

Conjunctive Surface And Ground Water Management In The Jakarta Region, Indonesia¹

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Abstract

ABSTRACT: This study investigates the degree of economic inefficiency of the current institutional arrangements for surface and ground water management in meeting urban water demand in the Jakarta region. A numerical model of integrated surface and ground water management is developed using GAMS (General Algebraic Modelling System) software. The model maximizes the net present value of social benefits from piped water and ground water consumption across all users over time from 1999 to 2025. Four policy scenarios are examined: the status quo, the social planner's solution, and two ground water pumping quota scenarios: an aggregate ground water pumping quota and a partial quota applied to commercial and industrial users. Three variations in each policy scenario are considered: investment in water infrastructure of the Jakarta water enterprise (PAM Jaya), water demand growth, and discount rates. The status quo, depending on the investment option, the growth of water demand, and the discount rate, results in a 7.4 to 47.8 percent loss in economic efficiency relative to the social planner's solution. The partial quota is the most feasible, applicable, and manageable scenario. The optimal investment option could increase the volume of piped water supply and reduce the cost of water production. The volume of water delivery could increase by up to 156 percent, but it implies only a 35 percent increase in the surface raw water demands above the current level. However, it does not significantly reduce cumulative ground water extraction over the time period considered.

Keywords

water utility • investment • economic efficiency • water allocation • optimization • PAM Jaya