

Making Up Arizona's Most Important Deficit -- Water

Martin M. Fogel

Some Day The Well Will Run Dry!

This is the prospect many Arizonans are faced with, if the present trend continues. We are constantly withdrawing more water than we put into our "bank," causing our reserves, the ground water supply, to dwindle each year with increasing alarm.

With all our technical knowledge, we are able to capture only four to five percent of the water that annually falls on Arizona in the form of rain or snow. Since our present day use amounts to eight percent of the annual precipitation, we have been forced to draw on our ground water reserves to make up the deficit.

In an average year, 80 million acre-feet of precipitation falls on Arizona. About 90 percent of this amount is lost through evaporation and transpiration by non-beneficial plants. Some five percent is used by timber and forage crops. The remaining amount, approximately 3.5 million acre-feet, is the quantity of water that is stored in our surface and underground reservoirs. Inasmuch as our present day needs amount to about 6.5 million acre-feet of water per year, our deficit runs to three million acre-feet of water each year.

Leaves Two Alternatives

To make up this deficit, Arizona can (1) Try to increase the total amount of water available; and (2) Try to make more efficient use of the water available.

Increasing the total amount of water available to meet Arizona's increasing needs can be brought about by importing additional water or by such processes as rain-increasing through weather modification and demineralization of saline water.

The Central Arizona Project, when finally realized, will provide the state with an additional 1.2 million acre-feet of water per year. While this will be a great boost to the economy of Arizona, it will make up only 40 percent of our present deficit. Rain-increasing is not a proven process at

this time, and saline water conversion is not envisioned as being the solution for meeting Arizona's agricultural requirements. Thus, the burden of making up our water deficit in the immediate future rests principally with making more efficient use of our available water supply.

As previously mentioned, Arizona's annual overdraft on its ground water reserves amounts to approximately three million acre-feet of water. Since natural recharge is not sufficient to maintain our water levels, artificial recharge techniques and procedures are required to help make up our deficit.

Investigation is under way at the Institute of Water Utilization to determine sites, methods and effects of artificial ground water recharge of alluvial basins typical of Arizona.

Studies Made at Safford

Research now is in its third year on a 4.54 acre plot at the Safford Experiment Station to evaluate the effectiveness of grass filtration as a low cost preliminary procedure for sediment removal from flood water prior to recharge. Presently, much of the flood water that may become available for natural recharge is lost through evaporation and transpiration by non-beneficial plants. Natural recharge is a relatively slow process. The areas where flood waters collect usually are not conducive to water intake because of such factors as silting, algae, bacteria and air-plugging. Artificial recharge can speed up the process by desilting and direct injection to underground water storage areas.

Another possible use of grass filtration is being studied. Sewage effluent offers a tremendous source of reusable water, as about half the water used in Arizona communities goes out as sewage. Plans are underway for cooperative investigations in both the

Tucson and Phoenix areas to determine the up-grading qualities of the grass filtration treatment of sewage effluent, and the subsequent recharge of the resulting water into ground water reservoirs.

Construction and instrumentation has been completed on 12 field lysimeters which will be used to evaluate the effect on recharge rates of organic matter additions to the soil surface. An Arizona Agricultural Experiment Station research team has been awarded a three-year grant from the U. S. Public Health Service to work on this project.

A project to conserve a saline industrial effluent by means of blending and artificial recharge techniques has received the sponsorship of the Tucson Chapter of the American Society of Sanitary Engineers. Members of this group have recently procured \$10,000 worth of pipe and diversion facilities and have committed themselves to installing these works. Construction of the recharge facilities is presently underway at the Institute of Water Utilization Research Center.

