

EXECUTIVE SUMMARY

As water scarcity increases the need for a framework to judge beneficial use becomes more pressing. The answers provided by such a tool are the basis on which society decides who gets access to the resource and who does not.

This study analyses the economic efficiency of water allocation on the Fish-Sundays scheme in the Eastern Cape Province of South Africa. The objective is to develop a basin-wide model of water use that calculates total and marginal water value. Estimates of total value are used to confirm financial feasibility while marginal values measure the efficiency of current allocation as well as gains from reallocation. A linear programming model shadow prices commercial irrigation, which controls 97 percent of available water on the scheme. The value of water to commercial irrigation is interpreted as the opportunity cost of reallocating water to an ecological reserve, irrigation equity and municipal demand. Value in these sectors is typically hard to quantify but the method developed here constitutes an easy procedure for obtaining a first estimate of the cost of meeting equity objectives.

Total water value is defined as residual farm profit after all fixed resources have been remunerated at their opportunity cost. Assuming the perfect competition of the Ricardian framework, residual profits are interpreted as payments to irrigation water, which pre-1998 was not sold in a separate market but traded as part of the bundle of resources associated with (irrigated) farmland. An accurate estimate of water value critically depends on identifying all other factors of production. Hence, risk is introduced through MOTAD, which penalises the objective function by an exogenous weighting according to risk preference. Accounting for risk reduces total and marginal water values, which are also sensitive to the value of crops and input prices.

Total water value for the scheme is estimated to be R27 million in 1999 Rand (\pm \$2.24 million) and irrigation shadow prices range from zero to R0.2115/m³ (\pm \$0.0176/m³). Results indicate that 77 million m³/year can be transferred away from irrigation at zero opportunity cost. Two thirds of the current allocation to irrigation can be bid away at a price of R0.0352/m³ (\pm \$0.003/m³). Thus equity objectives can be satisfied at zero or very low opportunity cost to commercial irrigation.

The typical model of water value relies on a vast array of assumptions that all influence final values. While orders of magnitude and directions of reallocation are therefore meaningful, one should not attach too much meaning to any particular result. Administered prices are too data intensive to be practical. Water markets represent a more reliable and cost effective institutions to derive subjective willingness to pay.