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Hydrol. Earth Syst. Sci., 13, 675-686, 2009  
www.hydrol-earth-syst-sci.net/13/675/2009/

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## A social-economic-engineering combined framework for decision making in water resources planning

E. S. Chung<sup>1</sup> and K. S. Lee<sup>2</sup>

<sup>1</sup>Engineering Research Institute, Seoul National University, 36-203. San 56-1, Sillim-dong, Gwansong-gu, Seoul, 151-742, Republic of Korea

<sup>2</sup>Department of Civil and Environmental Engineering, Seoul National University, 38-415, San 56-1, Sillim-dong, Gwanak-gu, Seoul, 151-742, Republic of Korea

**Abstract.** This study develops a social-economic-engineering combined framework for decision making in water resources planning. This framework consists of four parts which are to spatially identify the grades on hydrological vulnerability (potential streamflow depletion and potential water quality deterioration), to evaluate the monetary values of improvements on hydrological vulnerability grades using the choice experiment method, to derive an alternative evaluation index (AEI) to quantify the effectiveness of all alternatives, and to combine the derived willingness-to-pays (WTPs) with the AEI and do the cost-benefit analysis of feasible alternatives. This framework includes the stakeholder participation in order to quantify the preferences with regard to management objectives (water quantity and quality) and WTPs of alternatives. Finally, the economic values of each alternative can be estimated by this study which combines the WTPs for improvements on hydrologic vulnerability grades with the AEI. The proposed procedure is applied in the Anyangcheon watershed which has been highly urbanized for past thirty years. As a result, WTPs are \$0.24~\$10.08/month-household for water quantity and \$0.80~\$8.60/month-household for water quality and residents of the five regions among six have higher WTPs for water quality improvement. Finally, since three of ten alternatives have  $BC > 0$ , they can be proposed to the decision makers. This systematic screening procedure will provide decision makers with the flexibility to obtain stakeholders' consensus for water resources planning.

[Final Revised Paper](#) (PDF, 735 KB) [Discussion Paper](#) (HESSD)

Citation: Chung, E. S. and Lee, K. S.: A social-economic-engineering combined framework for decision making in water resources planning, Hydrol. Earth Syst. Sci., 13, 675-686, 2009. [Bibtex](#) [EndNote](#) [Reference Manager](#)



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