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Harvard Forest research sheds light on how trees respond to hurricane winds

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PETERSHAM -- Hurricane wisdom says New England gets an extreme storm every 50 to 200 years. Seventy-three years since the Hurricane of 1938, all eyes in the Northeast are focused on Irene.

A common measure of a storm's strength is its impact on local trees. A 21-year study at the Harvard Forest in Petersham reveals how modern New England forests respond to hurricane force winds in the short and long-term. Do certain tree species stand stronger? How does the damage affect what grows back?

In 1990, supported by the National Science Foundation's Long Term Ecological Research (LTER) program, the Harvard Forest simulated the 1938 hurricane in a two acre swath of forest. Seventy percent of the trees were pulled down in a northwesterly direction using a winch. Researchers used data and maps from before and after the 1938 hurricane to select trees for damage and determine the direction of their fall. The result was a realistic simulation of Central Massachusetts wind damage from a hurricane blowing northward across Long Island Sound.

Since 1990, the forest has been analyzed each year, leading to some surprising results. By 2010, living tree productivity was close to pre-"hurricane" levels, with surviving red oaks and a thick layer of new saplings the major components of the re-organized forest.

Audrey Barker-Plotkin, a researcher on the project and Site Coordinator at the Harvard Forest, explains, "Unexpectedly, many of the uprooted trees survived for a couple of seasons. Damaged hardwood trees sprouted vigorously, holding in the soil's nutrients until new saplings filled in the forest."

Below ground, researchers found very few changes in soil chemistry and other characteristics. This consistency increased the forest's resilience. "Forests are set up to handle hurricanes. These storms certainly change the way a forest looks for ten, 20, even up to 50 years. But in general, this forest bounced back more quickly than we expected," says Barker-Plotkin.

One major difference between the hurricane simulation and the actual hurricane in 1938 was that damaged trees in the experiment were left on-site. The 1938 hurricane was followed by a massive salvage effort. Fallen, damaged, and even healthy trees were removed, roads were built to transport them, and slash was piled and burned. Barker-Plotkin notes, "The human response to the storm may have caused more lasting impacts to the forest than the hurricane itself."

The Harvard Forest, founded in 1907, is Harvard University's outdoor laboratory and classroom for ecology and conservation, and a Long-Term Ecological Research (LTER) site funded by the National Science Foundation. Its 3,500 acre property is one of the oldest and most intensively studied research forests in the U.S.

Open to the public year-round, the site includes educational and research facilities, a museum, and recreational trails. More information can be found at <http://harvardforest.fas.harvard.edu/>.

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