A Focus on Uprooting

By Melanie Lenart
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The eventual fate of most trees is to fall over, either by breaking or uprooting. The uprooting process mixes up the soil profile, bringing long-buried plant nutrients to the surface. Uprooted trees fulfill an important role in forest ecology, with some tree species preferring to establish on the resulting soil mounds and others favoring the pits formed where the tree once stood. My dissertation research focused on the size of mounds – that is, the soil, rocks and roots pulled up when a tree tips over – created by uprooted trees.

My research involved a comparative study of two very different forest types: tropical moist forests of Puerto Rico and cool temperate forests of Colorado. In Puerto Rico, I studied uprooting frequency and the quantity of soil uplifted by freshly uprooted trees in various forest stands by Hurricane Georges, which passed over the Caribbean island in September of 1998 during my three-month research stint there.

In Colorado, my research included two sites at about 9,000 feet, one in the Rocky Mountains and the other in the Sangre de Cristos range. I surveyed a spruce-fir stand in the Rocky Mountains' Routt National Forest about 10 months after it had been struck by an unusual catastrophic wind event in 1997 involving a brush with the jet stream. The Sange de Cristos site, where conifers such as Douglas-fir and ponderosa pine mix with aspen, involved background uprooting rather than a catastrophic event. There, I used tree-ring crossdating to determine the year of final ring formation, and used that to approximate uprooting dates for 50 mound/pit complexes.

It turned out that the quantity of soil uplifted by freshly uprooted trees was similar at all three sites, as long as tree size was considered. In addition, landscape-level soil disturbance based on the proportion of uprooted trees was similar for the two sites involving catastrophic uprooting. This was a somewhat surprising finding given the differences among the sites in climate, soil, and tree species.

The tree-ring study in the Sangre de Cristo Mountains allowed me to consider how long it takes for soil mounds to decay and pits to fill in with soil and debris. The results indicate that soil and rocks erode from the mounds before roots decay. Also, it seems pits tend to outlast mounds at this site, with both features fading away within about a century except for root remnants.

These results can be useful in estimating mound and pit formation and decay at these sites. And because the influence of tree size seems to override site variables, the formulas may even apply to other sites. If so, they might provide an efficient means for researchers studying uprooting frequency during an event or background treefall gap formation to address soil disturbance, in addition to increasing our understanding of the effects of uprooting at the three sites surveyed in this study.

Hal Fritts

Continued from page 5

gathering in Tucson to mark the anniversary of Fritts' landmark conference. The workshop, set for April 6-9, 2004, will take a look back at what has been achieved in the last 30 years and where the science is headed. And while details are still being ironed out, one agenda item is certain: a tribute to Fritts' remarkable and varied accomplishments.

These days, Fritts is spending less time on research and finding new ways to express his love of nature. Tired of writing scientific papers, he embarked on a more creative writing project for young people about the "Tales Trees Tell." And using his new digital camera, he has become an avid and accomplished nature photographer.

Still, he has a few scientific articles in the works and would like to get his latest model in better shape – so the last chapter on his research may be forthcoming.

"I can say that I have had the greatest time working in dendrochronology I could have in my life," Fritts said.