as climate change, species loss, or the loss of important pollinators. Participants monitor the phenological changes of native plants, like the date when the Tulip tree blossoms, to help answer some of these questions. <http://www.neoninc.org/budburst>

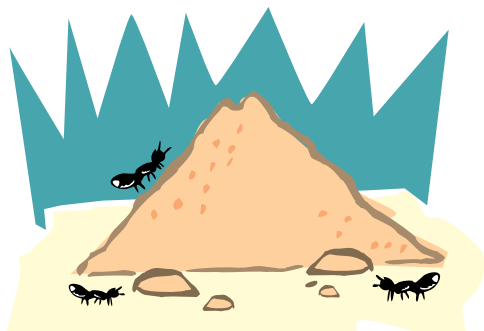
**Firefly Watch** – Fireflies are wonderful insects that light up at dusk and are one of the first signs of summer. Unfortunately, fireflies are declining in numbers, and if they disappear it will be a great loss to habitats (and people) all over the globe. At this time, scientists don't have a lot of data about fireflies. Firefly Watch aims to change that by recruiting volunteers across the country to observe and report data about firefly activity. <https://www.mos.org/fireflywatch>

**Project PigeonWatch** – You don't need a backyard or garden for this citizen science project – you just need to live in an urban environment! PigeonWatch is a program where city folks become familiar with and develop an appreciation for those surprisingly beautiful pigeons (also known as Rock Doves), PigeonWatch volunteers observe pigeons and describe the birds' various colors and patterns to help scientists better understand the history of birds. It's a fun and easy way to get outside and speak up for what some think of as “rats with wings”. <http://www.birds.cornell.edu/pigeonwatch>

**Spider WebWatch** – It's time to start paying attention to our 8-legged friends, the spiders. Actually, scientists really know very little about most of the species of spiders that live North America. Spider WebWatch asks citizen scientists to look for nine species (non-venomous) and report their observations of jumper spiders, garden spiders, and a variety of other spider species. <http://scienceforcitizens.net/project/31/>

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## BOOK BUZZ



### *ANTHILL* by E.O. Wilson

I am always a bit skeptical when someone steps out of their usual area of expertise to write in a different form. Generally, I have found fiction writers do not write good poetry, nor do poets write good fiction. So I approached the famous biologist E.O. Wilson's first (I think) attempt at fiction, *Anthill*, with a bit of skepticism. I was pleasantly surprised.

For those familiar with Wilson's work, and I confess my knowledge is small, it will come as no surprise that he chose the world of ants to play a major role in this tale. It was no doubt his own boyhood that gave him much of the context of the story that takes place in rural Alabama. The story is told through the eyes of the boy Raff, who grows up to be a naturalist and saves the riverine environment he so cherishes in boyhood. The author brings you into the world of the rural South, where one can easily imagine being hunted down for one's "Darwinian beliefs" and any attempt to stop development is perceived as being a sin against Mom and apple pie.

I think it is interesting to note that some environmental activists here in New York City, who, like Raff, grew up with a threatened environment as part of their childhood, became its greatest defenders. I am thinking in particular, of Don Riepe who wandered the open spaces of South Ozone Park bordering Jamaica Bay. Although I did not appreciate it at the time, I also wandered the "dunes" of Gerritsen Creek as a child. Little did I understand the wonders of the salt marsh that existed beyond them. Yet, it left a deep impression on me, demonstrating another reason why we need to keep "No Child Left Inside"!!!

Wilson's descriptions of life in the ant colonies of the riverine wilderness are informative and engaging. I will never look at ants in the same way after reading this book.

-Regina McCarthy

## EE Resources Helpful Blogs & RSS

### Science & Nature News

**The Great Beyond** - <http://blogs.nature.com/news/thegreatbeyond/> - up-to-the-minute coverage of research and science policy brought to you by Nature's news team

**Scientific American** - <http://www.scientificamerican.com/> - updates and articles from the magazine

**Talking Science** - <http://www.talkingscience.org/> - Talking Science aims to cultivate enthusiasm for science and a desire for scientific literacy in the general public – particularly teens.

