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Longer-term effects of pine and eucalypt plantations on streamflow

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ABSTRACT:

The longer-term effects of afforestation with *Pinus radiata* and *Eucalyptus grandis* on streamflows were analyzed using data from two paired-catchment experiments in South Africa. The experiments are rare in that they have been maintained over longer periods than the typical rotation period for industrial timber plantations in the tropics or subtropics. In both experiments the planting treatments led to large reductions in streamflow, which increased with the age of the trees and were positively related to water availability. The pine plantation caused peak reductions in yield over a 5-year period of 44 mm a⁻¹ or 7.7% a⁻¹ for each 10% of catchment planted when the trees were between 10 and 20 years old. The eucalypt plantation caused peak reductions over a 3-year period of 48 mm a⁻¹ and 10% a⁻¹ for each 10% of catchment planted. However, as the plantations matured (over 30 years of age in the case of pines and over 15 years of age in the case of eucalypts) the flow reduction trend was reversed, and streamflow effects appear to be tending toward preafforestation levels. The longer-term effects of planted forests need not be as harmful on the water yield of catchments as has been predicted from shorter-term studies. The implication of these results is that if trees are grown on very long rotations, they may be used for restoring degraded catchments or as a means of storing carbon without completely denuding available water resources.