DigitalGlobe™

An effective mapping solution for Australia's pine plantations

Employing more than 80,000 people and contributing more than $18 billion (AUD) to the economy, Australia's timber plantations are an important driver of revenue and jobs, particularly in rural areas where employment opportunities are limited. Keeping trees healthy and maximizing the productivity of these vast tracts is an ongoing challenge in which satellite imagery is playing an increasingly important role.

Mapping plantations essential

Growing, harvesting, transporting and processing timber profitably requires highly-skilled labor and sophisticated technology. Timber from pine plantations is harvested several times during their 30 to 35 year life cycle. Monitoring the health of trees and the timely identification of areas ready for harvest are critical to maximizing productivity.

"Mapping forest structural characteristics is essential to many forest management purposes, including the assessment of productivity and wood volume," explains Ali Shamsoddini, University of New South Wales researcher. "The ongoing, precise and reliable estimation of yield and structural parameters of the plantation is proving to be a complex and demanding task."

A comparative study

Since the launch of the first Landsat in 1972, numerous forest structure studies have been carried out using different remote sensing instruments. As part of a collaborative research project between the Forestry Corporation of New South Wales and the University of New South Wales, Shamsoddini and his colleagues Professor John Trinder and Dr Russell Turner, selected a 5,000 hectare site to determine the impact of high-resolution satellite imagery on pine plantation management. Imagery was procured as part of the DigitalGlobe 8-Band Research Challenge, which encourages researchers to investigate how DigitalGlobe 8-band imagery can enhance analysis and classification research and enable the development of next generation geospatial applications.

"The goal of the project is to compare WorldView-2 imagery against the much more costly Lidar data and other data collection methods to help plantation owners develop the most accurate and cost-effective mapping solution," Shamsoddini says.

Company information

The Surveying and Geospatial Engineering group at the University of New South Wales undertook a research project on information extraction from remotely sensed images to determine forest structure parameters.

PINE PLANTATIONS

AUSTRALIA
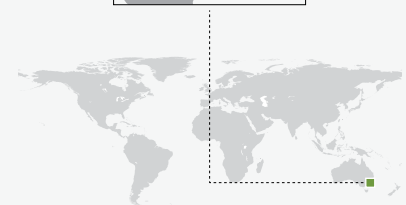
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Testing the accuracy of Worldview-2

Shamsoddini's objectives were to examine to what extent WorldView-2's eight bands perform over four-band solutions, quantify WorldView-2's ability to lead to improved structural parameter estimation compared to more common vegetation indices, identify the best estimated structural parameters from WorldView-2 data, and examine the potential influence of variable terrain, slope, age classes and thinning status on prediction accuracy.

"We successfully demonstrated that WorldView-2 data is very well suited to the task," Shamsoddini said. "When examining attributes such as tree height, WorldView-2's error rate was eight percent, well within the acceptable sampling inventory error, and for mean DBH, the measurement of diameter at breast height, the error rate was just over 13 percent, also well within the acceptable sampling inventory error."

Satellite imagery holds broad potential

Developing highly-accurate yet cost-effective mapping solutions of these vast tracts has been an ongoing challenge for plantation owners. Shamsoddini is helping to prove that readily accessible high-resolution satellite imagery is a viable option over more expensive Lidar solutions.

"Our research work made clear that WorldView-2 data is a cost-effective solution to determine several forest structure parameters. I expect that the higher spectral resolution of WorldView-3 will provide a huge opportunity to track the health of trees in many different environments and situations, such as the effect mining has on the structure and health of the surrounding forest."

ALI SHAMSODDINI, UNIVERSITY OF NEW SOUTH WALES RESEARCHER

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Challenge	Conduct a research study to determine the accuracy of high-resolution satellite imagery versus other technologies to create cost-effective mapping solutions for Australian pine plantations.
Solution	DigitalGlobe, under its 8-Band Challenge Project, provided the research group at the University of New South Wales WorldView-2 imagery of a 5,000 hectare pine plantation.
Results	The study proved that WorldView-2 imagery, producing results within the acceptable sampling inventory error for a number of forest attributes, is a highly-accurate, cost-effective solution to map pine plantations.

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