Half of It Lost

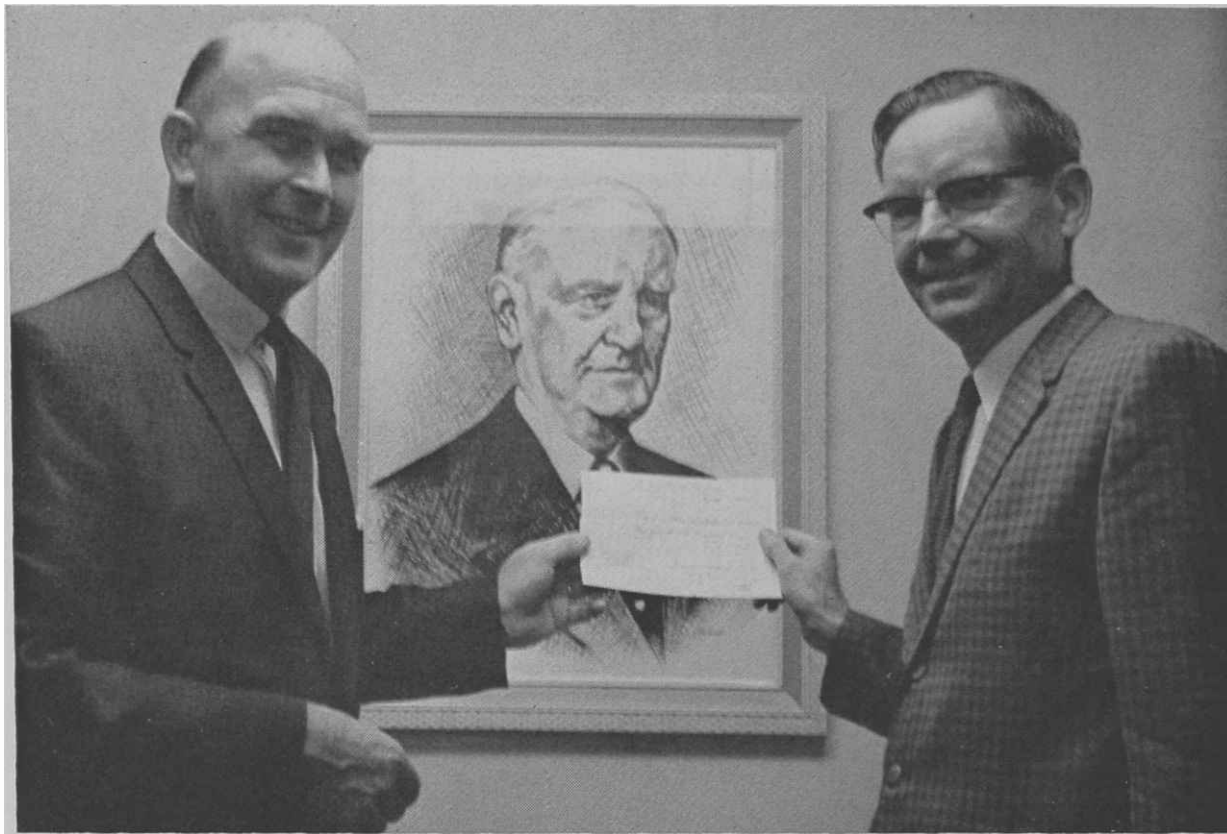
More than 80 per cent of the water used in Arizona is for irrigation. Before surface waters reach the farmer's headgate, nearly half of the supply is lost in storage and conveyance due to evaporation and seepage. Each year about 800,000 acre-feet of water is evaporated from Lake Mead alone. Not all the water that seeps from our reservoirs and canals is lost. Some is recovered in our ground water supplies. Normally accompanying seepage, however, are the two related problems of drainage and salinity.

The Institute of Water Utilization, with the aid of a grant from the Proctor and Gamble Company, is conducting a research program aimed at conserving our surface water supplies through controlling both evaporation and seepage. Using evaporation suppressant materials supplied by Proctor and Gamble on 53 x 78 foot test ponds, water savings of about 20 percent have been obtained. Similarly, seepage-control chemicals have cut seepage losses 70 percent on test plots.

In an effort to obtain higher savings through control of evaporation, a wind-activated dispenser has been developed in conjunction with a grant from the Bureau of Reclamation.

