



## Seeing the forest—and the beetle trees

A BC company is using technology--involving hyperspectral imagery--to give forest managers a head's up on pine beetle activity, with the potential to curtail beetle spread.

By Jim Stirling

An early warning mountain pine beetle detection system has the potential to save countless hectares of forest and the jobs they sustain.

The airborne system uses hyperspectral imagery to gather highly detailed data capable of identifying--with individual tree precision--when the beetles first attack a host. Given that type of accurate intelligence, forest managers have a crucial time advantage to plot on-the-ground control strategies that have a much improved chance of curtailing beetle spread.

The analysis of hyperspectral imagery to provide super-detailed information about what's actually going on in the forest as it occurs is part of the base-data services developed for the forest industry by Bluewater Business Solutions Ltd. The company is based in Prince George, British Columbia.

The technology's application might be too late for the BC Interior where the mountain pine beetle epidemic has pretty much had its way. But east of the Rocky Mountains--where the beetle is asserting itself--is another story. The beetle has developed an appetite for other conifers and poses serious threats to the jackpine forests that stretch across the rest of the country. It's incumbent on forest managers to act quickly and definitively to avoid repetition of the B.C. experience. Gathering and interpreting the information provided by hyperspectral imagery offers the kind of heads up tool required.

Paul Klotz is a forester and Bluewater's vice president and he explains how the technology helps. When a pine tree is attacked by the beetles, it switches its reserves to defence. As it does so, it reflects more energy. And while this process is externally invisible, it is detectable by hyperspectral imagery techniques.

The challenge then is to compare the energy levels from trees newly under beetle attack to the known spectral signatures of healthy trees.

By the time the needles of infected trees have turned red, the tree has probably been dead for a year, points out Klotz. "But with hyperspectral imagery, we believe you can find out what's happening a year ahead of time, locate individual tree attacks and do the necessary planning," he points out.

Hyperspectral imagery is just one of the sophisticated technologies in Bluewater's arsenal. The high-tech company also makes use of colour digital photography and LiDAR. That's a topographic measurement technique developed in the U.S. It involves beaming light energy from a fixed wing aircraft or helicopter flying at a height from 300 to 600 metres above ground level. The information that's returned is massively more detailed and accurate than data available from provincial governments or other conventional sources. It's accurate to within 15 centimetres.

LiDAR provides a wealth of information about tree heights, volumes and forest characteristics on the land base. About the only things it won't provide detailed information on are soil types and fish populations.



Bluewater has developed an interesting program to assist forest companies in planning their bidding strategies for Crown timber harvesting rights. The company calls it TimberAnalyst. It provides in-depth mapping of the types and locations of forest cover and other features on the landscape that might influence logging road locations and harvesting practices. The program also plugs in other factors including the numbers of company employees, their experience levels and the machinery available to do everything from road building through the log harvesting stages.

TimberAnalyst allows a comparison of various test scenarios with respective cost/benefit analyses. What might be the impacts, for example, of various logging road locations within a cutblock and how that might influence overall harvesting stages and efficiency.

All these types of information go into determining the optimum bid for the company. “With this program we can say with a high degree of accuracy this is what it costs for your logging,” summarizes Klotz.

The TimberAnalyst program also generates reports, like the productivity rates of individual machines for example. And because the system incorporates artificial intelligence to analyze the harvesting performance, the more it’s used, the better it can perform.