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Evaluating Water Conservation Strategies and Policies

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The four papers presented at this invited session examine various ways that economic analysis can be used to examine issues of water conservation strategies and policies. Three of the four are focused on water issues in Texas, and one examines a private insurance contract scheme for irrigation scheduling using Georgia weather and water data. All four papers are well written and interesting, but all four illustrated the limits of conventional economic analysis in its ability to shed light on public policy. This is particularly the case in the heavy reliance on economic efficiency analysis that is employed in the papers.

By integrating stakeholders' input into water policy development and analysis, Guerrero, Amosson, and Almas broaden the usual role of economic analysis by recognizing stakeholder involvement as crucial to the success of water conservation strategies. It is interesting that the authors began with the problem that "results of projects evaluating the impact of conservation strategies aimed at reallocation or extending the life of water supplies are being met with *great skepticism* (emphasis added) by stakeholder groups." Why is that the case? Have past evaluation efforts been flawed or not well communicated?

Another telling point made early in the paper is that the "results of this study will be valuable information *if* (emphasis added) water conservation policies are considered in the future." Given that the issue of water depletion in the southern portion of the Ogallala Aquifer has been a constant concern for over 20 years, one would think that the *if* part of water conservation policies would have been settled.

The paper is a description of the process used to include stakeholders in the analysis and choice of water conservation strategies. Paired with the paper by Wheeler et al., the process and the analysis are illustrated. In the Guerrero paper, the four-step method began with a survey of stakeholders to "set the stage" by presenting 12 policies for ranking. The list of policies, from water use restrictions to energy taxes, includes a number that are "voluntary incentive–based" programs. It is not clear from the paper whether the inventive structures were part of the information stakeholders had before ranking the policies. It is also not clear how this list of 12 policies was formed. The paper notes that the 12 alternatives had already been implemented or had the possibility of implementation in the near future. Were these the alternatives that had previously been met with "skepticism"?

The process then included stakeholder meetings, feedback to stakeholders, and a presentation of results based on economic optimization or socioeconomic models (the subject of the Wheeler paper). Although the paper notes that the "methodology has been successful," the authors do not indicate how such successes was measured. In fact, it would seem that we would not know how successful the process is until some of these conservation strategies are in place. While it is not evident at first, the paper by Wheeler et al. is the

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companion piece to Guerrero. The paper illustrates how the economic analysis that underlies the stakeholder process was accomplished. In this case, Wheeler et al. developed dynamic production functions for major crops in the Texas Panhandle. The authors considered three policy scenarios for nine counties that include a status quo scenario in which no change is made to current water policy, a long-term water rights buyout program where cropland is permanently converted to dryland production, and a short-term water rights buyout program where the cropland is converted to dryland production but allowed to revert to irrigated production after 15 years. The latter two scenarios were part of the list of 12 policy alternative in Guerrero and were ranked in the top five by the stakeholders.

The paper highlights the results for two counties in the study area: Floyd, a northern county with a diverse crop mix, and Terry, a southern county that is primarily cotton. In both counties, the status quo scenario analysis shows a significant decline in saturated thickness of the aquifer over the 60-year planning horizon, as did the short-term scenario. Further, the long-term water rights buyout policy saves more water but at a higher cost to the economy than the short-term policy. What is interesting about the county comparisons is that in Floyd County, where there is a more diverse crop mix, the long-term buyout has a lower economic impact than in the monocropped Terry County. This tracks well with the precepts of sustainable agriculture where diverse cropping patterns produce better environmental results than monocropping.

While these papers do acknowledge the importance of stakeholder involvement in water resource decisions, the process being used could be expanded. In the case described here, the analysis is restricted to standard economic efficiency measurements. In an analysis of the water allocation issues in Georgia, Florida, and Alabama, Rose and Bryan employed social impact analysis (SIA) to ''identify those segments of society affected by change and to assess in advance the potential impacts on those who have vested interests in the outcomes, that is, 'stakeholders''' (p. 159). SIA is ''a process for research, planning and management of change arising from policies and projects'' (Taylor, Bryan, and Goodrich). SIA begins with the assumption that all significant environmental alterations have social implications that must be addressed. This analysis goes beyond telling stakeholders how certain policies may affect economic return to ''determining which groups or business segments will be affected by the proposal and how they will be affected by alternative scenarios'' (Rose and Bryan, p. 159).

The other two papers in this session take different approaches to the issue of water policy. Both have less to do with conservation than the first two, but both provide insights that can be applied to conservation policy. In their paper, Willis and Baker use a Coasian analysis to estimate the social welfare gains to the United States and Mexico under alternative water debt repayment schemes. The limitations of Coasian analysis are well known, particularly regarding transactions cost, and will not be addressed here. The paper covers a decade-old dispute between the United States and Mexico that required Mexico to repay an accumulated water debt within one year, which was eventually accomplished in September 2005. The paper essentially asks if other repayment schemes might have produced better results. In particular, the authors suggest that net benefits would have been produced for both the United States and Mexico if the water debt could have been paid off in dollars and water instead of exclusively in water. As Willis and Baker note, the ''Coasian approach can easily be extended to efficiently reallocate water supplies between U.S. states, or regions, sharing a common fresh water resource in periods of drought.'' A contemporary and difficult case would be to apply this approach to the Georgia, Alabama, and Florida water dispute.

In the ''tristate water wars,'' the decades-old negotiations have failed because of an inability to move beyond original positions regarding the amount of water used or needed by each state. In the main two-party dispute, Georgia's position says to Florida, ''You tell us how much water you need and we'll get it for you—don't worry about what goes on inside of Georgia.'' Florida, on the other hand, says, ''Georgia, you tell us how much water you will use and let the rest flow into Florida.'' The problem is that the discussion has been about water allocation rather than allocating benefits. The approach presented in the Willis and Baker paper could help focus on this more quantifiable aspect in water negotiations.

The final paper in this session was both interesting and disappointing. It is interesting in its imaginative use of weather derivatives to affect irrigation water decisions. It is disappointing only in that the analysis showed that a weather derivative based on rainfall does not change irrigation decisions by producers, at least in the normally humid Southeast. The paper, ''Farm-Level Pest Management Using Irrigation and Weather Derivatives'' by Lin, Mullen, and Hoogenboom shows that water application rates that maximize utility are independent of water price and risk aversion coefficients.

The paper combines the use of new insurance instruments to improve farmers' risk management options with the perennial farm-level decisions on efficient irrigation strategies. Although the authors note that weather derivative contracts applied to nonirrigated crops may produce increased producer utility, when applied to areas such as Georgia (where the study was conducted), risk-averse corn producers are not generally made better off by purchasing rain-based insurance contracts. This may be a case where the authors would find more success for their approach in the Texas Panhandle, where the other three papers in this session reside.

References

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