

Releasing the Stranglehold of Invasive Plants in Urban Parks

Overview

New research reveals that cutting and removing invasive plants in cities can have a lasting impact on forest restoration. But, scientists say, the urban forests of the future may look very different from those of the past.

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Two researchers work to measure a vine-choked plot in New York City. Photo by Lea Johnson.

In many US parks, invasive exotic vines have a stranglehold on trees. Where once there stood huge old maples, chestnuts, hickories, and oaks shading paths and hillsides, there are now miles of matted Asian and European vines. Those invasives don't just look bad – they often support little in the way of native wildlife, and can limit some of the most beneficial ecological aspects of urban forests.

Although volunteers and municipal employees spend countless hours and millions of dollars each year trying to remove those vines, to date there's been very little research available on the long-term effectiveness of such projects. Volunteers have largely been working with a sense of desperation and lots of anecdotal evidence. Rather than watch the native trees be smothered to death or pulled down by the weight of the invaders, people have stepped in to help with the hope that the cutting and pulling, spraying and hauling away of weeds will have an impact more than a season or two, and that once removed the vines will not return as strong as they were before. So last month when a research team announced they had results showing that some invasive removal and restoration projects in New York City were successful, many in the plant world were excited.

The researchers, led by Steven Handel from Rutgers University and Lea Johnson of University of Maryland, examined six of New York City's most urbanized parks to see what they could discover about restoration and invasive removals. They compared 30 sites in three parks that had been restored between 1988-1993 with 30 sites in three parks that had not been restored.

In every location, invasive exotic vines were a management problem. Although some areas of the parks still contained some high quality habitat, many areas were completely inundated with blankets of multiflora rose, porcelain berry and oriental bittersweet, among other problem plants. In some places, no trees remained standing, just acres of almost impenetrable exotic woody vines.



Porcelain berry is pretty, but can smother an urban forest quickly. Photo courtesy of the National Park Service, <http://www.nps.gov/plants/alien/fact/ambr1.htm>

Neglect during the 1970s and 1980s had contributed to the extent of the vine coverage. New York City Parks during those years often became settings for violent crime, the sale of illegal drugs, and prostitution. Lack of funding and an underappreciation for the important role parks could play in enhancing the quality of the ecosystem and the quality of life for the city's residents meant few biologists were able to oversee many of

NYC's greenest spaces. And in those decades, few scientists were doing ecological research or work in urban locations anyway.

"One of the major uses of woodland areas during those years was for the burning of stolen vehicles," Johnson noted during a recent public lecture on her research.

Eventually, cities like New York began to once again embrace the idea of green areas. As the burnt cars were removed, crime scenes cleared, and the parks reclaimed in the late 1980s, a new team of foresters from the city was asked to begin restoration and record some data, at least in a few locations. It was their work which gave Johnson's team a place to start in 2009, visiting areas where the city's foresters had removed invasives in Prospect Park in Brooklyn, Pelham Bay Park in the Bronx, and Inwood Park in Manhattan. Johnson and her team then compared the results with information gathered from ecologically similar sites in Pelham Bay Park and Van Cortlandt Park in the Bronx and Cunningham Park in Queens, where no restoration had taken place.

Restoration projects had included removal of invasives using foliar sprays and the cutting and painting of stems with herbicides. In some locations, native trees had also been planted to replace the removed vines.



Oriental bittersweet forms a thick hold on native trees in urban forests. Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

By comparing the density of native plants, the size and diversity of trees and the relative density of invasives, Johnson's team found that after 15-20 years, the restored sites still differed dramatically from the unrestored sites. On average in the unrestored sites, 50 percent of the ground cover was comprised of invasives, whereas in the restored sites invasives made up only 7 percent of the ground cover. Furthermore, in the unrestored areas only 29 percent of the plants found were native; in restored areas the average was closer to 61 percent.

"Restored areas had a significant decrease in the targeted invasive species, and a significant increase in natives," Johnson said. In general, those sites which had been restored were the least invaded, and those

places where tree planting had occurred were also full of smaller immature native trees that had planted themselves.

“Johnson’s work is really a model for what we should all be doing everywhere,” said Marc Imlay, a biologist and park ranger with the Maryland National Capital Park and Planning Commission in Maryland. Imlay has been leading weed removal teams through some of the most urbanized parks of the metropolitan DC area for the last twenty five years and is credited with removing thousands of acres of vines across numerous locations. “The size of the invasives problem is huge,” he added.

Although Johnson said that her research shows that the central goals of the NYC restoration project were met and the project was successful, she cautions that the future forests in those locations will not look like forests of the past, in part due to the dynamic nature of city landscapes. City soils have been changed by pollution, altered by dramatic disturbances and are sometimes limited by past land use. The urban heat island effect can warm some inner city parks, making them more or less hospitable to certain native species. And cities, she added, are “hot spots” for new invasions because they are so heavily used by people, who often bring in new exotic plants in myriad ways both intentional and accidental.

Wayne Zipperer, an expert working with the US Forest Service Southern Research Station in Gainesville, Florida calls the work impressive, and thinks that Johnson’s work especially reveals how important the step of replanting trees is to such endeavors.

“This really documents the importance of establishing that canopy structure,” Zipperer said. “Even though we clear out the invasives, we need to replant.”

The establishment of urban plots for ecological research is still a relatively new and novel idea, Zipperer added. “Is that urban forest going to respond the same way to restoration as a suburban one? We don’t know.”

“Models for restoration have mostly been developed for pristine sites,” Johnson said. What’s needed are models for restoring forests in urban parks where intense urbanization will continue to be a large part of the management equation.

“It’s really hard to think about urban parks without thinking about the people,” Johnson said.

Johnson’s work will be published in a forthcoming edition of Ecological Applications, a peer-reviewed science journal from the Ecological Society of America. Citation: <http://www.esajournals.org/doi/10.1890/14-2063.1>

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