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Cultivating the Butterfly Effect

by Erik Assadourian

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Cultivating the Butterfly Effect

Chaos theorists suggest that the waving wings of even a single butterfly affect the weather around the world. All life affects all life. And so, in a vastly larger way, does the growth of even the smallest home or neighborhood garden. The millions of gardens growing around the globe are having a powerful cumulative effect on people, communities, and the environment.

by Erik Assadourian



Gulf fritillary caterpillar visits the 2nd Street Elementary School

Monarchs, anise swallowtails, gulf fritillaries: these are just 3 of the 15 species of butterflies that now inhabit the 2nd Street Elementary School

Garden. Begun 10 years ago in a few flowerboxes, the garden has expanded to the size of two classrooms. Kids who walk into it find themselves sharing space not only with butterflies, but with sunflowers, ladybugs, and yellow-rumped warblers. The National Wildlife Federation has even designated this little plot a certified wilderness area.

This would be a commendable achievement for any garden, but it's especially impressive for one that is contained on all sides by freeways, and is located in an inner-city Los Angeles neighborhood that suffers from a severe degree of gang-violence. The garden has become a refuge of green within the gray smog-filled junction of Interstate 5, Interstate 10, and Route 60, with chirping birds now defying the rumble of downshifting trucks that exit the I-5—the freeway whose retaining wall is shared by the school parking lot.

Like countless other gardens around the world, the 2nd Street Elementary School Garden is having noticeable effects on its community.

While it can't quite neutralize the smog of the three major highways or the aggression of nearby gangs, it has brought a new vitality to both the school and its neighborhood—restoring a piece of the local environment, fostering a sense of community, and providing the school with fresh vegetables and a fresh approach to education.

Brandyn Scully, the teacher who started the garden in 1992, says the project has become the students' "reason to learn," and is consistently voted their favorite part of school. "It helps me teach," she says. For example, it provides a creative way to discuss the intricacies of math and science, as when the kids investigate the lifecycle of flies that grow in marigold seed pods. For students who are just beginning to learn English, that kind of hands-on setting also helps to reduce the difficulties of learning only in a classroom setting. It has



*School garden in
downtown Los Angeles*

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Growing flowers in a prison yard.

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fostered a newfound respect for the environment, as teachers and students become partners in restoring a natural system that balances the needs of the environment—like milkweed for the monarchs—with the needs of humans.

The 2nd Street Elementary School is one of about 3,000 California schools that have maintained gardens with the encouragement, materials, and funding of a state Department of Education program, “A Garden in Every School.” A primary mission of the program, which began in 1995, is to provide “an opportunity for children to learn about nutrition, healthy eating, and basic food preparation.” According to the program’s coordinator, Deborah Tamannaie, the program is working. “Instead of eating junk food, the children are eating what they grow,” she says.

One indication of the program’s success comes from a recent study of 97 children, conducted by Jennifer Morris and her colleagues at the University of California at Davis. Morris found that the 48 children who learned about nutrition and worked in a garden throughout the school year were significantly more willing to try new vegetables than were those of a control group, who did not have gardens or nutrition education.

Critics might question whether school systems that are financially stretched can really afford gardens. But in fact, these gardens address a rather urgent need. In the United States, with obesity having reached epidemic proportions, the health of the school-age population is at stake. About 13 percent of American kids are overweight or obese, and only 1 percent meet the daily U.S. Food Pyramid Guide recommendations for all five standard food groups. As they grow older, if their eating habits remain poor, their vulnerability to getting fat is likely to rise dangerously. Already, a record 61 percent of the adult population is overweight or obese. According to a 2001 report by the U.S. Surgeon General, this epidemic contributes to 300,000 deaths per



Guard and inmate gardeners in the Metropolitan Remand and Reception Centre

Courtesy Patty Angre

year—just shy of the 400,000 deaths associated with tobacco.

School gardens also help to counter the damage done by two other notorious trends

in U.S. schools: cutting back on physical education classes, and signing sales contracts with soft-drink companies and fast-food restaurants. Gardening may not be as strenuous as soccer or tennis, but it gets the kids outdoors doing something physically active. And the pleasure of eating a sun-ripened tomato or fresh carrot may offer a refreshing alternative to processed potatoes, which currently make up about a fifth of the vegetables consumed by Americans.

Along with schools, other institutions are discovering the benefits of gardens. The Metropolitan Remand and Reception Centre, a correctional facility built five years ago in an industrial zone in Sydney, claims the honor of being the largest maximum security prison in Australia, and indeed in all of the southern hemisphere. Yet, in the middle of the forbidding concrete compound lies a virtual oasis, complete with a pond, peacocks, and even endangered green and gold bellfrogs. For both the staff and the prisoners, entering the garden offers an opportunity to “forget that you are in a jail,” according to Patty Angre, who supervises the MRRC garden. And given that many prisoners have had trouble with angry or violent behavior, there’s another benefit as well. Angre explains that the therapeutic act of gardening helps to calm the inmates. “The garden improves people’s spirit,” she says, “it changes their whole outlook on life.”

