



## Students Monitor Harlem River Water Quality and Air Quality, Seek Solutions

### Urban ecology courses examine pollution

Imagine green rooftops and blooming gardens in Harlem that provide food to the neighborhood as well as clean the air and water. This is the vision of science teacher Mauricio Gonzalez and his students at the Frederick Douglass Academy.

Gonzalez teaches courses in Urban Ecology—exploring plants, animals, and natural resources—and in the process opens up students to the idea of a more verdant and healthy world than the smoggy and concretized one they are used to.

Gonzalez's students study plant biology, aquaculture, and hydroponics in the school's greenhouse, built over the top of a subway station. They learn proper scientific and instrumentation processes. Then the students take what they've learned in the greenhouse and apply it to their immediate surroundings in Harlem -- by conducting environmental studies in air quality and water quality.

For example, since March 2009 students have been monitoring dissolved oxygen (DO) in the Harlem River at a site adjacent to the school. DO levels indicate the ability of water to support life. To do this, they have set up a YSI 600OMS sonde inside a PVC pipe which is attached to a bridge piling. The sonde and pipe extend to a depth of 20 feet. Data is recorded once every 15 minutes. Students retrieve the data every few weeks from the instrument and replace the batteries.

### Real-world experience and equipment

Gonzalez, who is trained as a marine biologist, says he selected YSI equipment for his program because he wants to give students "real-world, professional-grade equipment to learn on, so that they know they can handle it." He has just installed a solar panel at the monitoring site and is working with students to get the data sent to their classroom via Bluetooth wireless connection.

The students also have been monitoring particulate matter in the air. Once the data are collected, the students analyze it. And from this they propose solutions to the environmental challenges they are observing. These challenges include elevated levels of particulate matter, which U.S. EPA studies have shown to increase the asthma and cancer rates in Harlem.



*Students at the Frederick Douglass Academy in New York continuously monitor the Harlem River using a YSI 600OMS sonde. The sonde is positioned inside a PVC tube and attached to a bridge piling.*

Similarly, pollution from roadway chemicals is compromising the Harlem River, although the good news is that dissolved oxygen in the river has not dropped below a critical level that would kill fish.

If this sounds like serious stuff, it is, and Gonzalez expects no less from his students. "I want to get kids to realize they can do something valuable in the real world and enact some change."

### Fighting for a cleaner environment

So students put their research and data into action. As a result of their monitoring projects, Gonzalez and his students propose the following plans and developments to improve the environmental status in Harlem:

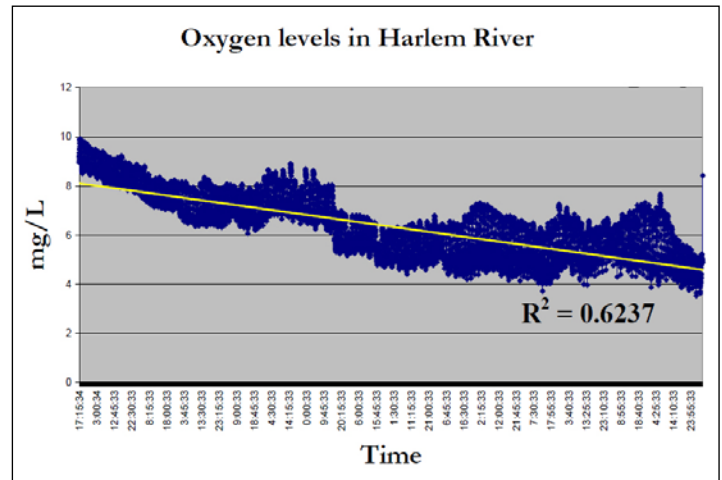
- Move some of the bus depots clustered in Harlem in order to spread out the concentration of diesel fumes in the air.

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- Build rooftop gardens and an urban farm. Growing food locally will curb the use of trucks to deliver food, which in turn will reduce the amount of cancer-causing diesel particulates in the air. Urban agriculture will also recycle water and, by not using fertilizers, the practice will reduce the amount of excess nutrients that run into the river and deplete oxygen.
- Create better access to the Harlem River for residents and students for educational and leisure activities.

They have presented these findings to neighborhood and community development groups and at Columbia University.

Affecting change based on scientific data is an on-going project for Frederick Douglass Academy students. Through his ecology courses and use of YSI instruments, Gonzalez aims to “create a culture more sensitized to the environment”—and a healthier future for his students.



Dissolved oxygen concentration in mg/L at the edge of the Harlem River during the warm months of April-July 2009.



YSI sondes are used throughout the world to monitor rivers, lakes, reservoirs, groundwater, wetlands, marshes, estuaries, and near-coastal oceans and provide accurate and timely data to those who work to protect the environment. Learn more at [www.ysi.com/v2](http://www.ysi.com/v2).

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