

The future of fir

ADAM WEI IS EMPLOYING HOMEGROWN UBC TECHNOLOGY TO HELP MANAGE THE SUSTAINABILITY OF CHINA'S FIR TREES

British Columbia's vast forests have earned an almost legendary reputation for their beauty and for the quality of their timber, but Canadian forestry is still in its infancy compared to the thousand-year-old forest industry of China. When Chinese forest managers noticed an alarming decline in yield among their long-dependable firststands, they turned to UBC researcher Dr. Xiaohua (Adam) Wei for assistance.

"Chinese fir has been a very important commercial species in five or six provinces in southern China for over a thousand years," says Wei, Watershed Management Research Chair and Associate Professor of Earth and Environmental Sciences at UBC Okanagan. "A Chinese fir stand matures within 30 to 40 years and is harvested and replanted. Because of the frequency of these rotations, the Chinese foresters began to notice a decline in yield of 30 to 40 per cent after just a few rotations of planting and harvesting. The overall cause was clearly the result of long-term unsustainable management."

It was a complex problem with potential for severe economic consequences. Any number of variables could affect the productivity of a forest ecosystem, and Chinese researchers needed a way to explore various scenarios in order to identify a root cause.

Such a technology has been in development at UBC for more than 20 years: the FORECAST simulator is an ecosystem-based computer model that can predict the impact of different management practices on forest growth and carbon sequestration. The brainchild of Dr. Hamish Kimmins, Professor Emeritus of Forest Ecology at UBC and Canada Research Chair in Forest Ecosystem Modelling, FORECAST has modeled forests around the world and was recently accepted by the B.C. Ministry of Forests and Range as one of the standard tools to analyze timber supply and evaluate the sustainability of a forest.

Big wake-up call

"FORECAST is a unique hybrid model that considers the impact of ecological processes, such as nutrient cycling, as well as the growth and yield of a stand," says Wei. "This enables us to predict future productivity based on changes in ecological processes. Surprisingly, FORECAST is even more suited to Chinese forests than B.C. forests, because the Chinese have a much longer history of empirical data describing their ecosystems than we do in Canada."

In collaboration with the Zhejiang Forestry University in Huangzhou (Professors Hong Jiang, Guomo Zhou and Shuquan Yu), Wei is working with Dr. Kimmins and UBC Research Associate, Dr. Brad Seely on a three-year project to implement FORECAST in select locations in China, with a view to expanding its reach in China and the rest of Asia. In September of this year, UBC and Zhejiang Forestry University organized a two-day joint international workshop that provided training for 20 to 30 students from both universities on the use of FORECAST.

"FORECAST provides a unique opportunity to integrate data from a variety of ecological processes," Wei notes. "There are many researchers in China who study Chinese fir forests—looking at moisture, temperature, soil biology, decomposition, photosynthesis—but the research is not collaborative or integrated. FORECAST allows us to integrate these data sets and to run scenarios on the overall forest ecosystem."

As China begins to address long-standing environmental issues such as deforestation, the ability to explore potential ecological scenarios has become more significant than ever. The catastrophic flooding of the Yangtze River in 1998—partially attributed to wide-scale deforestation—killed thousands of people and produced a huge economic loss, providing the Chinese government with a "big wake-up call," Wei says. The government moved expeditiously to enact a ban on harvesting trees in the upper regions of the river and implemented a nation-wide reforestation program.

"Chinese forestry is very different today than it was 20 years ago," Wei says. "As China grows and quality of life improves, people can afford to care more about the environment. Reforestation is an obvious way to do this, and FORECAST can answer specific questions about which species to plant in an area, whether to plant mixed stands or monocultures, and what is the best management strategy for that forest based on its own unique ecological properties." ■

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