LATE QUATERNARY LANDSCAPE EVOLUTION

OF

WESTERN HAWKE'S BAY, NORTH ISLAND, NEW ZEALAND

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ABSTRACT

Western Hawke's Bay, North Island, New Zealand, lies landward of an obliquely convergent offshore plate boundary, the Hikurangi Trough. Landscape elements exhibit classical island arc terrains. From east to west these are: an accretionary wedge, forearc basin, frontal-ridge, and a volcanic backarc basin.

The forearc was subdivided into four land systems: ranges, inland basins, hill-country, and plains. Soil patterns and geomorphological processes within each land system are detailed. The architecture and subsequent sculpturing of land systems have been subject to a complex interplay between: tectonic, climatic, fluvial, aeolian and volcanic regimes. These regimes have had a marked bearing upon the stability/instability of the landscape and its evolution.

The timing of stability/instability cycles within the district's coverbeds and aggradational/degradational terraces is facilitated by interbedded rhyolitic and andesitic tephra chronohorizons and ignimbrites (Taupo, Oruanui, Rabbit Gully and Potaka) derived from the Taupo Volcanic Zone. The glass chemistries of unknown rhyolitic tephras and ignimbrites were matched with those from the well-dated master sections around the volcanic centres. During this study the geographic distribution of many andesitic and rhyolitic tephra layers have been significantly expanded into a district not previously studied in detail. Andesitic tephras identified include members of the Tufa Trig, Ngauruhoe, Papakai, Mangamate and Bullott Formations. Rhyolitic tephras found, but not previously recorded in Hawke's Bay sequences, include Rerewhakaaitu and Rangitawa Tephras and four previously unidentified rhyolitic tephras termed A, B, C and D within Loess 4 and Loess 5.

Major cycles of landscape stability/instability are associated with Quaternary climate changes. During glacial and stadial times intense physical weathering prevailed within the ranges resulting in the transfer of material (aggradation products) through the fluvial and aeolian systems to the downlands and coastal plains. Interglacial and

interstadial times were marked by a predominance of chemical weathering (paleosols) and river degradation. The net result was landsurface stabilisation before the next episode of instability. Loess-paleosol layers recognised in Hawke's Bay are correlated to the Rangitikei River Valley sequences. Unlike the Rangitikei sequences, where the best loess-paleosol record overlies terraces, those in Hawke's Bay are found on footslopes.

Pre- and early-Ohakean loessial sequences overlying aggradational terraces are absent. Consequently, studies were focussed on colluvial foot- and toe-slopes (depositional sites) within the inland basins and hill-country land systems. Coverbeds from these slope positions have a fuller record and are more useful for stratigraphic studies.

Earthquakes, fires (both natural and man-induced), periodic cyclonic storms and ignimbrite sheets punctuate and complicate the climatically induced Quaternary cycles. The record for these non-climatic variables is often local and may mask or even destroy the imprint of older, more poorly preserved climatically-induced Pleistocene stability and instability episodes.

Field, morphological, mineralogical and chemical properties of loess and tephra layers were undertaken at four reference sections. These sections are arranged in a west (foothills of the ranges) to east (coast) transect reflecting differences in climate (1800-900mm rainfall/annum, lower rainfalls in the east), soil types (Pumice, Allophanic, Brown and Pallic Soils) and distance from volcanic source areas. The most distant site lies over 100km east of Lake Taupo.

Three aggradational terraces associated with the last stadial (Ohakean) are commonly found along Hawke's Bay rivers. Ohakean terraces along the Mohaka River have tread ages of *c.* 16-14 ka, 14-11 ka and 11-10 ka, respectively.

Field and laboratory characterisation of duripan horizons within Pallic Soils were undertaken to elucidate the nature and origin of the cementing medium. Soil chemistry and mineralogy show the cement to be highly siliceous and most likely derived from the weathering products of volcanic ash.

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