

# Tree death patterns revealed through statistical lens

August 27 2013, by Aaron Fernandes

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The method could be applied on a national scale to identify declining water tables over Australia's vast geography. Credit: Giles Hardy and George Matusick

New methods of analysing high resolution digital airborne imagery are being trialled in a bid to track water usage in Perth's drying climate.

CSIRO has collected images of large areas of native woodlands using morphological image analysis, and are now applying spatial point process statistics to assess if sudden death among trees is caused by a lack of access to [groundwater](#).

Spatial [statistician](#) Adrian Baddeley says the research aims to test the effectiveness of spatial point statistics as a method for extracting information from the pictures.

"CSIRO regularly fly planes over woodland areas and take [infrared images](#) at such a high resolution that you can actually identify individual trees and shrubs," Professor Baddeley says.

"If you take images over successive years, and then compare the photographs, you can spot where trees have died from one year to the next.

"[Currently] there is a concern in Western Australia that as we are taking [water](#) out of the [water table](#), we might actually be causing trees to run out."

Using photography, researchers are able to apply spatial point statistics to determine if tree deaths occurred at random or in a particular pattern, which may suggest the causal factor is declining [water resources](#).

"There might be a pattern evident in the images, if you are clever enough with your analysis and studied the same region several times," Prof Baddeley says.

"Our aim is to identify signals that something is going wrong and that water would not be taken from a particular bore.

"Of course, forests are not flat, simple surfaces and the topography, depths of the water, in addition to a range of hydrological and ecological variables make that very difficult to determine."

However researchers say spatial point statistics could play an integral role in sorting through the masses of data collected from airborne imagery.

"This was essentially a test case where we had intensively surveyed forest and were able to try out some new techniques, and we

demonstrated that they were successful."

He says the method could be applied on a national scale to identify declining water tables over Australia's vast geography.

"In a healthy eco-system, you expect to see trees evenly scattered all over. If that's true, then it means that just by taking a photograph, and being very clever you can spot that," Prof Baddeley says.

"We could then draw a map that shows which areas of Australia are environmentally stressed."

Provided by Science Network WA

Citation: Tree death patterns revealed through statistical lens (2013, August 27) retrieved 24 April 2024 from <https://phys.org/news/2013-08-tree-death-patterns-revealed-statistical.html>

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