ECONOMIC EVALUATION OF WATER FOR NEW IRRIGATION

H. R. Stucky*

The economic evaluation of the water for irrigation is dependent on three important items; first, water cost per acre foot; second, size of farm unit; and third, the productivity of the land to which the water is applied. These items have been considered in the study on the value of water for irrigation conducted by the Agricultural Economics Department of the New Mexico Agricultural Experiment Station in cooperation with the University of New Mexico and several other public agencies under a Resources for the Future grant of funds.

The methods for the agricultural study are quite well established. The Bureau of Reclamation and other public resource development agencies and farm management research workers use the farm budget method. This requires considerable basic data on production methods, crops to be grown, prices of products sold and on the prices of land, equipment, labor, supplies and other items to be purchased. It is usual to set a figure for family living and include this as a cost against water use, since the family must secure a reasonable income for living if the farm is to have any repayment ability. The minimum living costs are among the first expenses from the farm income which are paid.

The collection of the basic data for use in these budgeting processes is time consuming and accurate figures for a specific area being studied commonly are not available. In the case of a new project, such as the Navajo irrigation project, there are no data available on the best crops to grow, the expected yields, prices to be received, type of machinery required and many other items. This is true because none of the land within the immediate area of the project has been successfully irrigated. The result is that data from areas of similar soils, climate and topography are used when these can be found. When these are not available, then reasonable estimations based the data from less similar areas must be used.

The Colorado River Compact has allocated 834,000 acre feet of water to the State of New Mexico from the San Juan River. Some of this water is now used for irrigation. The balance is to be used for new irrigation, municipal and industrial uses, fish and wildlife, and for supplemental uses.

The water allocated for agricultural purposes can be used in any area from the Animas La Plata and the Navajo projects, in northwestern New Mexico to the areas around Taos and in the upper tributaries, in the Middle Rio Grande around Albuquerque, or in the Lower Rio Grande in Dona Ana and Sierra counties. It

*Head of Department of Agricultural Economics, New Mexico College of Agriculture and Mechanic Arts, State College, New Mexico.

can also be used on various size of farms and soils with widely different productive capacity. There also is a wide difference in elevation, growing season and the type of crops grown.

Budgets were prepared by the Agricultural Economics Department at New Mexico A & M to determine the value of water when used for irrigation in each of the above areas. Several farm sizes were considered, but the 120 acre size was used as a base, and repayment to water on soils with average or above productivity. Soil ratings were set up in each of the areas with the assistance of federal and college soils, agronomy and economics representatives.

Effect of Farm Size on Repayment

Farm size is an important factor in determining the value of water. It takes about the same amount of money for a farm family to live on a 20 or 40 acre farm as it does for them to live on a 120, 160 or 200 acre farm. The family must provide itself with food, clothing, housing, recreation, education and medical care. Also it takes almost as much machinery to farm 40 acres as it does a 120 acre farm.

Chart 1 compares the budgeted net repayment capacity per acre of Class A high productivity farms varying in size from 40 acres to 200 acres in the Elephant Butte Irrigation District on the Lower Rio Grande and on the proposed Navajo project.

The 40 acre farm in the Elephant Butte District has a negative repayment ability of -$13.48 per acre of -$539.20 per farm. For the Navajo project there was a negative repayment ability of -$42.38 or -$1695.20 per farm. This is based on 40 acre farms of the highest yielding land in these areas. In both areas, the farms of 80, 120, 160 and 200 acres in size have a positive net repayment capacity per acre. The Elephant Butte District has a higher net because of cotton which is a high yield and high net income crop. The 120 acre size farm was used as a base because this amount of land will produce a reasonable amount of income which will repay the water costs, pay for family necessities and permit a certain amount of capital accumulation. The 40 or 80 acre farm size would not provide the above requirements. The 120 acre unit on good quality land provides opportunity for near the maximum number of farm families to gain a satisfactory living within a given area.

Effect of Land Quality on Repayment

Land class, or quality of soil, is important in determining the value of water when used for irrigation.

Chart 2. Net Repayment Capacity Per Acre on 120 Acre Farm Size By Land Class in Elephant Butte Project, 1954, Prices and Costs.

