

WCU team studies slope slowly collapsing in Haywood County

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CULLOWHEE – Fast-moving mountain landslides called “debris flows” topped the news in September 2004 when one such slide killed five people in Macon County’s Peeks Creek community, but it is another type of less-understood slope failure that is the focus of a long-term research project involving Western Carolina University geology students and faculty, and the state’s Geological Survey and Department of Transportation.

WCU students and faculty have been conducting preliminary research this spring at the site of a “big slow mover,” a slope moving downhill at less than one inch per year in the Hunters Crossing subdivision near Waynesville, said Cheryl Waters-Tormey, an assistant professor who is leading the WCU research team.

Intense mountain rain causes debris flows, but no one knows what triggers the slow-motion failure of some slopes than have been modified by human activity. The slow-movers are much less of a threat to human life than debris flows, but they can cause just as much damage to structures, Waters-Tormey said.

The Peeks Creek debris flow and other landslides in the region caused by the passage of hurricanes Ivan and Frances resulted in government funding for a broad evaluation of slope movements in Western North Carolina by the N.C. Geological Survey. The emphasis so far has been on the dramatic debris flows, and the Hunters Crossing study is the first to look at what starts, and stops, the movement of slowly failing slopes, Waters-Tormey said.

“The Geological Survey and Department of Transportation are particularly interested in this study because the site seems similar to other large slow-moving slopes in Western North Carolina, and this will be the first detailed geological examination of the geologic materials and groundwater at one of these slowly failing slopes,” she said.

The Hunters Crossing development consists of four condominium duplexes on about three acres of land. Slope movement was first reported in November 2005 by residents, who had experienced water main breaks since the previous August and had noted fracturing in the foundations of two duplexes and in the paved development road. Four residences are now unoccupied because of structural damage and potential danger, including two homes that are not part of the condominium development, but lie at the base of the failing slope, Waters-Tormey said.

Five WCU geology majors are involved in the work as their senior research project, examining soil characteristics, bedrock structure, daily rainfall amounts, and movement of reference points on the slope, plus rainfall and earthquake history. Once the baseline data is collected, the Haywood County slope can be compared to other modified slopes, Waters-Tormey said.

One of the WCU seniors working on the project, Adam Hunter, a Sylva native who plans to graduate in May, said he has enjoyed making repeated visits to the site because it gives him perspective to see for himself that the ground beneath the development has moved. Hunter said he believes the research is particularly relevant as government officials in the region consider slope-related building regulations.

“Hopefully, this will help guide regulations that will provide for a sustainable situation,” he said.

The research will continue over the coming summer with the participation of other WCU geology majors as a well is drilled at least 60 feet to allow the slide to be investigated down to bedrock, Waters-Tormey said.

The well will provide information about the moisture content of the soil above and below the surface slope failure and, of particular importance, movement rates at various depths inside the sliding mass, she said.

Slope stability in WNC is a product of many variables, and it is impossible to determine the stability of any particular slope without a detailed evaluation. “However, the more it is understood about which variables are most significant in causing or accelerating slope movement, the better the slope hazard prediction will be,” Waters-Tormey said.

The Geological Survey will use the research results to improve its slope hazard maps for Haywood County, which are to be completed in 2008, and the Department of Transportation will use the information to improve the planning of new roads and mitigation of existing slowly failing slopes. The WCU students and faculty members will present their research results at regional and national Geological Society meetings.

In addition to Waters-Tormey and Hunter, the WCU team includes students Ryan Byas of Old Fort, Alex Causey of Raleigh, Heather Gregory of Franklin and Sharky McDoogle of Reading, Pa., plus faculty members Dave Kinner and Blair Tormey.

For more information about the project, contact Waters-Tormey at (828) 227-3696.

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