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Study: New England forests resilient to hurricane damage

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PETERSHAM — Before Irene says goodnight to the Northeast, the hurricane may — depending on the strength of the storm's winds — leave a wake of devastation to woodlands in her path.

While Irene's ferocity isn't expected to match that of the 1938 hurricane, a decades-long study by Harvard Forest shows that New England forests are resilient to extensive damage.

Using historical data collected by Willard Rowlands, a student at the Petersham research forest immediately after the 1938 hurricane, a team of environmental scientists in 1990 simulated the historic storm's wind damage on a 2-acre swath of the 3,500acre facility, pulling down 70 percent of the trees in that area in the hurricane's same northwesterly direction using a skidder and winch tied 10 to 15 off the ground until the trees — mostly oaks and maples — snapped or were uprooted.

The project, supported by National Science Foundation funding, has included analysis each year, with what researchers say have been 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."

Those trees, mostly oaks and maples in a forest that dated back about 75 years, so they'd lived to survive the 1938 hurricane — had enough of their roots attached to the ground that they produced leaves for a while, helping to stabilize the soil, according to Barker-Plotkin.

The other surprise was that a thick layer of saplings — mostly from black birch seedlings that had predated the 1990 "mock hurricane" — have grown in to be an important part of rebuilding the forest.

"Although a majority of trees were pulled over, the ones that survived are really important as the bulk of wood on site," Barker-Plotkin said.

A big difference between the simulation and the 1938 hurricane was that damaged trees in the experiment were left on-site, compared to the massive salvage effort after 1938. More than 70 years ago, the fallen, damaged, and even healthy trees were removed, roads were built to transport them and slash was piled and burned.

Barker-Plotkin said, "The human response to the storm may have caused more lasting impacts to the forest than the hurricane itself," in part by heavily damaging the soil.

Another surprise for the researchers from the study is that soil nutrients weren't much affected by the simulated damage, Barker-Plotkin said. She guessed that the delayed tree death, combined with sprouting of the saplings, probably contributed to soil heath.

“We thought maybe the nitrogen would be leached out of the system, or that the soil would release a lot of carbon, and we didn’t see that,” she said.

While lots of lessons about the resilience of forests can be learned from events such as the severe ice storm that occurred in high-elevation portions of Franklin County in December 2008, Barker-Plotkin said that having a control plot adjacent to the experiment provided a way to check the validity of the experiment’s results.

On the Web: http://harvardforest.fas.harvard.edu/research.html

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Workers clean up after the 1938 hurricane. More than 70 years ago, the fallen, damaged, and even healthy trees were removed, roads were built to transport them and slash was piled and burned.