Prof. Fogel is acting head of the Institute of Water Utilization in this College of Agriculture.

Scholarships Given By Sears



J. R. Metcalf, left, manager of the Sears, Roebuck & Co. store in Tucson, presents checks for \$2,700 worth of scholarships to Dean Harold E. Myers of the U of A College of Agriculture.

One \$300 scholarship is for a student in home economics, the other \$2,400 for eight \$300 scholarships in agriculture, available to able and needy students.

Portrait in the center is of Gen. Robert E. Wood, past board chairman of Sears.

84 Young Bulls Enter Annual Gain-Test Trial

The fourth year of University of Arizona gain-testing of young beef bulls has enrolled 84 animals submitted by 25 breeders.

Included are 55 Hereford, 20 Angus and 9 Brangus.

The 130 day test period began Oct.

19, ends Feb. 25. Bulls which pass the test, and which the owners do not choose to retain in their own herds, will be offered for sale March 4.

The idea of testing young bulls in such a gain-test period is "one of the newer tools in modern beef production," says Dr. Bruce Taylor, head of the U of A Animal Science Department.

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Water savings of about 40 percent have resulted with the aid of this device.

Catching Runoff Water

On an 18 square mile area where the Institute of Water Utilization is conducting hydrologic studies, the average runoff has been barely three percent of the precipitation. The rest of the water is essentially lost by non-beneficial evapo-transpiration. To increase water yields, small areas are being paved with various materials such as asphalt and plastics. The cost of water produced by these relatively

efficient water catchment or "harvesting" systems will depend on the initial cost of installing these materials and on their durability. Preliminary figures indicate that with the materials being tested, water can be produced at the cost of about \$1 per 1,000 gallons. This becomes quite favorable in those areas of Arizona where water is being hauled at a cost of \$5 per 1,000 gallons.

Summarizing, the entire effort of the Institute of Water Utilization is directed towards making more efficient use of Arizona's water supply "before the well runs dry."



Cochise County

KAWT, Douglas—6:15 a.m. Mon. through Fri.

KHIL, Willcox — Mon. thru Fri., 2 p.m.

Coconino County

KCLS, Flagstaff—Tues. and Thurs., 8:20 a.m.

KGLS, Flagstaff (Home Agent) — Thurs., 9:45 a.m.

KPGE, Page — Fri., 2:30 p.m.

Gila County

KIKO, Globe-Miami
Monday, 12:45 p.m.

Graham County

KATO, Safford — Sat., 9:30 a.m.
Mon. thru Fri., 12:45 p.m. (daily)

Maricopa County

KTAR, Phoenix — Mon. thru Fri., 5:55 a.m.

KOY, Phoenix — Tues. thru Sat., 5:40 a.m.

KOY, Phoenix — Sunday Garden Club of The Air, 8:35 a.m.

KPHO, Phoenix — Mon., Cotton Report, 12:40 p.m.

KPHO, Phoenix — Thurs., Dairy and Livestock Report, 12:40 p.m.

KUPD, Phoenix — Mon. thru Fri., 5:30 a.m. and 12:30 p.m.

KCAC, Phoenix — Mon. thru Sat., 6:30 a.m.

Mohave County

KAAA, Kingman—Mon., 10:45 a.m.

Navajo County

KDJI, Holbrook — Tues., 1:00 to 1:15 p.m.

Pinal County

KPIN, Casa Grande — Mon. thru Sat., 6:55 a.m.; Mon. and Fri., 9:30 a.m.; Tues., Thurs. and Sat., 12:20 p.m.

Santa Cruz County

KNOG, Nogales — Mon., 6:30 a.m.

Yavapai County

KYCO, Prescott — Mon., Wed. and Fri., 5:55 p.m.

KNOT, Prescott — Mon., Wed. and Fri., 5:35 a.m.

Yuma County

KVOY, Yuma — Mon. thru Fri., 5:45 a.m.

KYUM, Yuma — Mon. thru Fri., 6:25 a.m.

10:05 a.m., Sat.