Hydrological consequences of kauri dieback

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Kauri dieback, caused by the water mould, Phytophthora agathidicida is threatening one of our most treasured and iconic tree species, kauri (Agathis australis). A member of the ancient conifer group, Araucariaceae, kauri is amongst the largest and longest-lived trees in the world. It is culturally and ecologically significant for it's place in the forest and the quality of wood it provides. Harvesting of kauri by European settlers reduced kauri forest to less than 5% of their original distribution and while logging has ceased, kauri dieback is killing infected trees. While research on kauri dieback is ongoing, little is known about potential hydrological consequences of tree mortality.

We have been measuring sap flow of kauri trees at the University of Auckland Huapai Scientific Reserve for over four years. In this presentation, I will talk about the whole-tree and stand-scale patterns of transpiration in kauri. There were strong seasonal effects driven by solar radiation and evaporative demand of the air. There was also a response to dry soils during the summer. Large trees dominate the water use of the ecosystem. The largest tree (DBH = 176 cm) used more than 10% of stand water use while the four largest trees (DBH >80 cm) used almost 30% of the stand water use (with the remaining 150 stems using the remaining water). This result indicates that if smaller trees die, the impact on the hydrological cycle will be minimal but when larger trees die, the catchment water balance will be significantly impacted. Because these large trees are centuries old, recovery of the hydrological cycle is likely to be very slow if they die.