

Terrestrial Laser Scanning to Sustain Rural Unpaved Roads

Hanna Anderson

Advisor: Dr. Jeff Frolik; Department of Electrical Engineering

TRC Undergraduate Research Assistant 2013-2014

Abstract:

Road erosion can occur over a significantly shorter amount of time than roads are scheduled for regular maintenance. Rural unpaved roads, for example, go through a cycle that starts with soil particles being loosened and carried away mainly by water or transportation means into the drainage systems. The particles settle out and clog the drainage systems causing flooding, which in turn causes more erosion. 60 percent of Vermont's public roads are unpaved (Sarah McKearnan & VT ANR 2011) and recent flooding and heavy rain events have caused damage to these infrastructures. The most common response to the damage on a road is to fix the part that is failing so that it temporarily works, but this approach is not at all sustainable. There are programs like Vermont Better Backroads that are creating sustainable ways to reduce the pollution and sedimentation in waterways from erosion of unpaved roads. Example mitigation methods include rock lined ditches, increasing the size of culverts, and building outlet structures such as a rock lined plunge pool at the outlet of a culvert. Ground-based light detection and ranging (LiDAR) is a technique that can be used to study landscape change over time. The goal of this project is to use this modern instrumentation to study roadway erosion, its impact on the surrounding environment, and the effectiveness of such mitigation methods.