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*Late Quaternary Evolution
of Matakana Island,
Bay of Plenty,
New Zealand*

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submitted in partial fulfilment
of the requirements for the Degree of

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by

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Frontispiece: Oblique aerial view of Matakana Island and Tauranga Harbour from above Mount Maunganui township.

Abstract

Matakana Island consists of two main parts - an area of mainly Pleistocene materials to the southwest and a *c.*24 km long Holocene barrier to the northeast. Together with the tombolo systems of Bowentown Heads and Mount Maunganui, Matakana Island encloses the *c.*200 km² Tauranga Harbour.

This study establishes the late Quaternary geomorphological history of Matakana Island, focussing primarily on the evolution of the Holocene barrier. The barrier consists largely of relict foredunes, with relict parabolic dunes, lakes/wetland areas, washover deposits and estuarine flats also present. A detailed geomorphological map provides a foundation for palaeoenvironmental reconstructions. The landform information is supplemented with details of the sedimentology, tephrochronology, pedology, archaeology and palynology of the barrier in order to identify and describe past environmental changes.

The Pleistocene part of the island contains remnants of at least three late Pleistocene terraces, mantled by thick beds of tephra and ignimbrite. The lowest terrace, which retains some coastal landforms, originated as a relict foredune plain which probably formed during the Last Interglacial maximum (*c.*125 000 years ago). The older, higher terraces are likely to have originated during earlier interglacial periods.

The barrier consists primarily of moderately well sorted to well sorted medium to fine sand. The dominance of quartz, feldspar and hypersthene indicate that much of the sediment was originally derived from the active Taupo Volcanic Zone. Following the end of the Postglacial Marine Transgression *c.*7 000 cal BP, deposits of these materials on the continental shelf were reworked and transported shoreward to form the Holocene barrier.

Barrier formation commenced by around *c.*6 000 cal BP. The barrier initially formed in at least two separate parts, separated by a tidal inlet at present-day Blue Gum Bay. The entrance migrated southeastward as the barrier prograded and was closed off *c.*3 750 cal BP. Following the closure of the entrance, foredunes became larger and more irregular, suggesting a major change to the coastal sediment budget.

Progradation rates, calculated from shoreline ages determined by airfall tephra deposits, radiocarbon ages and sea-rafterd pumice deposits, generally decreased with time, from about 0.46 metres/year initially to about 0.18 metres/year over the last *c.*650 years. Significant erosion of the southeastern end of the barrier culminated shortly after the Kaharoa eruption (*c.*650 cal BP), at which time the barrier was approximately 83 percent of its present length. Subsequently, both ends of the barrier extended rapidly. The coarse texture of sand comprising the barrier ends and anomalously old radiocarbon ages of incorporated shells suggests that, as the entrances narrowed, sediment from adjacent ebb-tidal deltas was reworked to form the barrier ends. The barrier also underwent considerable change following the first arrival of humans on Matakana Island sometime after the Kaharoa eruption. Widespread vegetation clearance and soil disturbance are likely to have contributed to dune instability.

Matakana Island appears to have developed in a similar fashion to many Holocene barrier systems of southeastern Australia in terms of a predominant shelf sediment source, onshore sediment transport following the end of the Postglacial Marine Transgression and decreasing progradation rates through time.

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