Small New Zealand population initiated rapid forest transition c. 750 years ago

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Human-set fires by a small Polynesian population in New Zealand around 750 years ago may have caused fire-vulnerable forests to shift to shrub land over decades, rather than over centuries, as previously thought, according to a study published November 5, 2014 in the open-access journal *PLOS ONE* by David McWethy from Montana State University and colleagues.

Human impacts on forest composition and structure have been documented worldwide; however, the rate at which ancient human activities led to permanent deforestation is poorly understood. In South Island, New Zealand, the arrival of Polynesians ~750 years ago resulted in forest loss and conversion of nearly half of the native forests to open vegetation. This transition, termed the Initial Burning Period, is documented in pollen and charcoal records. To better understand the transition's speed, the authors of this study developed high-resolution reconstructions of vegetation (pollen) and fire (macroscopic charcoal) from radiocarbon dated lake-sediment records from two small, closed-basin lakes that represent different vulnerabilities to human-set fires: one drier lowland site and a second, wetter high-elevation site.

According the authors, following the initiation of human-set fires, drier, more vulnerable forests may have shifted to shrub land in decades rather than over centuries as was previously thought. The high rate of deforestation by small transient human populations may have resulted from native and previously burned vegetation vulnerability to fire. Removing fire from the forests may eventually lead to forest recovery,

but the authors point out that even in the absence of fire, many factors influence forest recovery, including seedling regeneration potential and introduction of non-native species. The authors conclude that the New Zealand example illustrates how seemingly stable forest ecosystems can experience rapid and long-lasting conversions.

More information: McWethy DB, Wilmshurst JM, Whitlock C, Wood JR, McGlone MS (2014) A High-Resolution Chronology of Rapid Forest Transitions following Polynesian Arrival in New Zealand. *PLoS ONE* 9(11): e111328. DOI: 10.1371/journal.pone.0111328