



PHOTOGRAPHS BY LAURA FEDRICK FOR THE NEW YORK TIMES

# Forests in Peril

## Concern Mounts That Alien Species Will Crowd Out Classic Oaks and Maples

By GLENN COLLINS

**I**t is as if you were Lewis, or Clark, and the land had never been spoiled.

Only an hour from Manhattan, you can experience the profound silence of the Upper Reservoir between Whitehouse Mountain and Mount Misery in New York's Black Rock Forest. Or track the hawks wheeling over pristine hills at the Pine Paddy outlooks in Norvin Green State Forest in New Jersey, or find lonely trails in the Pine Barrens of Long Island.

Even seeming wilderness — give or take a fire tower — is available to hikers at, say, the 1,300-foot level at Rattlesnake Hill in Black Rock. Forests cover nearly 60 percent of New York, New Jersey and Connecticut, and there is no question they will continue to exist.

But a concern is growing: What will they look like?

Will the forests of the future resemble today's, or will they be a green tangle of alien plants devoid of native oaks, maples and beeches?

That is the worst-case scenario envisioned by experts like Dr. Emile DeVito, manager of science and stewardship at the New Jersey Conservation Foundation.

The pressure of development, the exploding deer population and the proliferation of invasive plants and insects on native species is threatening the woodlands of New York, New Jersey

and Connecticut, say forest managers, scientists and public officials.

"It is a quiet crisis," said Carl P. Schulze Jr., director of the division of plant industry in the New Jersey Department of Agriculture.

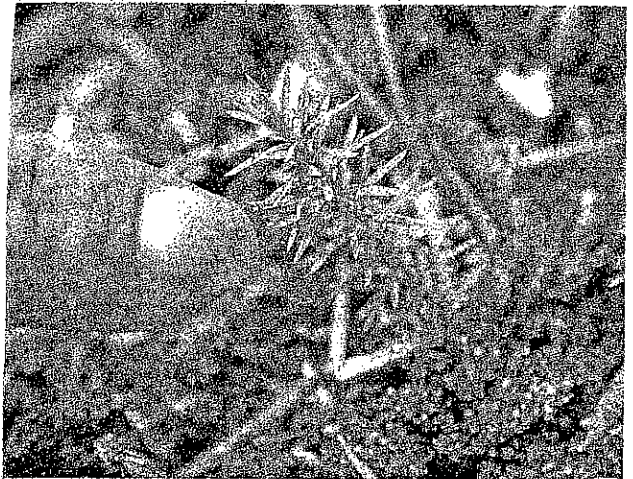
"The average person sees that the woods are green," he said, "and doesn't understand that foreign species — a form of biological pollution — are outcompeting" native vegetation.

For now, the big trees are still there. But Dr. DeVito said it is the changes in the understory, the layer of vegetation beneath the forest canopy, that are causing the most concern.

From state to state and forest to forest, the situation is variable and dynamic. "There is a lot of healthy forest left," said Dr. Joan Gardner Ehrenfeld, an expert on invasive species who is a professor in the Department of Ecology, Evolution and Natural Resources at Rutgers University.

But in some areas, multiple threats "are coming together as a sort of a perfect storm," she said. "There are too many different problems all converging at the same time in the same place, and the multiple effect makes the situation all the more serious."

These threats, experts say, include suburban sprawl, the impact of marauding invasive plants and insects, climate change and not only acid rain but also, contrarily, lack of rainfall. But in many locales, the implacable brows-



ing of deer on young trees is killing replacement saplings, depleting shade and promoting the growth of invasive plants that smother native species.

So some forests are increasingly a Potemkin village concealing a subtle, but devastating, transformation. "Many of the forests in this area are old-age homes, full of aging trees that

**MAKE WAY FOR SEEDLINGS**  
In New Jersey's Pine Barrens, hopes that new cedars, above, can replace dying ones, top foreground.

have no offspring nearby," said Leslie Jones Sauer, author of "The Once and Future Forest," a guide to forest restoration.

But while nursing homes for people will survive, "we may be seeing the last generation of these trees," she said.

And while the forests will not die, Mr. Schulze said, "a degraded forest could have large impacts on water quality, and habitats for wildlife in the forests."

