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Issues in Water Resource Economics: Discussion

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The authors have made courageous efforts to accomplish rather ambitious objectives with varying degrees of success. Both the water quantity and quality issues are addressed, and the differing approaches provide useful insights into alternative policy options for solving a variety of water problems.

Although quite a diverse set of water issues is covered in the papers, a number of common themes do emerge. First, the potentially important role of water markets and synthetic market information in addressing both water quality and quantity issues is addressed by Howe and Saliba. Given the usefulness of markets and market information in economic decisions, greater consideration of and experimentation with such alternatives is needed in the water policy arena.

Second, two of the papers illustrate the growing recognition of the importance of the groundwater contamination problem. Anderson, Opaluch, and Sullivan (AOS) treat groundwater quality as a potential constraint under which producers may have to operate. In a less traditional approach, Saliba suggests that quality should be treated as a policy variable with different quality goals for different sources. Such quality goals would be dictated by the expected marginal benefits and costs involved.

Third, there is explicit emphasis on the more static issues in water allocation. Yet, the intertemporal issues may be more critical, and market information may be less accurate in resolving them. As Schultz has indicated, short-run crises may receive primary attention but the long-run shifts in supply and demand are usually the critical factors to society. AOS do develop a dynamic model which is solved subject to a regulatory constraint. The more important policy problem may be establishing regulatory constraints in a dynamic economic context.

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Issues

Howe raises a number of important issues in water allocation but lacks an analytical framework to assess tradeoffs between conflicting objectives. The author does address the potential for interstate water transfers relative to efficiency, regional welfare, legal, and political implications. Howe considers transfers from existing consumptive uses and conservation efforts and concludes that large quantities of water could be induced to move at modest prices. Yet, such water will only move at modest prices if established water rights are such that compensating former users for the loss of their water is all that is required execute a transfer. Given the multiplier impacts of irrigated agriculture, states are also very interested in such transfers, especially if they are interstate. Howe tends to emphasize this state versus private user welfare issue in a more static context and ignores the intertemporal economic tradeoffs.

Saliba presents a useful background on the technical dimensions of groundwater quality but needs to tie the technical information more directly to an economic framework to evaluate the proposed policy options. For example, if we go to water markets for protection of water quality or for information to establish water quality regulations, how do we then devise a system to allow multiple holders or users of water rights to capture the benefits? Both common property and externality problems may arise. Or more important, is such a system adequate to protect water quality for future generations? How do program administrators implement different water quality standards or regulations for different water sources if greater efficiency is to be achieved? What economic basis does a water quality agency use in choosing between incentives and regulations, or a hybrid approach? On a more technical note, Saliba indicates that "pollution potential of fertilizers is low up to

the point of maximum crop yield. . . ." Presumably, farmers will not apply fertilizer to the maximum yield level if fertilizer has a positive price, and thus fertilizer pollution should not be a problem. This contention understates the nature and magnitude of the fertilizer pollution problem in some areas.

Anderson, Opaluch, and Sullivan provide a useful framework for analyzing groundwater contamination from pesticides. They succeed in relating producers' actions (emissions) and groundwater quality (contamination). Although this relationship is technical as opposed to economic, they do attempt to simulate the economic implications for producers when a specific groundwater quality regulation has to be achieved for all wells. Their approach provides an extremely useful analytical framework for policy analysis if it can be generalized to larger areas and other environments beyond the present 3,000-acre study area considered.

Some important questions do arise in the implementation of the AOS framework. First, will the potential transactions (administrative) costs of such a regulatory system outweigh the net benefits to be realized? Second, the same standards were applied to all wells, but would variable standards, such as suggested by Saliba, be a viable alternative? Third, can the necessary technical information be obtained to extend the analysis to a number of groundwater contaminants, including other pesticides and fertilizers?

Research Needs

Even though we have spent years and millions of dollars on water quality and quantity research, a number of questions, some quite basic, remain to be answered. Adequate responses require both technical and economic input. Without such input, the development of efficient, equitable, and effective water programs and policies is not highly likely. Current water depletion, quality, and misallocation are largely a function of outmoded policies and institutions, inadequate information, and lack of needed policy developments.

A basic question is how much water is available by source, quality, and price (cost). Howe provides some illustrative data on water supply costs. But generally, our water database is grossly inadequate. Although information does exist on groundwater decline areas (Sloggett), we have limited information on groundwater quantity and even less on groundwater quality. Our surface water database is more extensive, but uncertainty over competing claims, such as Indian water rights, makes it difficult to estimate water supply functions and quantities available for transfer. The Economic Research Service irrigation modeling effort has been hampered by such information voids.

Another area of concern is how to best effect the transfer of water to its highest valued use. As Howe and Saliba indicate, water markets could play a significant role in such transfers. Yet, policy concerns remain over the effective and equitable operation of water markets because our experience with this approach is somewhat limited. Also, markets may provide misleading intertemporal prices given supply uncertainty, common property characteristics, and externality problems. If the market solution is to work, restrictions on compensation for loss of use will need to be changed. How the compensation issue will be handled is complicated when public water development funds are involved, common pools are being pumped, surface water rights are threatened, or interstate transfers are involved. Yet, if rights are clearly defined by the courts and public agencies involved, then markets should operate effectively.

Further information is needed on the extent and nature of the groundwater contamination problem and, more important, on its economic significance (Saliba). Is public action required? Where? At what level of public jurisdiction? To what extent? Is prevention more efficient than treatment? Although such questions may be extremely difficult to answer, they do point to the importance of joint efforts with other disciplines to measure and value the benefits of avoiding or preventing water quality deterioration. Additionally, economists need to expand and extend their efforts not only to measure and value water quality impacts but to link such impacts to agricultural production practices as well as to other types of economic activity. Anderson, Opaluch, and Sullivan make a significant contribution in this area of research.

Finally, how should we establish water quality goals and maintain water quality? As previously indicated, greater efforts are needed to measure and value the benefits of water quality improvements and to relate such benefits to the associated costs of improvements. Further

research is needed on the efficiency gains of regional, as opposed to national, and source-specific, as opposed to regional, water quality standards, especially when including the administrative costs that might be incurred (Miranowski and Alt). As Saliba indicates, some contaminated water sources may suffer little decrease in social value if the potential uses of that water are insensitive to the contaminants involved. The tradeoffs between water quality and quantity also need more explicit economic assessment in terms of the policy implications that may be forthcoming.

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