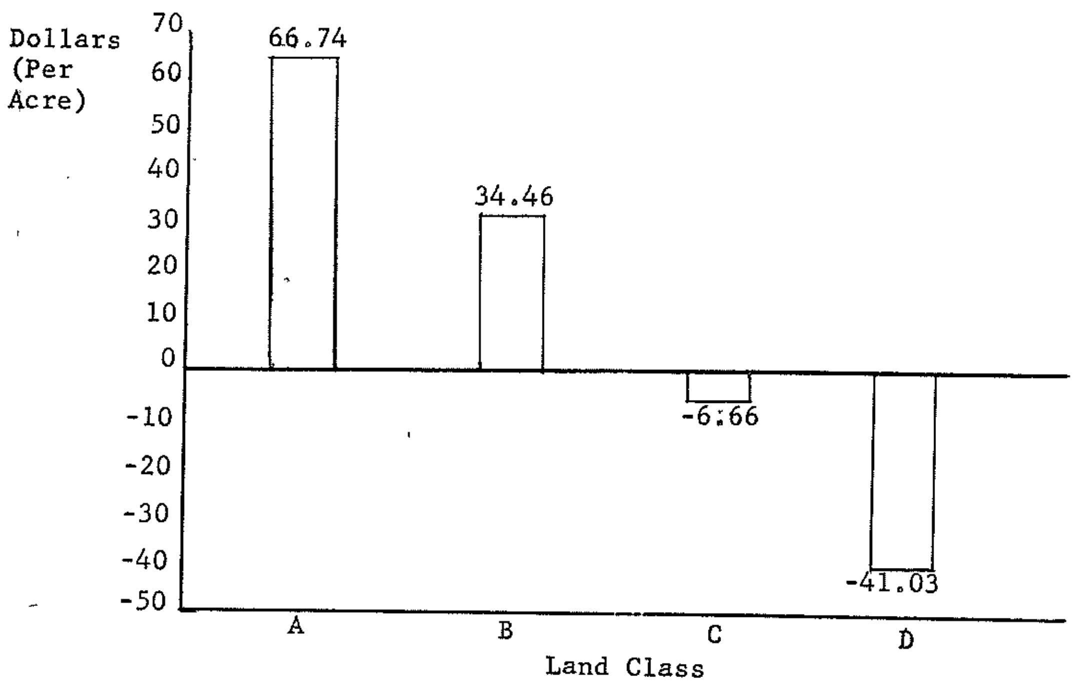

Chart 3. Net Repayment Capacity Per Acre on 120 Acre Farm Size By Land Class in Navajo Project, 1954, Prices and Costs.

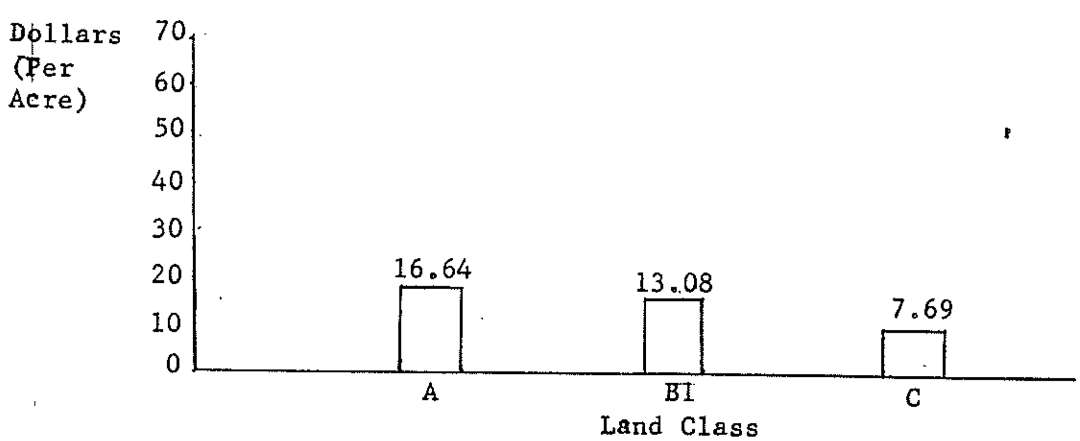

Chart 2 compares the net repayment capacity per acre on farms 120 acres in size by classes of land in the Elephant Butte area of the Lower Rio Grande. The general productivity of the classes of land is indicated by the following average yields.

		Yield Per Acre By Land Class			
		A	B	C	D
Cotton	Bales	2	1.5	1.0	.75
Alfalfa	Tons	5.0	4.0	4.5	3.0

The Class A farm of 120 acres produces a positive net repayment per farm of about $8,000 (66.74 x 120) while the Class D farm produces a negative net repayment of -$4923 (-$41.03 x 120). This means that a 120 acre farm on good soil provides the family the minimum essentials plus the money to pay for the farm and something in addition. The family on the poor soil can not pay the water charges, the farm, or even receive the minimum essentials for family living.

Chart 3 gives a similar comparison for farms on the Navajo irrigation projects in northwestern New Mexico. The general productivity of the land classes is indicated by the following average yields.

		Yield Per Acre by Class of Land		
		A	B	C
Alfalfa	Tons	4.0	3.5	3.5
Barley	Bu.	40.0	40.0	30.0

The difference between the grades of land is not so great in the Navajo area as in Elephant Butte. However, the Class A farm will produce a net repayment of about $2000 above minimum requirements while the Class C farm will produce about $925.00. From these amounts according to the budgeting process used, the farmer would pay water charges before having anything additional for himself, above the minimum requirements. The water charges would consume about 1/2 of the net of the Class C farm.

The Charts, 1, 2 and 3 point out graphically the importance of developing adequate size farm units and only the best lands for irrigation. Farmers on good land with a reasonable size farm have an opportunity to make a good living and pay project costs. Farmers on poor lands or on units which are too small, not only can not pay project costs but after a few years of extreme hardship, will likely lose the farm and leave it for some other farmer to take it over and go through the same process.

Reasonable sized units, and highly productive soils are "musts" if farmers on irrigation project developments are to succeed.