Rainwater Harvesting for Potable Water Use

Pete Melby, Department of Landscape Architecture

SCH Proposal 7

2006

Rainwater harvesting refers to the capture of precipitation to meet human water needs. In the developing world, rainwater harvesting for potable use is important both from the standpoint of water supply (many parts of the world are facing water shortages) and health (in many parts of the world, providing safe sources of potable water has become a critical need). In the United States, rainwater harvesting has been used primarily in areas facing declining water tables. It also reduces energy use in most applications and removes problems related to relying on a centralized distribution system. Techniques for producing and assuring high quality water for drinking and personal use are well established and reliable.

Rainwater Harvesting as a Sustainable Practice

Rainwater harvesting reduces pressure on groundwater supplies and results in a surprisingly large decrease in volume and rate of storm water runoff from the property. Incorporation of rainwater harvesting into a "sustainable house" is consistent with the purpose of the project.

Requirements of a Rainwater Harvesting System

If a rainwater harvesting system is to be used, certain other design features are required. First, asphalt shingles should not be used in a potable system. Metal, ceramic, or slate roof materials are best. The roof should be sloped (a flat roof does not make a good surface for rainwater harvesting). Exterior features include a cistern (either above- or below-ground), piping to route the water to the cistern, and simple systems for discarding first flush water from the roof and pre-filtering water conveyed to the cistern (various designs for each are available). Features that may be located within or outside of the building shell include a shallow well pump and a line pressure tank capable of maintaining household water pressure at 40-60 psi. Interior features include a dual coarse/fine filter system followed by chemical (chlorine or ozone) or light treatment (UV) for disinfection. Additionally, valves between each operating point are useful, as is a commitment to incorporate basic water conserving techniques into daily use practices.

Design Considerations

Although more detailed approximations are available, a convenient rule of thumb is that 600 gallons of water will fall on a catchment surface for each inch of incident rain. Capture rate is approximately 80%. Locations in the southeast U.S. typically experience greater than 50 inches per year. A 2,000 square ft (horizontal basis) roof will therefore receive rain in excess of the indoor water needs for a family of four that observes moderate water conserving practices.

Cost

Design of a 5000 gallon rainwater harvesting system, including all interior and exterior components will require approximately $6,500.

Advanced Housing Research Center
Forest Products Laboratory Madison, Wisconsin
Mississippi State University

The MSU Southern Climatic Housing Research Team is a collaborative effort involving Architecture, Civil Engineering, Electrical Engineering, Forest Products, Landscape Architecture, and Mechanical Engineering. The MSU Southern Climatic Housing Research Team is affiliated with the Coalition for Advanced Wood Structures (CAWS) as a partnership with the USDA Forest Service, Forest Products Laboratory in Madison, Wisconsin. CAWS is a partnership between universities, industry and government to advance research for wood structures related to residential, non-residential and transportation uses.

southern • climatic Housing
mississippi state university