NY Sun Works: The Women Behind New York City's Reviving Environmental Curriculum
By Ashley Jankowski

High above the polluted New York City streets, dozens of scientists are developing the solutions to the world's environmental mysteries of climate change, biodiversity, and agriculture. They are swabbing rather than swatting pests. They are designing their own man-made pollinating tools. They are developing sophisticated experiments to make conclusions about the future of urban food security.

But these aren't environmental engineers. These are the elementary school students at P.S. 333.

"Here in the greenhouse, students get to pick what they want to research," said Shakira Provasoli, environmental educator at P.S. 333, The Manhattan School for Children. "Students are the ones creating and testing their own systems."

Due to larger class sizes and declining public school budgets, many urban public schools are finding it harder to incorporate key scientific concepts into their lesson plans. According to a recent study conducted by The United Federation of Teachers, 26% of surveyed educators in NY Public Schools lack a science curriculum. Besides the massive legal implications and daunting paperwork this forebodes for the Department of Education, something greater is at stake: the city's children, who are then left unaware of their role within the drastically changing environment around them.

"The problem is that people in New York City don't actually see the need for environmental solutions," Provasoli said. "We've never experienced a drought, because we ship our water in. Even though our trash is huge, we quickly ship it out."

To address this growing problem, Provasoli spreads the much-needed awareness of science to her kindergarten through 6th grade students in Tribeca. She has developed a one of a kind curriculum exploring environmental systems and problem solving, including hands-on lesson plans that involve learning pest control with lady bugs, producing fertilizer with live tilapia, and developing high-yielding crops with hydroponic technology.

And if that wasn't revolutionary enough, she does it all in a greenhouse planted directly on top of the school, thanks to her partnership with NY Sunworks.

NY Sun Works is a non-profit organization that promotes sustainability in urban environments by implementing a uniquely engaging curriculum for public schools in the Greater New York Area. But their plans aren't to just teach environmental science; By constructing modern student-run greenhouses, the organization whisks kids away from their textbooks and scantrons and immerses them in a living, breathing ecosystem.

Established in 2003 by an all-women team of mothers, teachers and researchers, NY Sun Works began its urban sustainability efforts with a project called "The Barge", a floating food farm located on the Hudson River. Using energy harnessed from the sun, the wind, and a whole lot of vegetable oil, "The Barge" was the first successful example of this type of high yield agriculture facility. Their success generated much attention, but members soon realized that sustainable food production would only make a difference if it started from the ground up, with new generations of students.

"We got inspired to turn what we saw at The Science Barge into a science lab," said Sidsel Robards, the Director of Development and Events at NY Sun Works. "That's how we started the Greenhouse Project - simply as a project to improve the science education in our own children's school."

But the challenge of urban sustainability for students and environmentalists alike is the limiting factor of physical space. With the ceaseless construction of new residential buildings and the disappearance of scarce local greenery, how could something like widespread agricultural education even be a possibility? New groundbreaking ideas to fix this mismatch in space include underground gardens and green-wall architecture, but typically these ideas are developed and implemented by adults.

NY Sunworks wanted their students to get in on this momentum of innovation. By 2010, the organization had begun construction of student-run greenhouses uniquely built for NYC public schools.

"We're managing to take the science standard that [teachers] have to teach, and then creating hands-on and project based curriculum around it," Robards said. "The teachers feel really invigorated because the kids are so excited that it's easier to teach."

These greenhouse labs are each equipped with educational urban agriculture technologies such as hydroponic farming and fish farms. It is here that students are provided with the problems and guided to make the solutions for their own neighborhood, including efficient land and water use, conservation, symbiotic living, and more.

As students learn throughout the year, they also produce their own crops to be eaten and shared with their own school and even local nursing homes, allowing them to recognize the importance of engaging with the community, and the big impact their small hands could have.

Unlike other curriculums of environmental science that glosses over the serious threats to the planet, Provasoli isn't afraid to use an element of fear to teach. She often uses class-grown crops to simulate the menacing effects of climate change, eutrophication, and erosion.

With this method, she believes that students will have a larger grasp of what is happening in the real world.

“I go for shock and awe,” she said. “The goal of this is to show students how to find and understand a problem, and then design their own solution.”

Overall, she hopes to leave students encouraged to make positive contributions to help stabilize the environment, rather than simply throw in the towel in the face of initiated environmental damage. As a bonus, Provasoli has watched her students consistently receive 4’s on the science portions of State Standard Examinations - the highest attainable score.

The implementation of the greenhouses above each partner school undoubtedly helps students exceed NY State Standards and prepare them to generate healthy, scientific solutions to their changing urban environment - a win-win for both education and environmental legislators. Responding to the great interest in P.S. 333’s successful pilot greenhouse in 2010, NY Sun Works began the initiative to install 100 urban greenhouse classes in NY public schools by 2020.

However, as with anything implemented in public schools, the initiative runs into some problems. Even with extensive federal funding that can aid in the development and success of a greenhouse, the full cost is often out of reach - totaling up to $2,400,000 for its rooftop construction.

To solve this issue, NY Sunworks created an alternate “classroom conversion” plan, which turns an existing classroom space into a greenhouse space, which is equipped with all greenhouse equipment along with grow lights. This option rings in at about $50,000, a fraction of the original cost.

“It’s the same experience for the kids in terms of the curriculum, and what they grow is the same,” Sidsel explained. “But it’s more cost-effective for the school itself.”

NY Sunworks works on an individualized basis with each partner school to implement the program based on that school’s particular needs. So, if public schools can obtain personalized lab designs that are tailored to their budget while improving their test scores, why isn’t every school doing it?

According to Provasoli, the problem extends beyond just infrastructure and funding. It also becomes an issue of untrained or even uninterested staff.

“This is what I like and what I want to do,” said Provasoli, who was awarded the Presidential Innovation Award for Environmental Educators earlier this year. “But not all teachers are trained in sustainability. Since it’s not something they get paid extra for, they’ll typically only get involved if it’s something they know and care about.”

It is for this reason that Provasoli extends her reach past the students at the Manhattan School. On Saturday mornings, she holds sustainability lessons for some older students

as well - public school teachers - where they learn not only how to teach environmental science effectively, but to engage in its core principles in their daily lives as well.

As 2016 comes to a close, NY Sunworks clocks in at 45 completed greenhouse spaces - about the halfway point of their 100-lab goal. Is stacking greenhouses atop of buildings the answer to New York City's most pressing environmental dilemmas?

"Maybe," Provasoli said. "But what we know for sure is that the solutions will begin with what we choose to teach in our public schools, and the love for science it fosters."