THE LATE HOLOCENE VEGETATIONAL AND CLIMATE HISTORY OF WESTERN HAWKES BAY, NEW ZEALAND

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Frontispiece: Balls Clearing Scenic Reserve, Puketitiri

ABSTRACT

Sediments from (a) a flush, two peat mires and two ponds from a 94 km transect along the Mohaka Fault trace (a northern extension of the Wellington Fault) set in the eastern foothills of the Ruahine Range, in western Hawkes Bay, New Zealand, and (b) from a lake at Te Pohue in northwestern Hawkes Bay, are analysed for their pollen and charcoal records to reconstruct the late Holocene vegetational and climatic history of the region.

Western Hawkes Bay lies westward of an obliquely converging plate boundary, the Hikurangi Trough. This oblique convergence has resulted in tectonic strain being partitioned into domains of extension, contraction and strike-slip across Hawkes Bay. Within the study area, strain has resulted dominantly in primary tectonic landforms such as fault scarps and fault lines, and secondary tectonic landforms such as tilted and folded surfaces. Features of movement along the Mohaka Fault in the geomorphology include right-laterally offset streams, ridges with distinctive linear troughs along the line of the fault and the formation of triangular spurs.

The region generally has a warm, dry climate, and suffers from drought periodically, with the drought often being broken by heavy rains in the autumn. These rains may be of cyclonic proportion. Due to both seismic and co-seismic activity in the region, the landscape is both uplifted and broken, and continually subject to mass movement; localised topoclimates are also common. This study determines how the western Hawkes Bay vegetational cover and its composition have changed in response to late Holocene climate changes through analysis of sediment cores. Also addressed is the extent to which tectonism, volcanicity, fire, major storm events and human activity have left a local overprint on the regional vegetational pattern.

Climatically the region may be divided into three sectors: a dry central sector, (Big Hill site); flanked by moister southern and northern sectors.

The regional vegetation in the southern sector was dominated by a *Nothofagus*- mixed podocarp forest in the Kashmir region from c. 800 yrs BP. up to when the site was affected by fire in 1888. In the Hinerua region, 14 kms farther north, *Nothofagus fusca* with a minor *Dacrydium cupressinum*-dominated/ mixed podocarp forest, was established by c. 2790 yrs BP.

The regional vegetation of the central sector from c. 3700 to 3000 yrs BP. was predominantly a *Prumnopitys taxifolia*/mixed podocarp forest. There was also a notable *Nothofagus* component. There is a c 1900 year hiatus in the vegetation record between c. 3000 and 1150 yrs BP when no sediment accumulated at the Big Hill site. The regional forest of the central sector at c. 1150 yrs BP. was still a predominantly *Prumnopitys taxifolia*-dominated/mixed podocarp forest. However, *Nothofagus* was less important in this latter forest. At Willowford, 18 kilometres north of Big Hill, the same *Prumnopitys taxifolia* -dominated/mixed podocarp forest was evident at about 500 yrs BP. At Hawkstone, 10 kms north of Willowford, a *Nothofagus*/ *P. taxifolia*-dominated mixed podocarp forest was established by 6500 yrs BP. About 3400 yrs BP *Dacrydium cupressinum* became the dominant podocarp, thus placing the Hawkstone region within the northern climatic sector from this date, up to the present.

The regional vegetation of the northern sector from 1850 yrs BP. until European land clearance in the late 19th century at Te Pohue, was a *Dacrydium cupressinum* -dominated/mixed podocarp assemblage with a notable *Prumnopitys taxifolia* component.

Several erosional events have been identified in the stratigraphy of the sites. By estimating the age of these events by sediment accumulation rates, some of these events have been tentatively linked to Grant's (1985) hypothesis of periodic climate-forced

erosional events having partially destroyed the forest cover in the western Hawkes Bay region. Using radiocarbon dates from this study, often in conjunction with sediment accumulation rates, it has been possible to identify some erosional events as earthquake generated by linking these events to other known and radiocarbon dated movements along the Mohaka Fault trace in western Hawkes Bay.

Volcanicity has been identified as a factor influencing forest cover in the northern part of western Hawkes Bay. At Hawkstone, microscopic charcoal has been identifed at several levels throughout the 6500 year pollen record of the site. However, the sediment accumulation rate was too low to determine the exact nature of the disturbance, and the forest quickly recovered in each case. Although a 0.20 m layer of reworked lapilli from the Waimihia eruption (3280 ± 20 yrs BP.) was recorded at the site, no fire or disturbance to the vegetation was recorded. However, above the Taupo Tephra (1850 ± 10 yrs BP.) fire is continually recorded at the site. As a result the regional forest did not return. Primary ignimbrite from the Taupo eruption forms the base of the Te Pohue site. The regional forest was destroyed by fire in conjunction with this event. A similar forest to before the event, was re-established within c. 230 years.

Polynesian deforestation is identified by the advent of high frequencies of *Pteridium exculentum* and microscopic charcoal in the pollen record in the Willowford region c. 480 ± 170 yrs BP., and in the Big Hill region c. 435 ± 140 yrs BP.; and are coincident with the decline of indigenous forests in each case.

European settlement, commencing in the mid-nineteenth century at Te Pohue and about 1880 AD. at Hinerua, is identified by the decline of indigenous forests in these areas, coincident with the appearance of exotic pollen types such as *Pinus*, *Taraxacum* and pasture grasses.

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