Creating Garden Mosaics Piece by Piece

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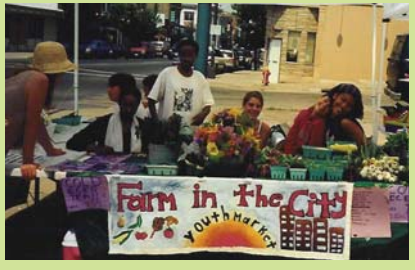

Not all environmental educators work in forests and nature centers. Some find themselves in large cities, amidst tall buildings and endless concrete. Ironically, it may be here where their skills are needed most. But in such settings, their students may find concepts like biodiversity and ecosystems to be abstract and remote. One of the most challenging aspects of urban environmental education is to make science relevant and fun. Place-based learning, which uses students' neighborhoods as the focus for investigations, can make science both tangible and engaging.

Formal and informal educators alike are using innovative resources from Cornell's Garden Mosaics program to teach science in community and school gardens. Funded by the National Science Foundation, Garden Mosaics combines science learning with intergenerational mentoring, multicultural understanding, and community service. The program's mission? "Connecting youth and elders to explore the mosaics of plants, people, and cultures in gardens, to learn about science, and to act together to enhance their community."

In many cities, natural areas for conducting outdoor science are often nonexistent. To address this problem, Garden Mosaics' educators turn to school and community gardens to enhance their teaching about ecological and biological principles. Schoolyard gardens—cultivated by teachers and students—can bring to life important scientific concepts, such as food webs involving plants, insects, birds, and mammals, decomposition in a compost pile, and the symbiotic relationships of microbes and plants on legume root nodules. Community gardens, often sited on formerly vacant lots that have been "reclaimed" by neighborhood residents, also offer a site to teach these biological lessons. Simultaneously, they help establish a greater connection to the surrounding community, and to our increasingly global world. Community gardens are often spaces where gardeners from different backgrounds and ethnicities cultivate a diversity of plants reflecting their heritage. For example, who would think that cotton can be found growing in New York City? Through involvement in a community garden, students have the opportunity to meet older members of their community with a wealth of gardening experience, and rich cultural backgrounds that shape their gardening practices.

Garden Mosaics programs take place at community centers, half-way houses, 4-H programs, schools, and other sites. The following projects are all parts and pieces of Garden Mosaics.

Science Investigations

The Garden Mosaics program promotes *"i ·m ·science investigations."* *"i ·m ·science"* can be interpreted in three ways—it can mean I Am Science, Information Mosaics, or International Mosaics. Youth conducting these Garden Mosaics investigations develop interviewing, observation, and data-recording skills, and make important contributions to their community. They then share the results and photos of their investigations on the Garden Mosaics website, which is used for education and research. Because many of the investigations involve interacting with elder gardeners, students also form positive relations with local role models.

The four Garden Mosaics *i ·m ·science investigations*—Gardener Story, Community Garden Inventory, Neighborhood Exploration, and Weed Watch—are designed to be conducted by youth in cooperation with community gardeners. But anyone can take part.

Gardener Story

The Gardener Story investigation gives youth the opportunity to interview elders in their community. Using guiding questions, students ask gardeners about their plants, planting methods, pest management practices, soils, and how their cultural heritage influences their gardening. Students take photos and write stories about the gardeners, which are posted on the Garden Mosaics website for others to share.

In the Bronx, in New York City, Garden Mosaics students interviewed Karen Washington, a community gardener at the Garden of Happiness. In this garden, each gardener has one individual plot, and another one for the farmer's market and food pantry. As members of the non-profit group

Daffodils in a Bronx community garden bring cheer to New York City's urban landscape.

La Familia Verde, gardeners at the Garden of Happiness have space in a nearby farmer's market which they hold on Tuesdays; they then donate any leftover vegetables to a local food pantry on Wednesdays.

During her interview, Karen Washington heard birds singing. "Do you hear that?" Washington asked. "That's music. Most people don't get the time to stop and listen to the birds, hear the rustle of falling leaves, or enjoy the smells of cut grass, cow manure, and compost. Gardening is relaxing. I enjoy digging up weeds and taking out my daily frustrations in this way. Most of all, I enjoy meeting people of different nationalities. I'm learning Spanish from others in the garden. I really enjoy the exchange of food and culture."

Community Garden Inventory

The Community Garden Inventory investigation is a garden tour, during which youth ask gardeners questions about crops and planting practices, and the social, cultural, and educational activities that take place in their gardens. Youth use a data form to record, then send their findings to the Garden Mosaics website, where visitors can learn about the role gardens play in communities. Their information will eventually be used by Garden Mosaics and the American Community Gardening Association to create an international database of community gardens.

Students may not initially realize how many community gardens there are in their city or neighborhood. In large cities such as New York, San Francisco, and Toronto, hundreds of community gardens exist, while most smaller cities have at least one. These gardens are living laboratories where students can conduct research in a community context. Students in Ithaca, NY explored the Ithaca Community Garden, where more than two hundred gardeners grow flowers, fruits, herbs, shrubs, and vegetables.

Neighborhood Exploration

Students conducting the Neighborhood Exploration investigation use aerial photographs, topographic maps, and walking tours to learn about places in their neighborhoods where people can enjoy nature, participate in cultural and social events, access fresh food, and get exercise. The students then produce a neighborhood collage using photos and maps, and share their results online.

Weed Watch

For the Weed Watch investigation, students gather data on the distribution of weeds in gardens by asking local gardeners about their weed problems and weed control techniques. "Weed Watchers" in urban vegetable gardens can submit their data to the Garden Mosaics website, where their efforts are helping Cornell University scientist Antonio DiTommaso develop a research program focusing on urban weed management. "Weed Watchers" also identify and measure weeds, gain an understanding of plant competition and population dynamics, and learn that weeds are not all bad—in fact many are edible!

