

Pounamu resource assessment and characterisation

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Pounamu is a Māori collective term for semi-precious stone scientifically referred to as nephrite, semi-nephrite, jade or bowenite (tangiwai) that is composed predominantly of metamorphic tremolite in a felted, fibrous texture. It is Aotearoa/New Zealand's icon mineral material. Ownership and management of this important taonga (treasure) has been vested in Te Rūnanga o Ngāi Tahu as part of a Treaty of Waitangi settlement process. Increasing demand from the tourist, jewellery, fashion and sculpture industries, as well as cultural renaissance, has placed pressure on the pounamu resource. This had led to nephrite importation, allegations that foreign material is being marketed falsely as New Zealand pounamu, and wider concerns over the potential for exploitation/over-use and theft of genuine pounamu.

Research is underway to characterise different pounamu source regions by defining their “genetic fingerprint”. The geological age and radiogenic isotopic composition of Aotearoa/New Zealand pounamu is distinguished from other nephrite jade occurrences overseas, due to relatively young cooling ages. Strontium isotope ratios distinguish pounamu from different source areas within Aotearoa/New Zealand (whakapapa), with signatures reflecting the host terrane rocks (their family) and their position in a sequence of metamorphic events (their generation). The research will provide a tool for archaeological research, trademark and resource protection.

Mineral resource assessments normally aim to define the total volume/tonnage present, which is generally assumed to be finite, applying drilling and geostatistical modelling. Pounamu resource assessment requires a different approach, as its intrinsic value is insufficient to warrant modern exploration methods (e.g. drilling, geophysics). Pounamu is only known to occur at a restricted few in-situ (hard-rock) localities. It is primarily found in transported (alluvial) detrital river and glacial outwash deposits, where collectable material has short term variability due to erosion and transport processes. A new methodology is being developed aiming to define (i) the total resource present, (ii) the relative rate of change in the availability of that resource through erosion and other geological processes, (iii) active areas where new material is likely to be exposed (e.g. by erosion), and (iv) appropriate extraction rates for sustainable use. The methodology will provide a holistic overview of the resource in different regions of Aotearoa/New Zealand, and may be applicable to other transient or restricted natural resources that occur within geologically active environments (e.g. supplies of driftwood on beaches).