Angre’s observation has been corroborated by mental health professionals. Over the past decade, psychologists have conducted ample research showing that human contact with nature—even with just a few trees—correlates with better mood, recovery from stress, and improved concentration. In a recent study of 145 urban public housing residents, Frances Kuo and William Sullivan, co-directors of the Human-Environment

Research Laboratory at the University of Illinois, even found that those with more access to greenery were significantly less likely to use aggressive tactics or commit violence against their partners.

As a result, urban gardens are being established as spirit-lifting refuges not only for restless school children or prison inmates, but for the residents of hospitals, domestic abuse shelters, and nursing homes. In fact, gardening is taking root as one of the newest forms of mental-health treatments, with “horticultural therapy” organizations being established in countries from the United Kingdom to Japan. According to Mitchell Hewson, a horticultural therapist at the Homewood Health Centre in Ontario and founder of the Canadian Horticultural Therapy Association, “horticultural therapy is having a profound effect, helping patients with ailments ranging from depression and addiction to post-traumatic stress disorder.”

In a way, the mental health benefits of gardens are an added benefit. Their primary purpose, in most places, is to augment the local food supply. On a global scale, according to the UN Food and Agricultural Organization, 840 million people are undernourished. Another 1 to 2 billion suffer from a deficiency of necessary vitamins and minerals. But gardens are helping to combat these deficiencies. For example, in Dakar, Senegal, local harvests—largely consisting of small family gardens—supply more than 60 percent of the city’s vegetables. In Havana, Cuba, over the past decade, gardens have become central in creating a secure and healthy food supply. With the fall of the Soviet Union and the ending of Soviet-sponsored industrial agriculture, the U.S. embargo cut off Cuba’s access to petroleum and agricultural chemicals. The country had little choice but to develop localized, small-scale, organic food production—both in farms and in home and community gardens. According to Catherine Murphy of the Institute for Food and Development Policy, there are more than



Atop the Kajima KI Building in Tokyo

© Yoshihiro Nojima

26,000 popular gardens in Havana, spreading across 2,400 hectares of land and producing 25,000 tons of food. In addition to

supplementing family food supplies and incomes, these gardens provide food donations for local schools and day-care centers.

The contribution of gardens to food security is not just a boon to the developing world. In the United States, while saving individual families hundreds of dollars in food costs per year, gardens also supply food to local poverty assistance programs. In Huntsville, Alabama, more than a thousand volunteers help to grow food at the CASA (Care Assurance System for Aging and Homebound) community garden. In 2001, volunteers harvested and delivered almost 9 tons of vegetables to elderly and homebound people in the surrounding area. The CASA garden is part of a national program, *Plant a Row for the Hungry*, which since 1996 has mobilized community gardeners to donate a portion of each year’s harvest. So far, the program has supplied over 800 tons of fresh produce to local assistance programs.

The potential, of course, is vastly greater than that. During World War II, 20 million community and home gardens across the United States provided more than 40 percent of the fresh vegetables consumed by civilians, so that farms could feed the troops. If gardening could be done on that scale again, local food security could be improved while freeing surpluses to assist in areas suffering from food shortages caused by political or environmental instability.

The kind of land-use shift required to grow gardens on that scale could have an ecological and health benefit far beyond that of providing fresher, more chemical-free food. At present, the largest “crop” in the United States is lawns, which cover 10 million hectares. By one estimate, the average U.S. lawn (about one-eighth of a hectare or one-third of an acre) absorbs up



Tokyo rooftop

© William Cook, www.wmcookillustrations.com

to 4.5 kilograms of pesticides, 9 kilograms of fertilizers, and 773,000 liters of water annually—along with the countless hours of labor and liters of gasoline consumed by mowing. Even converting just 1 percent of these lawns into organic gardens would reduce the toxic pesticide exposure to families and wildlife by up to 3.4 million kilograms per year, while also helping to reduce reliance on energy-intensive commercial food transport. Along with reducing nutritional value and creating vast amounts of packaging waste, shipping food over long distances—by ship, truck, or plane—leads to increased production of carbon dioxide emissions. In the United Kingdom, agricultural products traveled an average of 125 kilometers in 1999, producing 4 million tons of carbon dioxide in the process. Yet, 125 kilometers is relatively short; in the United States, the average food product travels from 2,400 to 4,000 kilometers, more than 20 times as far as in the U.K.

Aware that the agribusiness food industry has become hugely wasteful, the 45,000 residents of Høje Taastrup, a suburb of Copenhagen, are implementing a regional plan to become nearly self-sufficient in food production by 2005. By increasing the number and efficiency of gardens and boosting purchases from local farms, the town is reducing its dependence on imports from unstable areas, on chemical-intensive farms, and on petroleum-driven transportation. In addition to growing vegetables, the plan entails increasing hen production, which is helping to close the agricultural nutrient cycle. Instead of importing chickens from industrial agriculture operations, which are fed on imported corn meal and generate overwhelming mountains of chicken waste, many of the Høje Taastrup residents use food scraps to feed the hens, then use the manure as fertilizer for their gardens—thus helping to close the nutrient cycle by preventing usable food waste from entering landfills and manure from entering the rivers.

