

**Garner, R. L. 1983. Economics and Cost Sharing of Salinity Control in the Colorado River Basin. Ph.D. dissertation. Colorado State University. Fort Collins, Colorado. 252 pp.**

Salinity (dissolved solids) in water supplies arises both from natural and manmade causes. Salinity is the most serious water quality problem in the Colorado River Basin, affecting over 12 million people and 1 million irrigated acres. The Salinity Control Act of 1974 authorized a largely Federally financed solution to the problem. This dissertation endeavors to assess the economic benefits and costs of potential and proposed salinity control methods, with an emphasis on the effects of different means of sharing control costs.

A linear programming model of irrigated agriculture in the Imperial Valley provides estimates of salinity damages in the 800 to 1100 mg/l salinity range. Estimates of municipal salinity damages are drawn from past research. Direct damage estimates are discounted for an assumed six year hydraulic retention time between reductions in salt load upstream and lower salinity levels at Imperial Dam to obtain estimates of salinity control benefits.

A second linear program analyzed the effects of proposed alternative cost sharing mechanisms, or economic incentives, in encouraging changes in irrigation methods to reduce salt discharges in the Grand Valley of Colorado. Irrigation system subsidies, salt discharge taxes, constant and increasing block water taxes, and water conservation subsidies were tested singly and in combinations.

The net social cost of on-farm salinity control varies among cost sharing mechanisms, with salt discharge taxes the least cost and irrigation system subsidies the most expensive. The distribution of costs between farmers and the government is measured. Combinations of economic incentives offer flexibility in achieving explicit cost shares.

The direct benefits of salinity control in the Grand Valley exceed estimated on-farm salinity control costs, but administrative expenses are not included. Benefits are also compared to SCS and USBR salinity control project cost estimates. Only three of nine SCS and two of ten USBR projects are economically feasible. In general, SCS on-farm projects have higher benefit-cost ratios than capital-intensive USBR projects.

The author recognizes that some minimum water quality degradation is a natural consequence of irrigation, but suggests modifications in cost sharing policy to assess costs in proportion to benefits received. More direct economic incentives are desirable for efficient and equitable salinity control.