Such threats may seem surprising, since a generation of improvements in the region's air and water quality has benefited forests, animals and humans alike. And woodlands have been increasingly valued as a bulwark against global warming.

So accustomed are hikers to the seemingly infinite variety of the region's more than 2,000 miles of blazed trails, they may take for granted the astonishing 22.4 million acres of local forest — 18.5 million in New York; 2.1 million in New Jersey and 1.8 million in Connecticut, according to the United States Forest Service.

Some 46 percent of New Jersey's land area is forested, according to the national forest service, and, in the nation's most densely populated state, "people mostly don't have a sense that New Jersey has so much," said Ed Lempicki, head of the New Jersey Forest Service.

Forests produce large amounts of oxygen, cool landscapes and filter out air and water pollutants. They act as vast sponges, storing rainwater so it can flow down into aquifers instead of quickly running out to streams. And through photosynthesis the forests absorb carbon, "locking it up and taking it out of atmospheric circulation," Dr. Ehrenfeld said.

Given decades of environmental consciousness and the push for land acquisition by public and nonprofit entities — not to mention forest regeneration on abandoned farms — the region's woodlands are undeniably "healthier now than they were 20 years ago," said Edward K. Goodell, executive director of the New York-New Jersey Trail Conference, which maintains 1,700 miles of trails.

In recent years, large tracts have come under the protection of public and nonprofit agencies. In 2004 New Jersey designated 398,000 of the 800,000 acres of the New Jersey Highlands as a preservation area to limit overdevelopment.

Since the Laurentide ice sheet retreated some 18,000 years ago, local forests have endured a complex and irresistible process of munch and crunch, of competition and succession, decline and recovery.

The first settlers encountered the dense historic Eastern deciduous forest, and promptly cut it down not once, but many times, for farmland, pasture and lumber, and for fuel for homesteads, brickmaking, mining and a cornucopia of industries.

Since the late 1800s, though, when agricultural land began to be abandoned, the amount of woodlands in the region started growing steadily.

Despite such a trend, there is increasing concern for what foresters call fragmentation, the carving up of vast contiguous forest areas into little patches; replacing large, complex ecosystems with a smattering of smaller, simpler ones.

Researchers are especially concerned about fast-disappearing — "conservative" — native species, in specialized habitats deep in contiguous forests, which cannot survive the disruptions of human presence or competition from invasive species. Beyond this, proliferating herds of white-tailed deer are devastating woodlands.

In some areas the impact is so profound "that it looks like someone took a brown crayon and used a ruler to draw in a brown line and a green line," Dr. Ehrenfeld said. "The green above stops at a steady line at the height that deer can reach." Increasingly, "suburbia is uniquely designed to grow and harbor deer," Ms. Sauer said, "because lawns and flower gardens are high-quality deer delis, and the deer are safe from hunters." She added, "We have created a physical environment where there is no limit to their growth."

Even a rare virgin tract of primeval oak in the William L. Hutcheson Memorial Forest in Somerset County "has almost com-

pletely lost its native understory to deer browse, and is now heavily invaded by exotic species," Dr. Ehrenfeld said.

Forests can heal themselves when they have a population of 5 to 10 deer per square mile, "but now 35 per square mile is common, it's well over 50 in some places, and in a few places in New Jersey it can be 250 or even more," Dr. DeVito said. "One overabundant species is sacrificing thousands of other species. We have to recognize that, and deal with it."

In certain regions, "hunting is critical to having tree regeneration or not having it," said Robert K. Davies, the New York State forester.

Local concern in many areas of the region is exemplified by recent protests in Warren Township, where neighbors — citing a rising number of cases of Lyme disease — have called for local, county and state action on culling deer herds.

Deer, as well as invasives, are laying waste to native wildflowers and herbaceous plants "at an increasing rate," Dr. DeVito said. Past disappearing are native species like jack-in-the-pulpit, trilliums and orchid species like lady-slippers.

And newer invasives are perennially joined by older stalkers. This year some 320,000 acres of New Jersey trees were defoliated by gypsy moth caterpillars, the most since 1990, when more than 431,000 acres of trees experienced leaf loss. A growing concern is the appearance of kudzu, a climbing perennial vine that can reach heights of close to 100 feet and has caused hundreds of millions of dollars in damage to Southern woodlands.

