Scientists use lasers to measure changes to tropical forests

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New technology deployed on airplanes is helping scientists quantify landscape-scale changes occurring to Big Island tropical forests from non-native plants and other environmental factors that affect carbon sequestration.

U.S. Forest Service and Carnegie Institution scientists involved in the research published their findings this month in the journal *Ecosystems* and hope it will help other researchers racing to assess threats to tropical forests around the world.

"Our results clearly show the interactive role that climate and invasive species play on carbon stocks in tropical forests, and this may prove useful in projecting future changes in carbon sequestration in Hawaii and beyond," said Gregory Asner, with the Carnegie Institution's Department of Global Ecology.

Airborne technology might be the best way to quickly examine rugged ecosystems covered with dense vegetation that make them difficult to study on the ground or with satellites, according to the scientists.

"These findings showed airborne data correlated with data derived from study plots on the ground," said Flint Hughes, a Forest Service ecologist at the agency's Institute of Pacific Islands Forestry and one of the study's authors. "They also demonstrated what might be the most important environmental factors affecting forest biomass and carbon sequestration."

Hughes and his colleagues compared field measurements with data derived from the Carnegie Airborne Observatory (cao.stanford.edu/), a system that uses a combination of lasers capable of measuring elevation to within six inches, GPS and advanced imaging spectrometers that can identify plant species from aircraft.

The scientists placed the equipment on an airplane that flew over the northeast flank of the Mauna Kea Volcano and the Hawaii Experimental Tropical Forest, which the National Science Foundation has designated a National Ecological Observatory Network candidate site.

They then compared the information to field observations that included tree diameter, canopy height and wood density estimates. Their findings not only demonstrated the effectiveness of airborne observations, but also offered a landscape-scale view of how alien invasive plants like strawberry guava might affect biomass levels in the context of carbon sequestration and climate change mitigation.

Study results suggest fast-growing invaders decrease biomass levels, while slower-growing species increase biomass stocks.

The study is called "Environmental and Biotic Controls Over Above Ground Biomass Throughout a Tropical Rain Forest" and can be viewed at www.springerlink.com/content/1 … tent+Status=Accepted

Source: US Forest Service