Rhododendron expansion may increase the chance of landslides on Southern Appalachian slopes

August 31 2009

Results from a recent study suggest that rhododendron may be a key species affecting landslide initiation in the Southern Appalachians. Credit: Erica Chapman

Research by U.S. Forest Service Southern Research Station (SRS) scientists and partners suggests that the expansion of rosebay rhododendron (*Rhododendron maximum*) in Southern Appalachian mountain hollows may increase the likelihood of landslides during and after intense rain events.

In an article recently published online in *JGR-Earth Surface*, SRS researchers Chelcy Ford and Jim Vose, along with T.C. Hales and Larry Band (University of North Carolina at Chapel Hill), examine how the

interaction between topography and the species of tree or shrub present affects the ability of soil to hold together.

"We found that rhododendron had the shallowest, weakest roots suggesting that the recent expansion of this species may have lowered the cohesive strength of soil in some hollows," says Vose, research ecologist and project leader of the SRS Coweeta Hydrologic Laboratory located near Otto, NC. "Since debris flows usually start in the hollows, those dominated by rhododendron could represent a heightened hazard for landslides."

Landslides present a significant danger in the steep landscapes of the Southern Appalachians. Most of the recorded high rainfall events in the area occur in the fall and have been associated with tropical storms. In 1940, 1969, and 2004, intense rain from hurricanes caused landslides that together resulted in over 190 human casualties and $140 million in damage.

In 2004, rains from Hurricanes Frances and Ivan caused a large landslide at Peeks Creek in Macon County, NC, where 15 homes were destroyed, two people injured, and five people killed. With accelerating land use change and more frequent storms predicted for the area under climate change scenarios, concern about landslides has grown.

"Roots of trees and shrubs can represent up to 100 percent of what's holding soil together and keeping mountain slopes from sliding," says Vose, "For this study, we measured the root distribution and tensile strength—roughly, the force required to pull a root to the point where it breaks apart—of 15 southern Appalachian species in relation to topography and position on slopes."

The researchers dug pits down slope from 15 individual trees on the Coweeta site. The locations of trees varied from noses—convex

topographic positions—to hollows. The trees included native species of oak, eastern hemlock, birch, tulip poplar, hickory, and other species. The researchers tested one woody shrub, Rhododendron maximum, a native species which has come to dominate the forest understory in some areas of the Southern Appalachians.

"We found that root strength was similar among tree species, and root strength of trees was consistently greater than that of the native shrub rhododendron," says Vose. "Tree roots in nose positions were stronger compared to those in hollows, coincident with greater root cellulose content."

Although the study was not designed to firmly establish cause and effect, the results suggest that rhododendron may be a key species affecting landslide initiation in the southern Appalachians. "Landslide events during 2004 commonly started in rhododendron thickets, including the only landslide to occur in the Coweeta drainage basin," says Vose. "The largest landslide from 2004 at Peeks Creek also formed in a rhododendron thicket."

More information: The full text of the article can be found online at www.srs.fs.usda.gov/pubs/33547

Source: USDA Forest Service (news : web)