New technique for measuring tree growth cuts down on research time

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Tree growth is measured to understand tree health, fluxes in carbon sequestration, and other forest ecosystem functions. It is one of the most essential and widely collected woody plant traits. Yet, the traditional method to measure tree growth is awkward and time consuming. Scientists have developed a new, resourceful way to take repeated tree growth measurements safely and accurately.

Dendrometer bands are metal straps that wrap around a tree trunk to measure its growth. Bands are fashioned by bending banding material into a "collar" and passing the metal strap through the collar. The collar allows the strap to expand and shrink to measure trunk circumference and changes in trunk diameter over time. Construction of traditional bands is tricky. They have sharp edges, and the manipulation of the material requires a skilled worker.

Dr. Beth Middleton of the U.S. Geological Survey National Wetlands Research Center and Evelyn Anemaet of Five Rivers Services, Inc., discovered a way to simplify the construction of dendrometer bands. It is accurate and inexpensive, and is easier, safer, and faster to install than the traditional method.

Using the new method, prefabricated cable-tie heads are slightly modified and used as collars on the dendrometer bands. This makes more uniform bands and cuts down on assembly time. The cable ties are smooth edged, and thus less dangerous to manipulate and install on trees. Detailed instructions for the new method are published in the September

issue of *Applications in Plant Sciences* (available for free viewing at http://www.bioone.org/doi/pdf/10.3732/apps.1300044).

Cable-tie heads are normally marketed for military and industrial applications to bundle wires and prevent corrosion. It is no surprise that these materials hold up well in outdoor field conditions with extreme weather. In fact, unsuspecting materials often make essential environmental research equipment, with examples including steel nails used as plant tags and wedding veil material as insect netting.

Anemaet and Middleton were inspired to create an easier method by their field research on baldcypress tree swamps. Baldcypress swamps are an ecosystem that once spread across the southeastern and eastern United States. They are currently being restored in some areas of the Gulf Coastal Plain after years of degradation from agriculture, saltwater intrusion, and pests like the tent caterpillar. The swamps provide vital ecosystem functions like carbon storage and water purification. "We wanted to be able to look at how baldcypress trees respond to changes in their environment, such as differences in temperature, water, salinity, and day length," says Anemaet, "and this new method is very useful for these kinds of long-term studies."

The traditional method and new method of measuring tree growth were compared in ideal, non-field conditions and in the baldcypress swamps. In ideal conditions, installation time of the bands was two minutes faster. Installation time was up to 20 minutes faster in field conditions. These time savings accumulate when tens to hundreds of trees are tagged, which is common for environmental field studies that measure variation in tree growth among individuals of one tree species or multiple tree species. Saving time and easier band installation are also crucial when working in non-ideal field conditions. "Our work in baldcypress swamps is often carried out under flooded and/or muddy conditions, and we [the field team] did not want to get cuts on our hands (from handling the

traditional banding material) that were very likely to get dirty and infected," comments Anemaet.

Middleton and Anemaet developed a general method that is widely applicable to long-term forest studies. "We are hoping that other researchers will be more likely to utilize dendrometer bands in their studies, now that this new method has improved the speed and efficiency with which the bands can be made and installed."

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