

# **Responses of Vegetation to Temperature Gradients around Geothermal Features: A Review on Wairakei -Tauhara Geothermal Field, Taupo, New Zealand**

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## **Abstract:**

Geothermal ecosystems experience extreme conditions but can support unique communities of organisms. This study uses historical thermal infrared images and aerial photographs to review the vegetation responses to temperature gradients around geothermal surface features in the Wairakei-Tauhara geothermal field. Here, the spatial distribution of “geothermal kanuka”, *Kunzea tenuicaulis* and related species and hybrids is mapped in relation to ground temperatures measured from the thermal infrared images. Optimal growing conditions for these plant communities in the geothermal area were at ground temperatures higher than ambient. Areas of moderate to high surface heat continued to support plant communities but as ground surface temperature reduced, vegetation growth and establishment increased. The results presented here demonstrate the impact of surface temperature on vegetation and suggest that long-term temperature intensification or reduction over an area does not wipe out vegetation completely. In this case, geothermal kanuka was able to adapt to changes in the temperature and increase its distributing. Understanding how these plants survive in high-temperature ecosystems may provide insight into how they cope with changes in temperature in these and other extreme habitats and how other species may respond to future climate change. An awareness of the interactions between temperature and plant community structure can help plan conservation strategies for the future.

**Keywords:** Climate change; Geothermal; GIS; Remote sensing; Taupo; Thermal infrared