SAVING City WATER

by Don Dale

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Think of Tucson and Phoenix as leaky canteens. The inhabitants live in one of the most inhospitable environments in the nation, and their water containers are leaking in thousands of places.

All the places we put our water—our houses, lawns, reservoirs, gardens and other vegetation—are like sieves, and as we hike into the future we begin to wonder whether we have enough water to make it. We're not alone.

"It's a national issue," Dr. Martin Karpiscak says of urban water supply. "Quality water in needed amounts is an issue around the world."

Karpiscak, a research scientist in the Office of Arid Lands Studies (OALS), is part of a multi-faceted UA effort to apply its research and educational resources to the problems that comprise this complex issue. He doesn't have to go far to find leaks to plug. Our houses are one of the prime seepage points. The average Tucson single-family residence housing three people uses 113 gallons of water per person per day—totaling 2,373 gallons per week, 10,170 per month, 123, 735 per year.

Yet, how easily water can be conserved, Karpiscak found. Simply by changing over to a low-consumption toilet, a household can cut water use to 75 gallons per person per day. This has been proven in Casa del Agua, the retrofitted experimental house funded partly by Pima County and partly by the city of Tucson. The demonstration house, open at times to the public but occupied by a caretaker family, is monitored carefully by OALS to see just where modifications to a typical Arizona house can bring conservation benefits.

"The goal is to minimize the amount of water used per household and minimize the impact on our lifestyles," Karpiscak says. Water-saving devices, drought-tolerant landscape plants and a water harvesting system are the primary features. More than 15,000 gallons of water can be collected from the roof every year, and grey water from sinks, shower and laundry are reused.

"Most of the time grey water goes back to the sewage plant," Karpiscak says. "What we've done is keep it on site."

Simple, economical conservation techniques are employed so they can be evaluated for use by the public. Water

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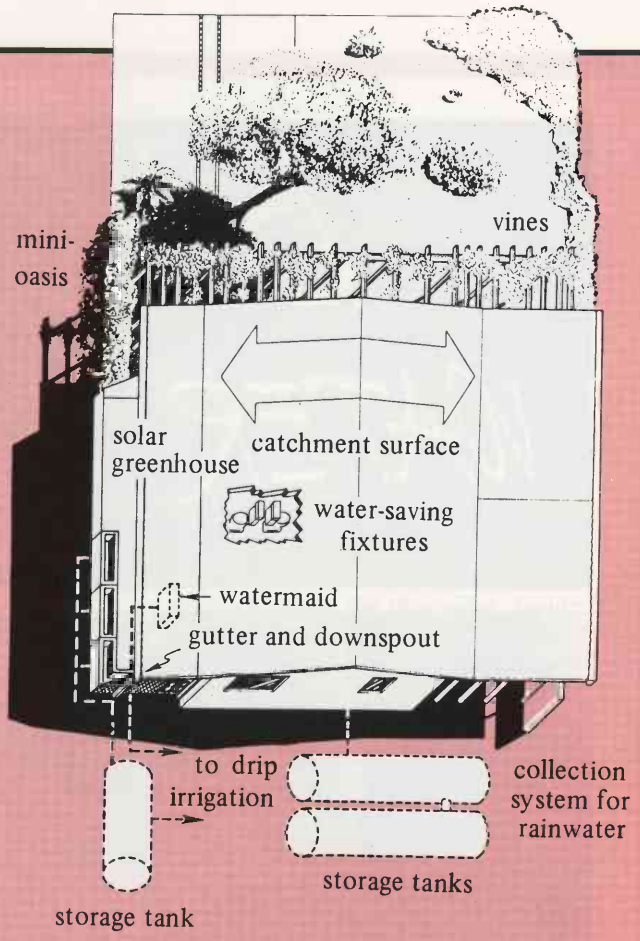

An architect's rendering shows how a retrofitted Casa del Agua makes the most out of very little water.

hyacinths, for example, are used to reduce bacterial content of the grey water by 99 percent, and this is a technique that may be expanded in scale to the county's sewage plants. In fact construction is underway on a pilot hyacinth wastewater treatment plant designed to investigate the potential of using hyacinths to treat large quantities of wastewater. Designed by OALS and a California engineering firm in cooperation with the Pima County Wastewater Management Department, the prototype facility is expected to treat up to 100,000 gallons per day of screened and settled sewage by running it through beds of water hyacinths. Such techniques may come into play most tellingly in newly constructed houses, and the university is now designing a house which will be constructed in Phoenix as funding becomes available.

"It will be a median house," says Richard "Rocky" Brittain, a research associate in the College of Architecture, who is the designer. Water saving methods demonstrated will be practical and affordable enough for the average buyer of a new home to utilize them in their plans. "We want to get the most mileage out of the concept."

An innovative way of thinking about a house's water use has already arisen from the Casa del Agua project. Hydrologist Dr. James DeCook developed the "W" Index which, like the "R" index for insulating values, lays out an easily calculated method for determining a house's water use potential. By allowing the homeowner or prospective homeowner to tally a home's water deficits and credits, the "W" Index could become a standard means of aiding conservation—and lowering utility costs. It would also tell a homeowner which improvements could save the most money.

"All told, you can save a major portion of your water input by installing some of those devices," DeCook says.

Landscape changes can have a dramatic impact on water and energy use. In their research, landscape architecture professor Greg McPherson and Extension urban horticulture specialist Dr. Charles Sacamano have found that careful landscape design can not only cool desert homes but "cool" water consumption.

Typically, one-half the water consumed by an average Arizona household is used for landscape irrigation. With established native or low water use landscape trees and shrubs, the researchers say, that figure would be virtually eliminated.

Although initial costs of some improvements—such as storage tanks for holding grey water and runoff—could be high, local government has to look at long-term savings. Much less waste treatment would mean less cost in building facilities, for example. Agricultural economist Dr. Paul Wilson has studied Arizona cities' handling of effluent and found that tragic wastage of water already exists.

"Right now Tucson is dumping

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