



David Foster

LANDS' SAKE

The Harvard Forest Protects New England's Wild Lands and Advances Science

BY CAROL CRUZAN MORTON

A visit to the Harvard Forest could forever change the way you look at New England's stone walls—and the woods that have reclaimed long-abandoned fields and pastures.

This year is the centennial of the Harvard Forest, located in the town of Petersham, Mass., some 70 miles west of Boston. The Forest's brick headquarters for research and education is on a former farm site, and the surrounding hilly land, like so much of New England's, was once pastures, orchards, and fields...but now is overgrown with maple, oak, and pine. In 1990, the Forest staff clear-cut some of the encroaching forest, effectively recreating the denuded agricultural landscape of 150 years ago. Saplings have already filled in much of this cleared land, but elsewhere cows have beaten back the arboreal encroachments, keeping the grass trimmed around one gnarled old apple tree.

A self-guided nature trail that's open to the public (and available on the Web at harvardforest.fas.harvard.edu/museum/trails.html) highlights significant environmental factors as well as some of the 100 years of research that's been undertaken at the Forest. A few strides up a dirt road into the woods, a rock wall along a hillside turns a corner and changes character with

the addition of smaller stones. A sample pit dug into the ground on the low-lying side reveals plenty of plow-stopping rocks below the surface, suggesting that this area was only used for grazing. None but the biggest stones were moved to the wall.

But the story is very different higher up, where the wall contains telltale small stones. Excavation there reveals much finer soil—evidence of years of removing even quite small rocks, which were then added to the wall. Here the dirt has also shifted downward, piling against the uphill side of the wall and creating an ad hoc terrace, a sign of severe erosion. Most likely, the farmer furthered this erosion by choosing the easiest direction in which to plow: straight downhill. Although the wall is disappearing under the fast-growing forest, its boundary-making role endures in the differences in soil chemistry and composition from one side of the wall to the other. And such differences continue to affect the future biology of the forest.

As Harvard Forest researchers have documented and investigated for decades, today's forest carries a strong cultural legacy of human activity, which continues to influence the local ecology with global consequences. The forest came back as agriculture moved to the Midwest and people who were spread evenly across the land moved and concentrated in cities, seeking the new factory jobs. Today, trees cover New England as much as they did before the Revolutionary War, making the

Northeast the most densely forested region in the country. The environmentalist writer Bill McKibben has called this accidental reforestation the single greatest environmental story in the United States. Yet these forests are measurably different from those that came before.

"Every landscape has its history," says David Foster, director of the Harvard Forest. "Forests in time are a synthesis of history and ecological consequences. In order to understand the forests, you need to understand people, history, basic biology, ecology, physical sciences, policy and management. Those are the pieces we bring together here."

REINVENTING THE FOREST

The Harvard Forest is internationally known for its pioneering integration of social, physical, and biological sciences. During the 1960s and '70s, research in the woods waned as intellectual interest traveled indoors to labs and greenhouses and tropical questions, Foster says. But in the early 1980s, director John Torrey reinvented the forest as a modern research station and educational forum.

Today, the Forest is a well-used lab and classroom for ecology and environmental studies, supplemented by a century of data. Except for the absence of forestry studies, "we're returning to our roots," Foster says.

Forty-five people work at the Forest fulltime. About that many more Harvard

Known as a Wofsy Walk-up, this is one of the three towers in the Forest that have tracked the respiration of water and carbon for 15 years. The study is led by Harvard's Steven Wofsy, the Abbott Lawrence Rotch professor of atmospheric and environmental science.

faculty members and their graduate students and research staffs use the forest as a lab, conducting studies in earth and planetary sciences, design, public health, archeology, environmental history, and applied mathematics. About 100 more non-Harvard-affiliated scientists from New England and beyond also conduct research at the Forest.

Beyond these many individuals, the Forest is used by Harvard undergraduates on undergraduate fieldtrips and other class visits and weekend labs, and for educational activities involving students of all ages from around the region. And this accounting still leaves out the many nature lovers and outdoor enthusiasts who hike and cross-country ski the Forest trails (see Website for trail maps). Nor does it include those who come to view the Fisher Museum (housed in one wing of the three-story main building) and its exquisite dioramas of New England forests through time.

"It's really open to anyone," says Posy Busby, who graduated last year from the Forest's own small graduate program with a masters in forest science and is now pursuing her PhD at Stanford. "The trail to the fire tower is my favorite."

The Harvard Forest covers about 3,000 acres. Foster and his colleagues are working with regional land trusts, conser-

vation organizations, the state, and private individuals to help conserve more of the surrounding land as open space for people and wildlife and as a resource for experiments and education. Foster says that thanks to good relations with public and private landholders and with officials of the town of Petersham and the nearby Quabbin Reservoir, the acreage available for research is effectively ten to twenty times larger than that of the Forest proper.

Even for those researching elsewhere, the Forest serves as a good intellectual home base. "There are great forest ecologists everywhere," says Busby, "but there are not a lot of ecologists really engaging in both historical sources and field data."

Busby uncovered the origins of an unusual beech forest on privately owned Elizabeth Island near Woods Hole on Cape Cod. She pulled the historical records of timber harvests and sheep numbers, and studied maps of fields dating back to the 1780s. She cored trees to analyze their rings. Foster and forest ecologist Glenn Motzkin helped her by analyzing 14,000 years of pollen data from a sediment core pulled from the bottom of a lake. So, what happened? A hurricane, in combination with human land-use patterns, changed the forest from mixed trees to entirely beech, Busby and her colleagues concluded.

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SAVING—AND FINANCING—MASSACHUSETTS'S "WILDLANDS AND WOODLANDS"

Beyond its role as a living laboratory, the Harvard Forest actively promotes land conservation in New England.

Last year, in a proposal called "Wildlands and Woodlands," Forest Director David Foster and colleagues called for protecting 1.5 million acres of forest, beyond the approximately one million acres of land already protected in the state. Cumulative acreage would be roughly half of Massachusetts's total area of about five million acres.

In April 2006, a nationwide group of experts in conservation finance—from groups such as the Nature Conservancy, the Massachusetts Audubon Society, the Trustees of Reservations, the Wilderness Society—gathered to discuss the feasibility and funding of Wildlands and Woodlands.

Their conclusions, issued in a November 2006 report, demonstrated support for the ambitious Forest proposal and detailed several strategies to finance it. These include a mix of conventional financing tools, such as bonds and tax incentives, and innovative mechanisms such as payments for ecosystem services and regulatory reform to facilitate smart growth.

Kathleen Fallon Lambert, president of Ecologic, a Vermont environmental consulting firm, coauthored the finance report. She estimates that to reach the Wildlands and Woodlands goal, the current \$100 million spent annually by public, private, and philanthropic sources on Bay State land preservation would require an increase of at least \$30 million to \$40 million a year for the next 20 years. She notes, "According to the Trust for Public Lands, the Commonwealth spends only \$7 per capita on land conservation each year, compared to \$21 in Maryland and \$25 in Florida."

A wave of human-driven deforestation is consuming the state's woodlands at an estimated rate of more than 40 acres a day, says Foster. So-called hard deforestation results in asphalt and strip malls that will occupy the land permanently, he adds. "The eastern forests are also a globally important sink for carbon dioxide that assists in offsetting the increase in greenhouse gases and global climate change."

The conservation finance report and original Wildlands and Woodlands proposal are available online at www.wildlandsandwoodlands.org.

—Susan Lumenello

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