Science Pages

The Garden Mosaics Science Pages, which are available on the Garden Mosaics website, enable students to delve deeper into concepts and processes seen in the garden. Students can use the Science Pages to learn more about specific crops, earthworms, insect life cycles, weed control, and other concepts that may require more time to learn than the garden visit allows. Learners can also use the Science Pages for plant identification projects. In researching the plants' scientific names, native continent, and how they are grown and prepared for eating, they may be surprised to learn that turnips, broccoli, collards, bok choy, and cabbage are all closely related!

A community gardener in Allentown, Pennsylvania shares her gardening techniques and results with youth conducting a Garden Mosaics science investigation.

Action Projects

To further connect to their community, Garden Mosaics participants conduct Action Projects, applying what they have learned to benefit others. One group in Sacramento compared the soil fertility in three gardens; another group grew vegetables and donated them to a local food bank; a third group worked with a landscape architect to design a garden that would teach youth about California's native plants. A group from St. Paul, Minnesota studied xylem and phloem, photosynthesis, and transpiration while creating an actual mosaic—bits of tile making up a tabletop modeled after a stem cross-section. Students take photos and write stories about their Action Projects and post them on the Garden Mosaics website.

Global Mosaics

Because many gardeners who share their knowledge with youth are immigrants who have brought their agricultural practices with them and adapted them to urban environments in the U.S., Garden Mosaics already has a strong "global" flavor. Building on this theme, we added an international component to Garden Mosaics. At Rhodes University in Grahamstown, South Africa, students and faculty are now developing curricula that use traditional farming practices to teach about science. For example, rural people in South Africa eat "umfino,"—a generic name for young edible greens, many of which are "weeds." Lessons have been built around the biology and health benefits of these greens. Last summer, Cornell students Jamila Simon and Kendra Simon adapted Garden Mosaics programs for township schools near Durban, South

Africa. This fall, Rhodes University student Nikki Kohly will be coming to Cornell to compare Garden Mosaics to similar programs in southern Africa.

Another way that Garden Mosaics is "going global" is by translating the website's short program description and several Science Pages into Arabic, Russian, and French; many more resources are available in Spanish.

Cornell Students

Cornell undergraduates are also involved in Garden Mosaics, serving as summer interns with camps and community organizations. For the last two years, we have taught an Urban Environments seminar in collaboration with the Cornell Public Service Center and Department of Natural Resources. Students in this seminar spend an "Alternative Spring Break" touring a wide variety of "green" environments in New York City, ranging from the sustainably designed Solaire building, to the Living Memorial Gardens in lower Manhattan. In the afternoons, they help Harlem teens clean up a local community garden for the spring planting season. Finally, they conduct Community Garden Inventories to learn about the availability of green spaces and how horticulture is being used in the city. Seminar student Tony Marks-Block, Natural Resources '07, worked with Garden Mosaics last summer in his native San Francisco.

"We learned about how community gardening was a tool for empowerment and youth leadership in Harlem, and about how the current wave of gentrification in Harlem has turned many community gardens into luxury homes that the community cannot

Rashard is justifiably proud of the beans he grew in this Greensboro, North Carolina community garden!

afford," said Marks-Block. He particularly valued comparing his experience in San Francisco to New York: "In both cities there is a constant struggle for land." When asked if he minded "giving up" his spring break for the New York City trip, he replied: "I could not have asked for a more motivational and informative spring break. It involved experiential learning and was much better than being at home or being a tourist!"

Nischit Hegde '06, a student in Industrial and Labor Relations, also participated in the trip. "I was born and raised in Queens, N.Y., and was never exposed to community gardens," she said. "Yet Queens is home to many immigrants, many of whom come from agrarian backgrounds. Visiting the gardens in Manhattan was a beautiful experience; each one was home to a different community struggle."

Future Directions

In February 2006, the American Community Gardening Association (ACGA) voted to assume responsibility for promotion and distribution of Garden Mosaics. This will allow the program to grow, since the National Science Foundation funding ended in the fall of 2006. ACGA, an international nonprofit organization supporting community greening, recognizes that community gardening improves the quality of life for people by providing a catalyst for neighborhood and community development, stimulating social interaction, encouraging self-reliance, beautifying neighborhoods, producing nutritious food, reducing family food budgets, conserving resources and creating opportunities for recreation, exercise, therapy and education. Garden Mosaics has found a wonderful home at ACGA, and Cornell has begun a relationship with ACGA that will certainly "bear fruit" in the future.

These young women constructed new raised beds and planted vegetables in a Harlem garden in New York City.

Garden Mosaics is an example of Cornell at its best—reaching out to communities while benefiting students and the environment. Over 40 Cornell undergraduate and graduate students have engaged with Garden Mosaics youth and gardeners over the last four years, helping students learn to think like scientists, while at the same time helping them recognize the important role gardens play in their neighborhoods.

As a St. Paul, MN Garden Mosaics participant noted, "There is so much 'invisible science' that happens in gardens. It just takes a unique combination of people and plants to bring it into view."

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Resources: Funding for the Garden Mosaics program is provided by the National Science Foundation Informal Science Education program (ESI 0125582), the College of Agriculture and Life Sciences at Cornell University, and other donors. To obtain copies of the Garden Mosaics interactive DVD for educators, program manual, colorfully illustrated Science Pages, and other resources, or to simply explore the world of garden mosaics, read about gardeners and community gardens, or obtain weed watch data, visit www.gardenmosaics.org