



Plantation Forests and Water

(IFA Forestry Policy Statement Number 5. 2)

Key Statement

The impact of plantations on the quality of and quantity of water within catchments is highly variable. With appropriate planning and management plantations will not cause major impacts on stream flow or groundwater quality or quantity.

The Issue

The establishment of plantations in water catchments can have positive and negative effects on stream water quantity and quality. The National Water Initiative identifies large-scale afforestation as a land use change that may intercept significant volumes of surface and ground water and which therefore may require a water access entitlement. However, targeted plantation establishment can help control erosion, reduce salinity and improve water quality.

Background

Reforestation with plantations provides substantial environmental, social and economic benefits. However, because trees use more water than annual crops and intercept more rainfall than pastures, there will be reductions in stream flows and ground water recharge in many, but not all, situations.

Both soil type and vegetative cover affect the quantity of water in streams. The amount of water lost through evapo-transpiration from a forest is greater than that from grassland. However, the generally high rate of infiltration of water into the soil under the forest means that changes in stream water flows across the seasons and following storm events are more gradual and of lesser degree than those from a non-forest cover.

Changes in stream water flow after plantation establishment depends on the area of the catchment affected. It is difficult to detect a significant effect on stream flow in catchments smaller than 1000 hectares where plantations occupy less than 20% of the catchment. In larger catchments the impacts on run off will depend on the location of the plantations in relation to where the rain falls and other land uses in the catchment.

Long term research at the Cropper Creek Hydrology Study in north-east Victoria shows that, although water use by young Radiata Pine (*Pinus radiata*) plantations slightly exceeds that of un-logged mixed species eucalypt forest, thinning of the plantation more than compensates for this loss (as thinning leads to increased water yield by removing a percentage of plantation forest cover). The study also revealed that water quality is not diminished by conversion of native forest to pine plantations.

In regions, such as the south-east of South Australia, where groundwater resources are extensively used for irrigation, industry and stock and domestic water supply, establishment of forest plantations can reduce the amount of groundwater available for alternative use. Research in this area indicates that closed canopy plantations generally use all the available rainfall and that where there is shallow groundwater the plantations use 1-6 ML ha⁻¹ yr⁻¹ of ground water. However, water use by plantations must be assessed against seasonal rainfall and the intensity of water abstraction by users other than plantations, as well as against the background of groundwater conditions prior to European settlement.

On the other hand, the establishment of plantations in low rainfall areas can prevent rainwater accessing saline groundwater or mobilizing salt in the soil profile. Study of the Denmark River catchment in Western Australia has shown that trees moderate salinity of streams by

reducing groundwater recharge and consequent groundwater discharge from the upper catchment into the streams. The benefit of less saline discharge is partially offset by an associated reduction in the volume of available river water.

Policy

The Institute of Foresters of Australia (IFA) advocates that plantation development take account of water management requirements and that plantations be treated equitably with other land uses when determining water use rights in water catchments.

The IFA supports and encourages:

- Further long-term research into the impacts of plantations on water quality and quantity;
- Equitable and science based methodologies to determine the appropriate treatment of plantations under the implementation of the National Water Initiative;
- Plantation managers working with governments and catchment management authorities to ensure that plantation development minimises adverse impacts on water, including avoiding groundwater recharge areas;
- Implementation of appropriate measures, including Codes of Practice, to protect water quality during the establishment and harvesting of plantations; and
- Investigation and use effluent irrigated plantations to avoid the discharge of nutrient-rich urban and agricultural effluent into streams.

The IFA considers that:

- Sustainably managed plantations are an increasingly important land use in Australia;
- Plantations can have minimal impact on stream flow with appropriate planning and management;
- Strategically located plantations can have positive hydrological impacts on dryland salinity; and
- When plantations are established on agricultural land, stream flow reductions will tend to peak within 10-20 years of establishment before stabilising.

Further Information

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