**Discovery News: Michael Reilly** - <http://news.discovery.com/contributors/michael-reilly/> - stories written by Michael Reilly for Discovery News on science and the environment

### Kids & Science & Nature

**Urban Science Adventures** - <http://urban-science.blogspot.com/> - written by a female African American biologist as an online reference for environmental science, environmental education, and ecology

**Kids Loving Nature** - <http://www.kidslovingnature.com/> - information about teaching our children how to make a connection with and fall in love with the Earth

### Education News & Tips

**Curriculum Matters** - <http://blogs.edweek.org/edweek/curriculum/> - education news

**Coach G's Teaching Tips** - [http://blogs.edweek.org/teachers/coach\\_gs\\_teaching\\_tips/](http://blogs.edweek.org/teachers/coach_gs_teaching_tips/) - teaching tips from a seasoned teacher and administrator

**Teaching Now** - [http://blogs.edweek.org/teachers/teaching\\_now/](http://blogs.edweek.org/teachers/teaching_now/) - tips for teaching from a working teacher

### New to RSS?

#### What is an "RSS Feed"?

RSS (most commonly expanded as Really Simple Syndication) is a family of web feed formats used to publish frequently updated works—such as blog entries, news headlines, audio, and video—in a standardized format.

#### What RSS reader does Betsy use to keep track of 45+ blogs/RSS feeds she likes to read?

Google Reader! Since I use Google as my main search engine and Gmail as my primary personal email address, I have set up a Google Reader account and just click the on the blog or page I want to follow and then select the Google option.

## Jamaica Bay Education Resource Directory

### A Teacher's Guide to Education Opportunities in the Jamaica Bay Watershed

Enhance classroom lessons and field trips that raise awareness about Jamaica Bay, an important natural resource in our own backyard. You will find maps highlighting access to Jamaica Bay, descriptions of programs offered by almost two dozen organizations, Jamaica Bay environmental topics, a check-list of local flora and fauna, a glossary, and bibliography.

Visit [www.nyc.gov/dep](http://www.nyc.gov/dep) to download your copy.

Follow us on Facebook at [www.facebook.com/nycwater](http://www.facebook.com/nycwater).



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### Milkweed and Nectar Plant Phenology Project -

This citizen science project is working to better understand what effects climate change and other factors have on plants that are critical for the survival of monarch butterflies.

Volunteers focus their attention on the milkweed plant, the plant that monarch larvae feed on and the nectar from specific flowering plants that adult monarchs feed upon.

<http://monarchwatch.org/blog/2008/02/milkweed-and-nectar-plant-phenology-project/>

**Great Pollinator Project** - This project really wants to get the word out about the importance of pollinators – specifically native bees! Bee Watchers have contributed to data on pollination throughout the five boroughs since 2007 to inform park management and gardening methods and techniques to benefit native bees. Check the website for current bee observation activities. You'll really gain a huge appreciation for bees!

<http://greatpollinatorsproject.org/index.html>

## EE News

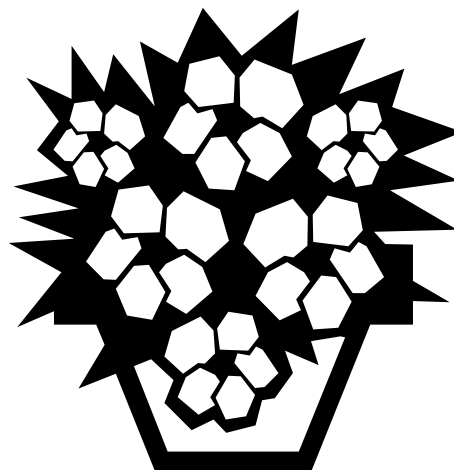
### Skype's New Teacher Network

Skype just officially launched a network dedicated to teachers, called Skype in the Classroom. Teachers have been using Skype's free videoconferencing software to bring experts to class, connect foreign-language students to native speakers, and hold virtual field trips since the service began in 2003. But it hasn't always been easy to find other teachers to connect with. The new network allows users to post and search for projects to collaborate on and find other teachers by location on a map. Almost 5,000 teachers are signed up for Skype in the Classroom.

