

What's Old is New Again - Harvesting the Rain in Texas -

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Abstract: Rainwater harvesting is a centuries old technique of collecting excess runoff from storm events and storing it for later use. Such collected rainwater can then be used in a more timely manner, in proper amounts, and targeted to desired locations. Catching rainfall during intense runoff events can also reduce the negative effects of erosion and reduce the amount of contaminants transported to surface water by stormwater runoff.

The Texas rainwater harvesting task force is composed of members from the departments of Soil and Crop Sciences, Biological and Agricultural Engineering, Horticulture Science, Ecosystem Science and Management, Family Development and Resource Management, and Wildlife and Fisheries Science of Texas A&M University. Objectives of this task force are to establish a variety of program delivery methods, demonstrate harvest techniques, and develop educational resources.

Efforts of this group include training Master Gardeners and Master Naturalists through hands-on workshops to increase local volunteer capacity for community outreach. The task force has also built several rainwater harvesting units across Texas in a variety of locations to demonstrate harvesting techniques and applications. These include harvesting stations in public schools for use in youth education, stations in rangeland to provide water for livestock and deer to enhance forage utilization and herd distribution, collection systems for in-door restroom use and outdoor landscape and garden use, as well as, collection stations dedicated to storing water for use in emergency fire fighting. Finally, this group is actively involved in providing up-to-date, quality educational resources for Extension staff and others to use. These include: the rainwater harvesting website (<http://rainwaterharvesting.tamu.edu>), publications related to rainwater harvesting, on-line system design tools, and instructional videos.

The efforts of this task force have been instrumental in increasing awareness of the need for rainwater harvesting, developing human and instructional capacity related to rainwater harvesting, and placement of harvesting units across Texas.

Keywords: Rain, Rainwater harvesting, Water conservation

1. Introduction

Over the past 10 years the Texas population has grown dramatically and *Water for Texas 2007* (2007), the state water plan, predicts that by 2060 there will be 45.5 million residents, which is more than twice as many as in 2000. Dealing with the demands of the human population on Texas natural resources is a real challenge. One common ingredient necessary to the survival and health of humans and the land is water. The *Water for Texas 2007* report projects the increase demand on water by population growth and the need to supply water to fuel agriculture irrigation and manufacturing will create supply issues in the near future.

Water use generally falls into three dominant categories: municipal (city; 24% in 2000), industrial (manufacturing, steam electricity, and mining 14% in 2000), and agricultural (irrigation and livestock; 62% in 2000), according to *Water For Texas 2007*. The state water plan estimates that agricultural water use will decrease from 10.2 million acre-feet per year to 8.56 million acre-feet per year in 2060. Municipal water demand will increase dramatically, from 4.0 million acre-feet to 8.26 million acre-feet.

The drastic increase of impervious surfaces (e.g., pavement, rooftops or other surfaces) related to urban and suburban development and other land-use changes has not only decreased potential groundwater recharge associated with rainfall events, but also causes problems for municipalities that must deal with increased rates of stormwater flow into stream corridors. Nutrient loading associated with stream pulses

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can also negatively impact water quality and ecosystem health during times of intense rainfall. Considering these trends of increased water demand and the subsequent decreases in water quality and quantity associated with urbanization and other land-use practices, a need clearly exists to re-examine how we develop and manage existing, as well as new sources of water.

Although we use water from streams, rivers, reservoirs and groundwater, somewhere in our rush to become more civilized, the majority of Texans lost knowledge of techniques used by early Texas settlers to capture and hold water from rainfall events. The Texas AgriLife Extension Service has a unique multidisciplinary group called the Rainwater Harvesting Task Force, whose goal is to increase knowledge about water recycling in the environment by teaching and training people how to manage rainfall on their property.

2. Materials and Methods

To accomplish the goals set for this team, Extension members from the Departments of Agricultural and Biological Engineering, Horticulture, Soil and Crop Sciences, Ecosystem Science and Management, Family Development and Resource Management, Wildlife and Fisheries Sciences and the Texas Water Resources Institute and Texas AgriLife Extension Service agents joined in a truly interdisciplinary partnership to create innovative educational resources and training opportunities and integrated them with Extension programs like Texas Master Gardeners and Texas Master Naturalists to broaden their impacts. All of the team members have worked together in an unselfish and seamless process to develop and deliver exceptional programs which have brought substantial credit to AgriLife Extension in this popular program area and have received applause from many organizations, agencies and individuals.

3. Results and Discussion

The Rainwater Harvesting Task Force has developed and delivered many innovative programming and educational resources which include:

- Five courses geared towards rainwater stewardship 9 peer-reviewed Texas AgriLife Extension Service publications, 3 web-based articles, and 7 popular articles;
- Twenty-one local, 8 county, 6 state, and 5 national presentations given by team members plus 4 national professional accreditation workshops with participants from 15 different states;
- Developed rainfall simulators and sent blueprints to educators nationwide; constructed and distributed 45 rainfall simulators for local Extension offices, soil and water conservation districts, other universities, and organizations;
- Developed the Rainwater Harvesting Web site <http://rainwaterharvesting.tamu.edu/index.html>, viewed by 37,577 and 17,786 unique visitors, who averaged 379 and 281 page views per day in 2007 and 2008, respectively;
- Nine video clips teaching rainfall capture techniques;
- Scores of photos demonstrating classes, devices, and activities can be found on the Web site;
- Rainwater harvest educational materials were viewed by 118,000 attendees at the San Antonio Livestock Show and Rodeo in 2007 and 107,607 in 2008;
- At least 31 demonstration sites having rainwater capture systems can be found at county Extension and municipal offices and learning centers; and
- Formed Texas Rainwater Catchment Association December 2007; Billy Kniffen first president, currently 80 members.

