Since 1907 scientists have been exploring forest ecology on the Harvard Forest LTER’s (HFR) 3,500 acres in central Massachusetts, the surrounding area, and throughout the New England region. Research focuses on forest plant communities from the end of glaciation to the present, disturbances ranging from hurricanes to forest harvesting, and from insect pest infestation to climate change, wildlife dynamics, ecosystem processes such as carbon and nutrient dynamics and water fluxes, and interactions between humans and forests.

The Harvard Forest LTER program was initiated in 1988. In 2007 Harvard Forest was nominated to be the northeastern center for the emerging National Ecological Observatory Network (NEON) project.

For more information about the LTER Network, see:http://www.lternet.edu http://harvardforest.fas.harvard.edu/

Research and Education in Ecology, Conservation and Forest Biology

Research

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The Fisher Museum with its world-famous dioramas introduces the public, hundreds of schoolchildren and dozens of university classes annually to the region’s dynamic forest history.

The Research Experience for Undergraduates (REU) program provides an opportunity for 25-30 summer interns to work directly with senior scientist mentors on current research.

Through the HFR Schoolyard LTER program, K-12 students and their teachers carry out research on tree phenology, invasive forest pests and freshwater ecology.

Harvard Forest publications contribute to public education and inform policy about forest ecology and conservation.

Frequency of species is indexed from records from colonial New England farm surveys. Below comparison with modern species abundances.

Sampling a core of sediment from a pond bottom. Changes in abundance of pollen of different species through time documents vegetation change since the last glaciation.

Colonial era Modern era

http://harvardforest.fas.harvard.edu/

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A century of investigating temperate forest dynamics in New England

Harvard Forest LTER (HFR) is an integrated program that studies forest response to natural and human disturbance and environmental change over broad spatial and temporal scales. Involving more than 25 senior researchers, 150 undergraduate and graduate students and a dozen institutions, HFR embraces the biological, physical, and social sciences to address fundamental and applied questions in dynamic ecosystems.

Scales of Study at Harvard Forest LTER
Illustrated by research on the introduced pest, the hemlock woolly adelgid

Organism: We are studying the rates of decline and mortality of infested hemlocks and the variety and growth of species that replace hemlock, such as black birch (shown below).

Watershed: The loss of hemlock typically results in major changes in forest type and ecosystem function. In gauged watersheds (the Neils Brook, above), we are studying changes in water flow rates, stream chemistry, and species composition of invertebrates in streams flowing through hemlock stands.

Region: Since the early 1980s, hemlock woolly adelgid has expanded slowly northward through New England. Our regional-scale studies track the spread of the adelgid and the corresponding decline of hemlock across southern New England.

The Need for Long Term Research
Carbon Dynamics
The Harvard Forest Environmental Measurement Station (EMS) tower provides the longest-running record of carbon exchange for any forest in the world. EMS measurements suggest that New England forests play a globally important role in mitigating climate change by storing carbon. However, more than a decade of measurements was needed to show that rates of carbon storage are actually increasing over time.

Soil Warming
Harvard Forest scientists are also studying the effects of climate change on carbon storage and soil nutrient dynamics at two soil warming sites where buried heating cables maintain soil temperatures 5°C above ambient temperatures.

Annual carbon storage (Net Ecosystem Production—NEP) of 0.8 to 4.6 metric tons/ha per year has resulted in a cumulative uptake from 1992-2006 of about 40 metric tons/ha (top). Uptake is increasing by about 0.2 metric tons/ha each year (bottom).