**The 95 Percent Solution:** School is not where most Americans learn most of their science

<http://caise.insci.org/uploads/docs/FalkandDierking95perc.pdf>

An article recently published in the November-December issue of *American Scientist* calls into question whether schools are really the most effective conduit for learning about science. It points to growing evidence of the power of "free choice science learning"—often referred to as "informal science learning"—to advance the public's understanding of science. With this in mind, they call for a change in the ratio of money going toward informal versus formal learning. The authors suggest that an increased investment in informal science learning might be a cost-effective way to significantly improve Americans' understanding of the subject. They offer a variety of examples of the types of informal resources and activities available to the American public, such as digital content, educational TV and radio, science museums, zoos, aquariums, national parks, and community activities such as 4-H and scouting.





# New York City Water Supply



## Activity 4: I Spy Water

**DESCRIPTION:** Students walk through their neighborhoods every day but how much do they observe? Students will take a scavenger hunt to find fire hydrants, storm sewer drains, and other parts of their neighborhood water infrastructure. By mapping their findings, they will have a better sense of their community's hidden, but valuable, water supply and sewer systems.

### OBJECTIVES:

Understand the infrastructure behind delivering water and removing wastewater from our homes and schools.

Raise awareness of neighborhood resources and realize how communities depend on it.

Utilize navigation and mapping skills.

**MATERIALS:** Paper, Pencil, Ruler, Map of neighborhood/block, Clipboards

**BACKGROUND INFORMATION:** Water travels to each building and to the 115,000 fire hydrants in New York City through a network of aqueducts, tunnels, and pipes, which consists of 6,200 miles of water mains.

Once used, wastewater from storm drains, toilets, sinks and other plumbing fixtures, is collected by another network of pipes: the 6,600 miles of New York City sewers.

**METHOD:** You may want to run through this activity first, in order to create an answer key of the water structures in your school neighborhood.

Create or find a map of your school neighborhood. If you do not have a map, you can create one by using Google maps. Include a box for a legend,

Explain the activity and review what water structures (fire hydrants, storm drains, water manhole covers, water towers, water sampling stations, sewer manhole covers, storm water manhole covers, etc.) they can look for in the designated area. Graphics of some structures are at the top of this lesson.

Split the students into pairs. If you want to make it competitive, the pair that finds the most water structures wins.

Pass out the maps while reviewing the title, compass, legend, and street names.

With adult chaperones, slowly guide the students in pairs around the school neighborhood and record all of the water structures they see on their maps. Orient the maps in the direction they are walking in so they can easily record their findings. Make sure you leave enough time for this part of the activity so that your students can stop and draw the structures as they walk along both sides of the street.

Review and discuss the findings back in class.

**DISCUSSION:** How many water structures were you able to find?

- What purpose does each structure serve?
- Can you infer where the water mains and sewer pipes run in your neighborhood? Draw them on your map. Using your map, how does water enter and leave your school?
- If a fire hydrant was open in your school area, how might it affect your school?
- Where are the streets flat or sloped? Why might this be?
- What was life like before these structures existed?
- Have you noticed these same structures around your home?
- Repeat this activity in your neighborhood.

### EXTENSION ACTIVITIES:

Students might notice that the manhole covers have different designs, abbreviations, and may even have dates. Ask the students to draw the different manhole covers and compare them back in the classroom. They can look up what all the abbreviations and dates mean, A good book for this is *Designs Underfoot: The Art of Manhole Covers in New York City* by Diane Stuart.

Although this activity mainly focuses on water infrastructure on the ground, students can also look up and note the water towers on top of buildings. Explain what water tanks are and how the New York City Water Supply System can deliver water up to the sixth floor of most buildings by the force of gravity and water pressure. Buildings more than six stories have a water storage tank on the roof. Ask the students to count the number of floors a building has in order to identify the buildings with water tanks, You may not always be able to see a building's water tank since some are enclosed behind walls.

To get an engineer's view, there is a graphic of underground utilities on the DEP website, [www.nyc.gov/dep](http://www.nyc.gov/dep), Ask students why pipes are located where they are. For example, sewers are positioned underneath water pipes so that if there is a leak, wastewater cannot get into the water mains carrying clean water.

To see what happens when it rains, have students pour cups of water on different parts of the sidewalk and street. Watch where the water travels to see how engineers have designed the street to prevent flooding.