3.1. Rainwater Harvesting County Programs – (RWH-CP)

As part of the Texas AgriLife Extension Service programming efforts, County Extension agents offer rainwater harvesting classes. These classes serve to lay the ground work for other more in-depth instruction. These classes also provide a format to increase the awareness of the need for rainwater harvesting by the citizens of Texas. Several resources have been developed to assist local agents in educational efforts in their individual counties.

3.2. Rainwater Harvesting Texas Master Naturalists – (RWH-TMN)

This fee-based course is offered only for Texas Master Naturalist participants. It requires at least 15 hours of initial training (classroom and field activities) to earn “Rain Steward” recognition. Team members trained 45 Texas Master Naturalists about rainwater harvesting as an innovative way to control stormwater in urban and rural settings. Two training events were conducted (2006 at Mo Ranch in Kerr County and 2007 in San Antonio in Bexar County).

3.3. Rainwater Harvesting Master Gardener Specialist – (RWH-MGS)

This fee-based course is offered only for Master Gardener participants. It requires at least 16 hours of initial training (classroom and field activities) and an additional 12 hours of volunteer service to earn “Rainwater Harvesting Specialist” recognition. As of August 2008, 8 trainings were held in different cities. Overall, 190 Master Gardeners from 56 different counties completed the 2-day, 16-hour training event. To date, 87 Master Gardeners earned Rainwater Harvesting Specialist certification and in turn they contributed 2,107 service hours, valued at \$37,930 (\$18/hr) back to the Master Gardener Program. Volunteers taught 6,116 people and many more viewed educational articles in Master Gardener publications and/or newsletters prepared by trained volunteers. These volunteers have increased the available pool of trained “specialists” available to local County Extension staff to call upon for educational needs. This increase in trained human capital has greatly enhanced the educational and outreach efforts of the rainwater harvesting task force.

3.4. Rainwater Harvesting In-Home Use – (RWH-IHU)

This fee-based course is offered to the public. It requires at least 8 hours of training for those wanting to design, install or use rainwater for in-home water use. In September 2007, the first class was held in McKinney, where 29 individuals participated. Fourteen individuals participated at the second training in Boerne. Trainings were 7-hour events that focused on the current water situation in Texas, how to harvest rainwater for use in the home, and proper methods to safely treat and disinfect rainwater for use in the home.

3.5. Rainwater Harvesting Professional Accreditation – (RWH-PA)

This fee-based, 8-hour course is offered to the public by the American Rainwater Catchment Systems Association (ARCSA). The purpose of the ARCSA program is to recognize individuals with a high level of knowledge, proficiency, and experience in rainwater capture. In December 2007, the first RWH-PA training was held in Georgetown in Williamson County. Fifty attendees participated in a 6-hour workshop that covered collection basics, uses, and value of rainwater for landscape, wildlife, livestock, in-home potable and non-potable uses, sanitation, and maintenance. Training was conducted at Texas State University in July and August 2008 where 110 and 90 people attended, respectively; and out-of-state training was conducted at the University of Georgia where 225 attended; Purdue University Extension in Salem, Indiana where 45 attended; and another is scheduled in Santa Monica, California in September, 2008.

4. Conclusions

The team conducted program evaluations for each training course. For the 2008 Texas Master Gardener courses, overall program evaluations averaged 4.85 out of 5, including a rating of 5.2 for expectations met. The average for participants’ ability to educate others on selected topics was 4.3 out of 5. Evaluations for the training aids used received exceptional ratings and evaluation results of knowledge before and after the program, reported knowledge gained and retrospective pre-post test of knowledge gained on selected topics showed similar high ratings.

Since the inception of the Rainwater Harvesting Task Force in 2004 by Texas Water Resources Institute, the team has been extraordinarily productive. The acceptance and implementation of rainwater harvesting as an alternative water supply over the last few years has fostered the development of a rainwater harvesting industry in Texas and planning for entire communities with rainwater stewardship being a central component to their designs. The impact of Task Force educational materials and

programming can be linked to consumer acceptance of the rainwater management concepts and the success of the growing market. Although past successes are substantial, it is recognized that there is much still to be achieved and goals are being formulated for the future. For instance, to address predicted water shortfalls, the Task Force is in the process of developing a rainwater installation manual, which is slated for completion in September 2009.

By looking at past successes and reviewing current trends, the Rainwater Harvesting Task Force is working to insure materials developed and programs delivered remain timely and incorporate the latest technologies available.

In closing, the efforts of the task force started long before the current “green” movement. These efforts stemmed from a real need for quality information and resources as requests by local County Extension staff. The rainwater harvesting task force was developed and continues to work to address the need for educational materials and support related to rainwater harvesting.

Reference

TWDB (2007); *Water for Texas, 2007*. Texas Water Development Board, Austin, TX