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**THE CLAY MINERALOGY AND EROSION
OF THE
WAIPAOA RIVER CATCHMENT,
GISBORNE, NEW ZEALAND.**

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“Look Lorax,” I said. “There’s no cause for alarm.
I chopped just one tree. I am doing no harm.”

The Lorax, Dr Seuss



ABSTRACT

The Waipaoa River Catchment lies N-NW of Gisborne, covering 2181 km² it drains south into Poverty Bay ~10 km SW of Gisborne. It carries approximately 15 million tonnes of suspended sediment annually, ranking it as one of the most sediment - laden rivers in the world. Deforestation in the early 1900's has led to severe landslide and gully erosion. To assist in catchment analysis and sediment budgeting, Landcare Research divided the Waipaoa River Catchment into 16 land systems, based on the Land Resource Inventory; principally rock type and erosion type and severity. Four of these land systems were chosen to test the hypothesis that clay mineralogy will influence whether landslide or gully erosion is dominant. And, if mineralogical signatures could be established for the different land systems, they could be traced downstream onto the floodplain and into the marine environment.

There is no consistent mineralogical difference between the two chosen landslide dominated land systems and the two gully dominated systems. The Mangatu Land System is dominated by gully erosion. Samples taken from the Tarndale Gully complex within the Mangatu Land System for example, are dominated by quartz in the clay fraction, whereas gullies in the Waingaromia Land System are dominated by mica and smectite. The landslide dominated Te Arai Land System, like the Waingaromia Land System, is also primarily mica and smectite, while the clay minerals of the Mako Mako Land System consist of mica and the clay – sized mineral feldspar. It appears that tectonic influence of uplift and faulting, and its influence on headward erosion by streams, is most important in predisposition to gully erosion.

The Mangatu Land System dominates the clay mineralogy of both the bedload and suspended sediment of the Waipaoa River at normal flow. However, dilution of this signature does occur at Te Karaka with the influence of the Waingaromia, Waikohu, and Waihora Rivers. In major flood events during high intensity storms, landsliding is more prevalent. Floodplain sediments are thus predominantly soil mantle materials derived from shallow landsliding and bare little resemblance to the dominant Mangatu Land System sediments. Whereas, the Poverty Bay marine core MD2122 sediment, representative of the annual Waipaoa River sediment yield, is produced by the continuous gully erosion. The effect of differential settling gives the core mineralogy a similar signal to that of the floodplain cores; however, sediment is considered to be predominantly Cretaceous material.

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