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**Leaf litter decomposition and stream
macroinvertebrate communities of the Central
Volcanic Plateau: the effects of landuse**



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ABSTRACT

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The effects of landuse on benthic macroinvertebrate community structure was assessed in 35 streams draining four different landuse activities (native (Beech and Broadleaf/Podocarp) forest, exotic (*Pinus radiata*) forest, hill country pasture and scrubland) around Lake Taupo, North Island, New Zealand, between January and March 1997. Ephemeroptera (mainly *Deleatidium* sp.) were abundant in all landuse types. Diptera (Chironomidae), Coleoptera (Elmidae) and Trichoptera (*Pycnocentroides aureola*) dominated invertebrate communities in open canopy pasture streams, where higher algal biomass existed. Native forest and exotic forest stream communities were considerably different. Native forest streams had higher water velocities, substrate stability and overhead cover, whereas exotic forest streams had low bed stability and high sand levels. In response to the higher sand levels in exotic streams, invertebrate communities had higher abundance of molluscs (*Potamopyrgus antipodarum*) and Coleoptera (Elmidae). Native stream communities were dominated by Ephemeroptera (*Deleatidium* sp. and *Colorburiscus humeralis*), Coleoptera (Elmidae) and Trichoptera (*Aoteapsyche colonica*). Landuse effects on invertebrates are different throughout New Zealand and will depend on local conditions, especially geology.

In December 1997 and January 1998, leaf litter decomposition and invertebrate colonisation were examined in 12 streams draining four different landuse activities around Lake Taupo. Mesh leaf tubes (0.2mm) and mesh leaf bags (3mm) containing dried Rangiora (*Brachyglottis repanda*) leaves were immersed into streams draining the four landuse types. Leaf tubes and bags were removed from streams after 14 days, 28 days and 42 days to measure the percentage of leaf weight lost from each leaf tube and bag and to assess the invertebrate colonisation of the leaf litter bags. Open canopy streams processed leaf litter in the tubes faster than closed canopy streams and it is likely that the increased temperatures and nutrient levels in open streams contributed to this phenomenon. Leaf bags were decomposed more rapidly in exotic streams where invertebrate densities in bags were highest among the landuse types. The low abundance of quality food available in exotic sites is likely to have contributed to

the higher numbers of invertebrates feeding on the limited food resource. Invertebrate communities in all landuse types were distinctly different from each other, in contrast to benthic communities which were more similar. It appears that landuse does affect invertebrate communities in leaf bags, and this in turn influences leaf litter decomposition rates.

Keywords: abundance, algal biomass, benthic communities, exotic forest, hill country pasture, invertebrate colonisation, leaf litter decomposition, macroinvertebrate community structure, mesh bags, mesh tubes, native forest, percentage weight loss, scrubland.