September 10, 2008

Rainwater Harvesting Fact Sheet

Tucson's annual rainfall is usually 12" or less [1].

Equation for calculating harvestable rain in gallons [2] is:
area of collection surface (in sq. ft.) x rainfall (in ft.) x 7.48 gal. (per cu. ft.).
Plan cistern size to match collection surface area and allow for bad years.

Examples: A roof of 5,000 square ft. can collect 37,400 gallons at 12" rain/yr.
A square mile of solar panels would collect 208,529,432 gallons.

Multiple buildings, car ports, solar panels, etc. can be collection surfaces; since Tucson rainfall is 50:50 in summer:winter, cistern size can be less than a year's capacity.

Quality of treated rainwater is outstanding. There is no need to buy bottled water.

In the last 3 years our cistern (modeled on [3]) detained sufficient rainwater for all household uses. It contains a 7 mos. supply now.

This involves no burden to the water grid system, groundwater, or taxpayers. New housing, resorts, etc. could do this now, without adding infrastructure to the grid.

The Future: 2 birds with 1 stone – conduct joint studies with electric utilities to harvest rain from solar panel arrays; consider arrays on stilts over settling basins in Avra Valley, along CAP, over reservoirs and parking lots – for least impact on natural lands. How best could rain from Santa Catalina Mts. be directed to the aquifer and/or large cisterns? Update water laws where necessary.

Multiple systems = less risk from terrorists, freedom from international demands. Don't develop reliance on foreign water while eliminating addiction to foreign oil.

Limits: Perpetual growth beyond our reasonable carrying capacity is not a viable option.

Note: 61% of rain returns to the atmosphere by evapotranspiration [4] (global average); warm and arid Tucson's % must be much higher; i.e., much less than 39% of our rainfall enters the aquifer if not detained in a closed system.

[1] Tucson Water's web-site: www.ci.tucson.az.us/water.
[2] Lancaster, B. 2006. Rainwater Harvesting for Drylands. Vol. 1. Rainsource Press, Tucson.
[3] Pfeiffer, P. L. 2001. Rainwater-Collection Systems. Fine Homebuilding, November 2001: 84—89.
[4] Rogers, P. 2008. Facing the Freshwater Crisis. Scientific American, August 2008: 46—53.

Charles J. Cole and Carol R. Townsend, Tucson: (520)-743-3402