

Recharging and recycling ground water—the Fresno experience

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The City of Fresno, like most of the cities of the San Joaquin Valley, gets its municipal and industrial water from wells that tap the underground reservoir. Pumping over many years has lowered the water level by several feet and has created a cone of depression in ground-water level beneath the city.

Some of the well water is returned to the ground water from excess irrigation of gardens and parks, but a large share of the water goes to the liquid-waste treatment plant southwest of the city. Furthermore, a large share of the runoff from rainfall finds its way into the storm sewer system and is carried outside the city.

Removing these waters from the city and spreading them in the infiltration ponds at the waste treatment plant is raising the water table in that area. This is not now a problem but, if it continues unabated, it could cause a problem in the future. The area, then, is faced with two problems: a falling water level beneath the city and a rising water table to the southwest.

To resolve the problem of the falling water level, the City of Fresno and the Fresno Irrigation District have entered into agreements whereby the

irrigation district delivers water to a city ground-water recharge basin, known as "Leaky Acres," northeast of Fresno. Developed by the city with the technical assistance of the Water Management Research Field Station of the U.S. Department of Agriculture in Fresno, the recharge basin is highly effective.

The water used for recharging the underground supply is made available through a city contract with the U.S. Bureau of Reclamation. It is released from the Friant-Kern Canal into the Fresno Irrigation District distribution system for conveyance to the city's recharge basin.

Leaky Acres is now supplying more than 20 percent of the city water supply. When the expanded facility is completed, the recharge ponds will be capable of supplying about 30 percent of the current needs.

In the first three years after the recharge procedure was begun, the water table has been favorably affected for a distance of about six miles to the southwest and over two miles north and south of the recharge basin. Not only has the quantity of water available for pumping increased, but the quality also has improved. There has been a decrease of at least 25 percent in total salt. The nitrate levels near the basin have been reduced from 29 parts per million (ppm) to 1.02 ppm after three years. This means that further degradation of the ground water has ceased. The cost for this recharge, including direct water charges and the lost taxes on the land, amounts to about \$16 per acre-foot.

Any water that the city buys from the Bureau of Reclamation which cannot be applied to the recharge basin is used

for irrigation by the District in an area northeast of the city. Some of this water then finds its way to the ground-water reservoir through percolation and reduced pumping.

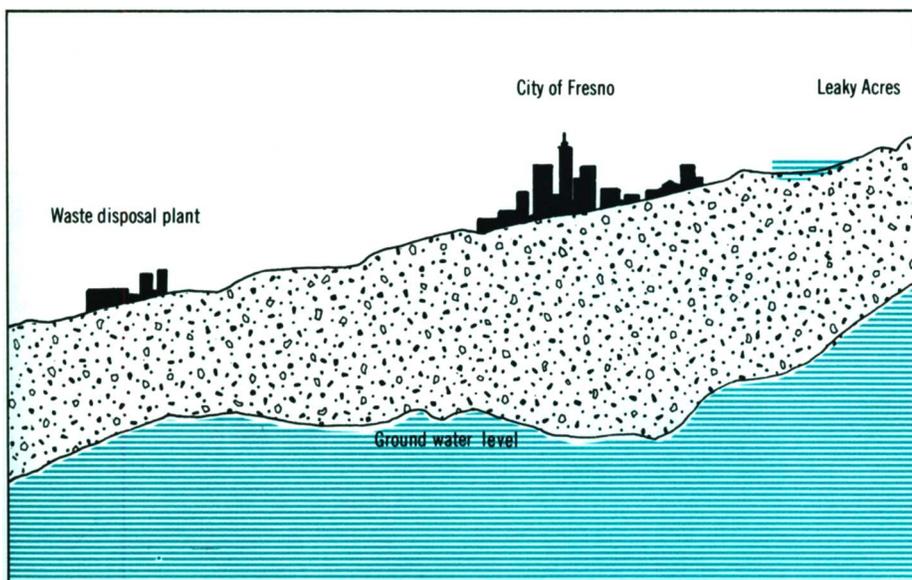
Meanwhile, to head off a problem that may develop from the rising water table below the waste disposal plant, the City of Fresno has drilled a number of deep wells in that area and built a pipeline system to deliver this water to the Irrigation District canals west of the city. This augments the irrigation water supply and, it is hoped, will keep the water table from becoming a problem.

The District, in return, makes available to the city an additional quantity of water from the Kings River equivalent to 46 percent of the recycled water it receives. This water may be used for recharge or for irrigation east of the city.

The quality of the water delivered by the city is monitored periodically to ensure that the water will not be harmful to plant or animal life and that it will meet all of the standards of the Regional Water Quality Control Board.

When this water exchange comes into full operation this year, it will help solve a water supply problem for both the City of Fresno and the Fresno Irrigation District, while at the same time efficiently recycling valuable water in a water-deficient area.

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Schematic diagram of the land and water table from the city's ground-water recharge basin (Leaky Acres) to the waste disposal plant.