

SYMPOSIUM: "The Quality of the Environment in the Tucson Basin and South-eastern Arizona." The Department of Geography and Area Development*

WATER IN THE ENVIRONMENT**

by

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Past History

If you were in a wagon train heading for California just about the time Old Main was being built on The University of Arizona campus, as you moved across Arizona and had to ford the San Simon Creek, the San Pedro River, and the Santa Cruz River, you would have found each of these rivers flowing in a sluggish course northward through a marshy, largely unchanneled valley. These grass-choked valleys were dotted with cienegas and pools. Cooke, a settler on the San Pedro, reported in 1882 that "fish are abundant in this pretty stream. Salmon trout are caught by the men in great numbers. I have seen them eighteen inches long."

While the picture that comes to mind is one of camping next to pleasant, cool, shady rivers as you move across the State, it should be remembered that malaria was a major plague among the early settlers in the area. And Col. Green, Commandant of Camp Apache, Arizona Territory, described the country as follows:

"If you wish any further correspondence from me as to my views of Arizona, I can only tell you I have been over a great portion of it.... and found it a rocky mountainous desert, not fit even for the beasts of the field to live in." (Arizona Citizen, April 22, 1871.)

Present History

If you were making the same trip today down Interstate Highway 10 in your new air-conditioned Cougar, you would find less oak and more shrub and mesquite in the upper woodland; less grass and more woody species in the desert grassland; and little change in the open desert -- it is true the saguaro is less abundant at Saguaro National Monument today than formerly, but the reverse is true at MacDougal Pass - except when you cross the major drainages, such as the San Simon Creek, the San Pedro River, and the Santa Cruz River. The beds much of the time are dry, sandy wastes that support little, if any, vegetation. Five to thirty feet above the channel and set

* Environment Awareness Week, The University of Arizona, Tucson, Arizona, April, 1970.

** Information taken freely from The Changing Mile, J. R. Hastings and R. M. Turner, University of Arizona Press, Tucson, Arizona, 1965.

apart from it by abrupt vertical banks, one typically finds an area dominated by mesquite. During the summer rainy season, flash floods render the streams impassable. At such times the channel is filled bank to bank with a raging, muddy torrent that carves new incisions into the flood plain and sharpens the edges of the old.

If you still wish to see a cienega, you could travel to the Knipe Cienega in the Canelo Hills past the town of Sonoita. The area has been purchased and is being maintained in its natural state by the Nature Conservancy -- even here, though, a mortal battle is under way with O'Donnell Creek which wants to follow the present pattern of the larger drainage.

Then, of course, besides the changes in the river channels, the big changes you would see as you drive across the state are the irrigated areas and the urbanized areas that have been developed in the interim. One is usually amazed to see, in the middle of the desert, vast highly developed irrigated fields of colorful cotton, citrus, pecan trees, etc., and, of course, grassed and flowered areas in the streets and around the homes in the cities - and we must not forget the swimming pools.

Webb (1957) in his The Great Plains, states that:

"Americans have created an oasis civilization. Holing up in his city, the westerner lives a life of humid abundance. His wells tap the water resources of a vast surrounding area and irrigate clover lawns. His air conditioners, powered by energy from Texas gas . . . enable him to evade the discomfort of high temperatures. He lives at the expense of an arid region and surrounded by it, but not with it. His technology enables him to escape its rigors without making concessions.

Should an oasis need more water, engineers extend an aqueduct to a river two hundred miles away. Or they throw up surface reservoirs to collect runoff that has fallen at another place. Or they put down deeper wells to tap an underground supply deposited at another time, possibly during another geologic era. These are not, of course, solutions. They are mere borrowings from Peter to put off for a little the inevitable reckoning with Paul."

If you stopped for lunch in Tucson, let's say Bobo Joe's, the water you drank is about 5,000 years old and has been pumped up about 250 feet from a ground water reserve that is dropping at the rate of about five feet per year. As the water table drops, the quality of the water generally becomes poorer with an increase of troublesome salts, such as the fluorides.

Actually, if you stop at a restaurant supplied with water by the City of Tucson you are fortunate, because elsewhere you could easily be served water laced with excessive nitrogen and/or other tasteful organic and inorganic salts from a well receiving subsurface flow from irrigated fields or even from the waste effluent of a city or county sewage treatment facility.

Future History

If you make the same trip about the year 2020 by means of an overhead rail, you will probably see still less oak, still less grass, deeper incised stream channels, and, of course, bigger cities. The population of Tucson is projected at about two million for this date.

Irrigation, as we know it, will probably be out; and high-value crops, such as vegetables and fruit, will be grown under controlled environmental conditions with a minimum use of water, as being demonstrated at present by The University of Arizona, Environmental Research Laboratory, under the Institute of Atmospheric Physics headed by Dr. A. R. Kassander.

The mines will probably be using the effluent from the City of Tucson and Pima County sewage treatment facilities in their processing procedures. The remaining effluent, following additional treatment such as by filtration through sand and gravel beds, will be available for public water-related recreation facilities.

For domestic and industrial use, ground water treated to remove troublesome salts will be available. But the supply will have to be augmented by conserving surface water already available locally and by importation of water. Recycling treated industrial effluents will be standard procedure.

Excellent quality local surface water will be generated from rainfall by harvesting methods being developed by C. B. Cluff of The University of Arizona's Water Resources Research Center; and conserved through evaporation suppression from open reservoirs by means of floating rafts, again as developed by C. B. Cluff, and/or artificially recharging into the ground water reserves by means of wells or recharge pits, as developed by Dr. L. G. Wilson of the Water Resources Research Center.

Water for importation will be made available from the following sources: Excess water in other river basins; and additional water generated in the Colorado River Basin by cloud seeding, desalting, and watershed management for increasing snow pack in the Rocky Mountains. However, politically speaking, another mortal battle will have to be fought. Economically speaking, we will pay for the privilege of living in the arid Southwest as the imported water has to be fully treated besides being piped in. But environmentally speaking, what do we do with the over 1,000 tons of salt brought into Tucson daily as part of the imported water package? I can see myself floating down the Santa Cruz River into the sunset, reading the Wildcat, with a self-destructing can of Coors, without the benefit of a rubber inner tube.