

Demand for water use by new tree plantations and downstream economic, social and environmental interests

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Abstract New tree plantations in upland watersheds may directly displace other land uses such as perennial or annual pastures or cropping on arable land, affecting both water yields (W) and river salt loads (S). Our “factorial vector analysis” describes the envelope of possible changes in long run W,S combinations. Economic analyses find least-cost changes in land uses to attain particular W,S targets from a watershed. Changes alter watershed net present value as direct and opportunity costs are subtracted from earning prospects of new tree plantations given stumpage values (\$40, \$50, \$60 and \$70/m³) to determine their marginal values of water. Water use distributions are projected under two regulatory settings: (1) where no downstream water entitlements need be purchased, and (2) where the latter are required for new plantations. Economic balances are projected with initial supply of water entitlements held by downstream irrigators, stock and domestic interests and wetland environmental areas.

Key words evapotranspiration; interception; watershed; rivers; groundwater; salinity; environmental services; water entitlement; downstream externality; market; economic surplus; urban water; irrigation; wetlands