# Costs of Irrigation Water

## distance of transport, height of lift and timing of pumping operations influence costs of irrigation water to farmers

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**The price** farmers pay for irrigation water depends to a large extent on the cost of constructing and operating the engineering works needed to deliver the water to their farms.

The cost of irrigation water varies from a few cents to more than $50 for each acre-foot of water used. The higher costs are where the water must be transported long distances or must be lifted against high heads.

The waters within the state—surface waters and ground waters—are presumed to be the property of the people of the state. However, farmers have spent considerable sums for legal actions relevant to establishing or protecting their rights to the use of water, and these sums are part of the development costs of an irrigation project.

Most of the early irrigation projects were situated in areas where surface waters could be easily diverted, or where shallow ground waters were available for pumping. The present cost of water delivered by these old established projects is, in many cases, the lowest to be found in the state. Some projects deliver water to farmers for less than $1.00 an acre-foot. The cost of water on other projects may range from $2.00 to more than $3.00 an acre-foot.

Water costs on more recently developed projects and for projects that are being proposed reflect the higher costs of constructing irrigation works needed to carry water great distances. Water from areas of excess supply is often carried several hundred miles to water deficient areas.

Under the Central Valley Project, costs of Class 1 water delivered at canalside vary from $2.75 to $3.50 an acre-foot. In addition, the farmers pay for the cost of the distribution works needed to deliver water to their farms.

Water costs under the Feather River Project will depend on the distance the water must be carried and the lift required.

Where surface waters are not available for irrigation, ground waters may be obtained by pumping from wells. There are some 75,000 such wells used in California, varying from less than 50′ deep and costing less than $1,000 to wells several thousand feet deep and costing $25,000 or more.

### Pumping Costs

Costs for pumping water from wells include annual fixed charges for interest, taxes, depreciation and maintenance on wells and pumping equipment, and charges for energy needed to operate the power unit.

The energy required to pump an acre-foot of water depends on the efficiency of the pumping equipment and on the height of the lift—whether a few feet or several hundred feet. The cost of power is related not only to the amount of energy used but to the number of hours that the pump is operated each year. Because of the power rate structure in common use by utility companies in California, power costs will be less for a small pump operating long hours than for a large pump operating a few hours, even though both pumps use the same amount of energy and deliver the same amount of water with the same lift. Overnight storage reservoirs are used on many farms, to permit continuous operation of pumps tailored to the water requirments of the area to be irrigated. The reservoirs permit irrigating during daylight hours while taking advantage of reduced power costs. Joint use of a single pump by several farmers is another practice used to reduce pumping costs.

There are wide limits between the costs of pumping water in California. An average cost for power might be 2¢ an acre-foot per foot of lift plus a similar amount for fixed charges, making a total of 4¢. To lift water 100′—in this case—would cost $4.00 for each acre-foot pumped.

In many ground-water basins the amount of water being pumped is greater than the normal recharge to those basins. This has resulted in a lowering of the water table and increased pumping lifts with increased costs. Many farmers have found it necessary to lower the pumps in their wells as the water table recedes. During the past several decades, improvements in pump operating efficiencies and reductions in power rates partly compensated for the increased lifting costs, but the trend has been reversed during the last several years. There has been some increase in power costs and a considerable increase in the cost of pumping equipment.

With some high income crops, water costs may be only a minor part of the total production costs. In such cases a considerable increase in water costs may not greatly affect the farmer's operations. On the other hand, with many low income crops, the cost of water is an important item, and any increase in the price a farmer pays for irrigation water may make his operations nonprofitable or place him at a disadvantage in competing with areas where water costs are less.

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## COTTON

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the number of irrigations as compared to Treatment *B*, yet the reduction in yield was only 6% whereas a 29% reduction occurred in vegetative growth. This is an excellent example of where a soil condition limits root development and the relationship between irrigation frequency on yield and vegetative growth when compared with results obtained on the Buttonwillow plots where root development was better.

In all three locations and extremes in irrigation treatments the quality of the fiber was not materially affected. Lint from Shafter and Tulare basin showed no differences in either grade or staple length even for the extremely dry treatments where the yields were severely reduced. After the lint was spun into yarn there were no outstanding differences. However, the less frequently irrigated treatments did show a tendency to have slightly stronger yarn with a better appearance index which is probably a reflection of less trash in the seed cotton and fewer nappy thin walled fibers.

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