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Willingness to pay for hydrologic information appropriation in consensus based decision-making on water allocation: A Hypothetical analysis

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This paper simulates a consensus based decision-making approach for water allocation. A non-trivial three-user allocation problem is considered. Upon availability of water surplus (from an exogenous source), the users in deficit demand a share. In contrast to conflict style decision making, they want (or are forced) to resolve this allocation process by consensus building, i.e., the users desire (or should arrive at) an allocation solution agreeable to all. We simulate this decision-making process by the game theoretic approach of Rausser-Simon (Adams, et al., 1991), a multilateral bargaining model. The players (users) in this game are motivated to bargain for a share by their payoff functional, which they desire to maximize[1]. Furthermore, the players are motivated not to reach a disagreement by their disagreement payoff (the payoff they realize if the process fails)[2]. This model therefore provides a useful instrument to understand the dynamics of such a decision making process. To illustrate its usefulness, we study the influence on the water allocation solution of having insufficient information about conveyance losses. The conveyance loss is the physical loss in transporting allocated water from the source of surplus to its point of use. Insufficiency is measured by the uncertainty in loss estimation faced by one of the players. It is inferred from our simulation study that this uncertainty distorts the allocation solution. As a result of this uncertainty, all the players incur economic losses in the solution payoff, with the player facing the uncertainty being most affected. This leads us to conclude that all the players would be willing to pay for more information on conveyance loss even though only one player is faced with such information insufficiency. However, the respective portions of total expenditure would depend on their individual willingness to pay (WTP) for a particular decrement in uncertainty. Assuming all the players have perfect information about the payoff functions and the surplus amount, this tool therefore enables us to inquire about the viability of any effort to obtain additional information, and also sheds some light on sharing such a responsibility.

Reference:

ADAMS G, Rausser G and Simon L (1996), Modeling multilateral negotiations: an application to California water policy. *Journal of Economic Behavior and Organization*, 1996, vol. 30, pp. 97-111.

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[1] Under the assumption of rationality that the players always attempt to maximize their utility

[2] the lower the disagreement payoff, the more the players are motivated not to let the decision-making process fail