Coordinated forest management is another problem, experts say. Although in recent years the focus has been on forest acquisition and land-banking, "the challenge now is to have enough rangers and volunteers to be good stewards of protected lands," Mr. Goodell said.

Public lands are often managed with threadbare resources. The three states together have only 139 foresters, one for every 161,000 acres of woodlands. But hiking trails, for example, are being overrun by illegal off-road vehicles. The states receive federal grants for forest stewardship, fire protection and other activities. But "invasives aren't just a state or regional issue — this is a federal issue," Mr. Davies said. "States can't act independently."

Still, some forest managers fear a future of "boring forests" or "trash forests," with fewer hardwoods and more species like alanthus and cottonwoods that may transform the region's wildlife population.

In the worst case, "we are looking forward to forests that look like the landscapes of vacant lots," Ms. Sauer said. "Alien species, and no complexity. And that level of simplification will affect birds, mammals, butterflies, everything."

To Dr. DeVito, "if we do nothing, the big mature trees will survive one human generation, and then eventually the overstory — the canopy of oaks and maples — will go. They'll be succeeded only by alien weeds and animals from other parts of the world."

But efforts are under way to forestall such doom. Conservation groups throughout the region are working to restore forested areas. Volunteer groups of vinecutters have taken up loppers and shears to attack invasive vines.

To counter the tide of exotics, other volunteers are contributing to the Plant Stewardship Index database, a growing ZIP code inventory of existing native plants in New Jersey and Pennsylvania that is a tool for forest stewardship, compiled by the nonprofit Bowman's Hill Wildflower Preserve in New Hope, Pa. ([bhwp.org/psi/](http://bhwp.org/psi/)).

Technology, too, is being employed in managing state and local woodlots. Towns like Greenwich, Conn., are using global positioning systems to keep records on trees' location and health.

Town maintenance workers use handheld computers to dial up specific trees, view their digital images, and even check out pruning records and the condition of endangered trees.

Novel strategies also keep deer at bay long enough for forests to grow. In fencing them out with "exclosures," forest rangers in the New Jersey Pine Barrens are relying on Kiwi solar-powered electric fences, which have been effective in fending off kangaroos in Australia. They produce an attention-getting, but not harmful, shock of 4,000 to 8,000 volts.

The fences, part of the Atlantic White Cedar Restoration project of the New Jersey Forest Service, are essential because "in wintertime, cedar saplings are a great food supply for the deer," said David M. Finley, the regional forester for New Jersey's southern lands.

Rot-resistant and light in weight, Atlantic white cedar was "the wood that built Philadelphia and Atlantic City," Mr. Finley said, used for everything from siding to roof shingles. It once inhabited 130,000 acres in New Jersey, but now, he said, it covers less than 30,000 acres.

## With 10 deer per square mile, forests can revive. But not with 250.

In the reforestation project in the Bass River State Forest in the Pinelands National Reserve, the land is cleared with huge mowing machines that cut the existing brush — to remove competition for the cedars — and turn it into wood chips, left on the ground as mulch and fertilizer.

The oldest test seedlings, planted in 2000, are now seven years old. Cedar grows quickly and shades out its competition, Mr. Finley said. Mature cedars can take 50 to 75 years to grow 50 to 100 feet.

The pilot project is being coordinated with other reforestation efforts in New Jersey, as well as with other states in the region. It can cost \$2,000 to \$4,000 an acre to restore cedar forest, and so far the project has cost more than \$300,000, mostly in state funds. The Forest Service has brought back 11 fenced-in areas amounting to about 80 acres, and foresters plan to grow cedars in four more restoration projects that will add 70 acres.

Forest managers in the region say they have no grand fantasy of putting everything back the way it was in the 1800s. The realistic hope, said Dr. William Schuster, executive director of the Black Rock Forest Consortium, would be to stabilize forests that are dominated by native species, where we can identify and prevent the most critical threats.

After all, Ms. Sauer said: "We live in a forest, even if it doesn't look that way all the time. Many people in the area think they live in suburbia, but they live in a forest. It doesn't look like forest, but it wants to be. Given its temperate climate, this landscape is trying to grow forest all the time. So that's why we have to spend all that money and energy on lawns, just trying to grow grass. If left alone, our land would become forest very quickly."