Conceptually, that closing of the nutrient cycle points to a virtue of gardening that may be of particular importance to planners who recognize that cities have ecological relationships with their environments. Gardens aren't simply added to the landscape like inert

stone walls or benches; they participate dynamically in the region's life processes. Just as they help absorb waste carbon dioxide from human activity and convert it into needed oxygen, they also help to dispel waste heat. Tokyo, like many large cities, suffers from a "heat-island effect," wherein the concentrations of asphalt, cars, and factories render the air several degrees hotter than in the surrounding area, which in turn increases smog, asthma, and heat stroke. Responding to this environmental health problem, the Tokyo metropolitan government passed a law in 2001 that required new private buildings with rooftops larger than 1,000 square meters, or public facilities larger than 250 square meters, to cover at least 20 percent of their area with gardens. The Tokyo government recognized that gardens help cool the city by utilizing solar energy—both in photosynthesis and in evaporating water from the foliage and soil. The plants, by absorbing rainwater, also help to reduce runoff and pressure on municipal sewage treatment. Plus, installing the gardens on rooftops helps to more effectively maintain the internal temperatures of the buildings, thereby reducing both the energy needs of buildings and the heat and pollution created in generating that energy.

Urban gardens aren't without their problems. While they can improve the local environment, they do take more time and effort to maintain than empty rooftops or vacant lots. And in some areas, air, soil, and water pollution can compromise the safety of the produce. In southwest Poland and especially in Upper Silesia, a 200-plus year history of concentrated heavy industry, energy production, and mining has rendered the soil so toxic in some places that eating locally grown produce can be a health threat. Yet, many residents depend on public gardening plots to supplement their food intake and to break the monotony of the densely built environment. In response to these health risks, Silesian environmental organizations have helped gardeners to shift cultivation to flowers and other ornamental crops that can be sold or traded for food from unpolluted areas, or to foods that absorb toxins at a lower rate (e.g., legumes and grains instead of green leafy plants). In any case, the

ability of plants to absorb toxins actually offers another potential benefit of gardens—their use in helping to clean up contaminated plots—a

process known as phytoremediation. In Hartford, Connecticut, Jack Hale, the executive director of the Knox Parks Foundation, started a garden in order to extract lead from the soil of an abandoned site where a paint store once stood. With the help of local college students, he planted Indian Mustard, a plant which effectively absorbs lead. After one harvest, the soil readings fell in many areas to half of the 1,000 parts per million at which they started. While the project was discontinued after one season, it demonstrates the efficacy of gardens in environmental remediation projects.

Finally, there is a benefit of urban gardens that is too often overlooked by urban planners and government officials. People often congregate to work, relax, and enjoy communal spaces, and through these interactions build community. In a study of community gardens in upstate New York, Donna Armstrong of the State University of New York at Albany found that in 54 of 63 gardens surveyed, people worked to some degree cooperatively—sharing tools, work, or harvest. Having a garden often helped to foster pride in the neighborhood, evidence of which could be seen in reduced littering rates and improved maintenance of other properties in the neighborhood. Further, in one-third of the gardens, more expansive community empowerment initiatives were generated by participants—initiatives that included the creation of a new park and the establishment of a neighborhood crime-watch program.

Along with empowering communities, gardens can also help to integrate them—facilitating interactions between diverse populations. La Plaza Cultural, a garden founded in 1974 in New York City's Lower East Side, functions as a cultural center and performance space—holding regular performances that range from



Courtesy Brandy Scully

2nd Street Elementary School butterfly collectors prepared for action

King Lear to Sufi dancing. At the same time, it provides organic produce to local food shelters and, like the 2nd Street Elementary School garden,

serves as a registered wildlife habitat.

Gardens can be venues for community building and empowerment, either by providing a communal space, cultural activities, or—sometimes—by providing a common cause when the garden itself is threatened. Often, as gardens transform previously rubble-littered vacant lots into green havens, they attract not just butterflies but bulldozers, sent to convert the now pristine land into new developments. In the United Kingdom, about one-third of the half-million allotment gardens that existed in the mid-twentieth century have been destroyed.

La Plaza Cultural is another of these threatened gardens. For many years, a developer wanted to build a senior citizen housing complex on its city-owned lot in Manhattan. When public housing and open space come into conflict, the former is usually regarded as the more urgent of the two—and the garden is lost. In New York, a city known for both its beautiful gardens as well as its 18-year-long conflict between the city government and gardening community, these two constituencies reached a major compromise this past autumn, resulting in an agreement that preserves 391 of the 838 contested gardens. While some (including La Plaza Cultural) are not covered, the settlement dramatizes how much the social value of gardens has grown. If these spaces can survive in a city where real estate is some of the most expensive in the world, they can thrive anywhere.

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For further information on the global impacts of gardening, including more on food security, horticultural therapy, and environmental improvement, see www.worldwatch.org.