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A Novel Paradigm for Accounting for the Cost of Groundwater Pollution

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Establishment of environmental policies relies in the proper assessment of the value of the resource being affected. Standard risk assessment analyses calculate the cost of pollution as consisting, solely, of the cost to remediate a site. This leads rationally to selection of the lowest-protection technology. In this work the reduction in value of groundwater, from potable high quality water to irrigation water, which is returned after remediation, is defined. Incorporation of this lost value of groundwater is sufficient to drastically alter the conclusions of the decision-making analysis and make the highest level of technology the most rational and profitable alternative.

This study also conducts a Bayesian decision analysis to assess at what level of penalty relative to the cost of remediation measures an optimum decision can be reached. The following questions are addressed: (i) What is the sensitivity of a decision on the assumptions of probability models, which are used to describe exceedance of pollution limits in samples; (ii) what is the influence of the shape of the loss function; (iii) what is the effect of the length of a sampling record on the decision; and (iv) at what level of cost, collection of additional information improves a decision.