

How New Zealand's forests may transform in the future

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Credit: Victoria University

Research from Victoria University of Wellington suggests the ancient forests on New Zealand's West Coast may be under threat from climate change in the near future.

A study by Matt Ryan, who graduates next week with a PhD in Geology, examined sediment cores from the ocean about 100 kilometres west of

the central South Island.

"The sediments can tell us a lot about how New Zealand's vegetation and landscape have changed over different time periods," says Matt.

"Because of the high erosion rates and the large sediment volumes transported down submarine canyons in this region, it's the perfect spot to study fossil pollen grains, which are delivered along with the sediment to the ocean floor.

"Their slow accumulation over time allows us to reconstruct vegetation patterns and look into what types of plants thrive or suffer when climate changes."

Matt's investigation determined that approximately 125,000 years ago, when land surface and ocean temperatures were up to 1.5°C warmer than present, the rimu-dominated forests of the West Coast were largely similar to those of today.

In contrast, approximately 400,000 years ago the West Coast may have been up to 3°C warmer than today—and under those conditions the West Coast forests were distinctly different.

"In particular, there was a decline in the abundance of pollen from rimu-dominated rainforest and increases in plants better adapted to a warmer climate," says Matt.

This suggests that if the average temperature goes much higher than 1.5°C above pre-industrial levels—the maximum temperature increase agreed to under the Paris Agreement—Westland's iconic podocarp rainforests may be affected.

"We don't know how quickly [climate](#) changed at the time or how long it

took the vegetation to respond, but other studies show that these changes can happen rapidly," says Matt.

"What can this research tell us about New Zealand plants' responses to projected [climate change](#) exceeding 1.5°C in the near future? Rising temperatures could affect our lowland podocarp forests. Trees like rimu thrive in warm weather but beyond a certain level—about 1.5°C warming based on our findings—they may start to suffer decline in some regions, notably Westland. Of course in cooler regions, such as further south in Fiordland, they may actually thrive, but if so, that may threaten the prevailing beech forests there.

"Other plants would benefit, such as *Ascarina lucida* (hutu), an endemic plant of tropical origin that persisted and dominated for 10,000 years during the warm period 400,000 years ago."

Matt says it is important to consider how [forest](#) structure may differ in the future. "Some plant species won't be able to tolerate the warm conditions that will be occurring. It's also important to think about the organisms and larger communities that rely on certain [plants](#) to survive and how they may struggle."

More information: Late Quaternary vegetation and climate history reconstructed from palynology of marine cores off southwestern New Zealand. hdl.handle.net/10063/6143

Provided by Victoria University

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