

Demonstration and Monitoring of Rainwater Harvesting Technology in North Carolina

Kathy M. DeBusk, Jason D. Wright, William F. Hunt

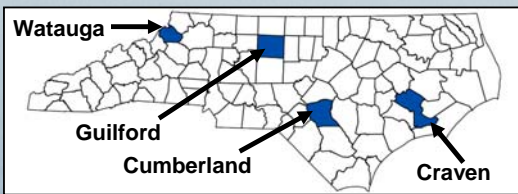


Introduction

In recent years (2002, 2005/2006) parts of North Carolina suffered under moderate to severe drought conditions. While rainwater harvesting systems (cisterns) have been used frequently in the Western United States, small scale water harvesting systems are still novel in North Carolina. The goal of this project is to highlight across North Carolina (coastal plain, sandhills, piedmont and mountains) the many applications of water harvesting technology. Several uses for cisterns will be examined and the "efficiency" of each use will be compared. Data will be collected to help the State of North Carolina determine the amount of runoff reduction and nutrient removal credit that should be awarded for the use of cisterns.

Methods

Water harvesting systems were installed at four locations: Craven County (coastal plain), Cumberland County (sandhills), Guilford County (piedmont), and Watauga County (mountain) – see map below. Each site will be monitored for water quantity and usage, and one system will be monitored for water quality.



Results

Three cisterns totaling 4,400 gallons were installed at the Guilford County Agricultural Center. Two cisterns, 1,700 gallons each, collect water from 4,000 square feet of roof top. The cisterns were connected together and gravity feed to a 1,000 gallon below ground cistern in a community garden area. The below-ground cistern was fitted with a valve that will prevent the cistern from overflowing. The below-ground cistern was also fitted with a 1hp submersible pump that will be used to irrigate the community garden. Monitoring has not yet begun in Greensboro.



A 15,000 gallon underground cistern was constructed at Fayetteville Technical Community College's Horticulture Center. The cistern was comprised of plastic structures placed side-by-side and wrapped in a heavy-duty rubber liner. The grids support the weight of soil and light vehicle traffic and reserve the space within them for water storage. The rubber membrane holds water within the system, prevents leaking and keeps soil from intruding into the water storage space. The system collects rainwater from the roof of the Horticulture Center and is used to irrigate several greenhouses on the property. Monitoring has not yet begun.

A 6,000 gallon water harvesting system was installed at the Craven County Animal Shelter. Rainwater collected from the roof of the Shelter is used to flush the kennels. As the Animal Shelter's water demand is extremely high, the cisterns are expected to be emptied frequently. Therefore, the cisterns were connected to the potable water system inside the building. The system is automated such that when the cisterns run dry, the potable water supply switches on and is used to flush the kennels. When the cisterns accumulate water, the potable system switches off and the cistern water is used. Monitoring has not yet begun at this location.



A 5,000 gallon cistern collects water from 2,170 square feet of roof top at the Town of Boone, NC municipal yard. The water will be mixed with a brine solution and used to de-ice roads in the winter. The harvested water will also be used for vehicle washing and irrigation around the Town of Boone. Initial results (see graph below) confirm that there is a high demand for the water, as indicated by large reductions in the water level of the cistern.