For more information, including a bibliography of great water books, contact:

New York City Department of Environmental Protection  
[educationoffice@dep.nyc.gov](mailto:educationoffice@dep.nyc.gov)

Visit DEP's Website at [www.nyc.gov/dep](http://www.nyc.gov/dep)

Become a fan of NYC Water at [facebook.com/nycwater](https://facebook.com/nycwater)



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A hopeful sign of our growing awareness of the benefits of microorganisms to health and the environment is the increasing interest in fermenting foods and beverages and in fermenting food waste (which is what I do). Fermenting is becoming popular; people are pickling vegetables and brewing craft beers and drinks, like kombucha. These kinds of fermentation processes are in sync with nature, and they can be done at home and in the classroom. They rely on microorganisms that have evolved over millions of years and processes that humans have been using since ancient times.

### **Recycling Food Waste by EM Fermentation**

There are two general ways in which organic matter is broken down: decomposition (aerobic and usually at high temperature) and fermentation (anaerobic and usually at normal air temperature). Furthermore, there is a distinction between methane fermentation and lactic/alcohol fermentation. The former involves naturally preserving organic matter (a benefit of fermenting foods), and the latter is the putrefaction, or rotting, of organic matter — basically the opposite of composting.

Here in New York City, I've been volunteering to help community gardens who want to recycle food and yard waste, but for one reason or another have not been able to maintain a compost system. I have suggested the pickling method of recycling food waste as an option to the usual composting methods. Since the fall of 2009, I've been a part of the compost-fermentation team, with Susan Greenfield and Barbara Augsburger, at the El Sol Brillante community garden on 12th Street between Avenues A and B. They have allowed me to help them and become a part of their team and we've developed quite a model there. By using EM in over a year, with mostly just the three of us, we have recycled over 2.5 tons

(5,000 lbs!) of food waste without the backbreaking effort of having to turn and manage compost piles. Our goal is to make our 12th Street Project—which would include three community gardens in the area, the elementary and high schools, and three restaurants nearby—a community model using local resources (leaves, food waste) to grow our own food and provide an ongoing educational and cultural center.

As part of my volunteer efforts, I also teach, demonstrate and help set up the method of recycling food waste by the EM fermentation method. I do regular workshops with adults and children (see photo). I've been helping one Pre-K class and a special needs class (8 to 10-year olds) recycle their food waste and I was recently a part of a project, in collaboration with Earth Matter ([earthmatter.org](http://earthmatter.org)), at the East Side Community High School where six students compared thermophilic compost with fermented food waste as a soil amendment.

Training others to be able to teach this method has taken on greater importance. Just becoming aware of the role of microorganisms is important in order to better care for the environment. As awareness expands, people may be drawn to, instead of repulsed by, microorganisms, becoming interested in learning how microbes keep us alive and healthy and how we can use what nature has provided all along.

E. Shig Matsukawa ([shig@recyclefoodwaste.org](mailto:shig@recyclefoodwaste.org)), volunteer, 12th St Model Project, EM projects and school curriculum development

For the full article and references, see [goodmicrobes.org](http://goodmicrobes.org)



# MEMBERSHIP APPLICATION 2011

New Member       Renewal

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Apt. \_\_\_\_\_ Zip Code \_\_\_\_\_-\_\_\_\_

If Sustaining Organization, Name of Contact Person  
\_\_\_\_\_

Business Phone (      ) \_\_\_\_\_

Home Phone (      ) \_\_\_\_\_

Affiliation (for categories other than Sustaining Organization): \_\_\_\_\_

Title/Position: \_\_\_\_\_

Address (for categories other than Sustaining Organization):  
\_\_\_\_\_

E-mail address: \_\_\_\_\_

Mail completed form and check to:

Jay Holmes, Treasurer, EEAC, American Museum of Natural History, 79<sup>th</sup> Street and Central Park West, New York, NY 10024

Date: \_\_\_\_\_

Please check the appropriate calendar year membership category:

- \$ 20 Regular       \$ 50 Sustaining Organization
- \$200 Individual Life Membership

Please make checks payable to EEAC.

Thank you!

EEAC is a 501-(c)3 organization.

I would like to become involved in a committee.

Please provide me with information about the following committees:

- Communications       Programs       Membership
- TEEP (Teacher Environmental Education Preparation)



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