

LAND-USE HISTORY AS A DRIVER OF CURRENT ECOLOGICAL PROCESSES

John F. O’Keefe, David R. Foster, Glenn Motzkin, and Brian Hall

Harvard Forest, Harvard University, 324 North Main Street, Petersham, MA 01366
jokeefe@fas.harvard.edu

The forests of the northeastern United States present a history of almost continual change, albeit change that has varied greatly in scale, rates, and causes through time. The importance of human disturbance relative to natural disturbance has steadily increased, most rapidly and dramatically following European settlement. Legacies from clearing and plowing, grazing, burning, and cutting from the 17th through 19th centuries strongly influence most ecological processes in the region today. Harvard Forest has been investigating these influences for nearly a century, as exemplified by the famed Land-use History dioramas in the Fisher Museum at Harvard Forest (Foster and O’Keefe 2000) and, more recently, through its research as a National Science Foundation (NSF) Long-Term Ecological Research (LTER) site.

We have used a variety of data sources including proxy data such as pollen in sediments, historical maps, survey data and records, physical evidence on the landscape, and long-term plots and experimental treatments to investigate these changes. Virtually every ecological process studied reflects a legacy of land-use history. The dramatic cover changes during the last 150 years and the resulting successional patterns influence current plant species abundances (less beech and hemlock, more birch and red maple now than pre-settlement) and distributions. Moreover, these impacts typically vary with scale: homogenization at the broad landscape scale, but a mosaic of persistent patches at the local scale. Wildlife species have responded strongly to these changes and patterns. The landscape’s ability to store carbon (approximately 2 metric tons/ha/yr) and its response to nitrogen deposition also reflect land-use history.

Separating human and environmental drivers of ecological change requires much work and at least a millennial perspective. It is critical that environmental decision-making begin with a knowledge and appreciation of the history and dynamic nature of our landscape.

Literature Cited

Foster, D.R.; O’Keefe, J.F. 2000. **New England Forests Through Time: Insights from the Harvard Forest Dioramas.** Harvard Forest, Petersham, MA.