Publications

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The Agricultural Benefits of Salinity Control on the Red River of Texas and Oklahoma

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- Full Text

Salinity of the waters from the Red River and its major tributaries has virtually eliminated its use for irrigation of agricultural crops in Texas and Oklahoma. A chloride control project has been proposed whereby the source salt waters will be captured and diverted to storage facilities. The purpose of this study was to estimate the net direct benefits to agricultural producers attributable to the proposed salinity control project. Further, estimates of project costs, municipal and industrial benefits and benefits from improving the water in Lake Kemp were obtained to complete a benefit-cost analysis.

The procedure used to estimate agricultural benefits was to use a FORTRAN program to develop initial tableaus of a recursive linear programming model representing agricultural production in the study area. Alternative scenarios involving profit maximizing behavior on the part of producers, current cropping patterns, and with and without SAR

crop yield effects were developed to provide a range of benefit estimates. The basis for benefit evaluation was to use parameters prescribed by the U.S. Water Resources Council's Principles and Standards and recent proposed changes along with those developed in this study to estimate the increase in net returns to producers in the study area between a with project and a without project condition for a 100 year period of analysis. Benefits were discounted to their present value with discount rates of 7 1/8 percent and 3 1/4 percent for comparative purposes. Benefits estimated herein were used in conjunction with external estimates of project costs and other benefits to evaluate the economic feasibility of the salinity control project.

In all scenarios considered, cotton emerged as the major irrigated X crop. Scenarios involving profit maximizing behavior on the part of producers resulted in benefit estimates of over $65 million and $117 million without and with SAR crop yield effects, respectively, at the 7 1/8 percent discount rate. Under a constrained profit maximization scenario where SAR crop yield effects were included and in which producers were assumed to keep current cropping patterns in 1990, adjust to 50 percent of the optimal land use in 2000, and were fully adjusted to optimal land use by 2010, resulted in agricultural benefit estimates of over $87 million at the 7 1/8 percent discount rate. In a scenario where producers were assumed to maintain current cropping patterns throughout the 100 year period of analysis, benefits were estimated to be $28.8 million and $35.8 million without and with SAR crop yield effects, respectively, at the 7 1/8 percent discount rate.

Benefit-cost analysis performed in this study indicated that the proposed project was economically feasible under assumptions of all scenarios considered except where current cropping patterns were followed for the entire analysis period. B/C ratios of 1.068 and 1.291 resulted for the profit maximization scenarios without and with SAR crop yield effects, respectively. Where benefits from the constrained scenario were included in the benefit-cost analysis, a B/C ratio of 1.162 resulted. Finally, with current cropping patterns maintained through 2090, B/C ratio estimates Of .907 and .938 resulted without and with SAR crop yield effects included, respectively.

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