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From the Director's Desk (by Dave Engle)

How much water does an eastern redcedar tree use?



This question has been the topic of debate, especially since the drought of 2010-2012, but until recently, postulations were based entirely on opinion. A team of researchers led by Drs. Chris Zou and Rod Will in OSU's Department of Natural Resource Ecology & Management recently completed a three-year study to answer this question. The study was funded through the Water Center culminating a national competition with a grant from the USGS and the Oklahoma Agricultural Experiment Station.

The first study to actually quantify water use by redcedar, the researchers found that water use in the form of transpiration by individual trees spanned a large range, depending on a number of factors. They concluded that average water use does not mean much because the range in water use is large. The most important factors were tree size, whether the tree was open-grown (trees with crowns receiving full light from above and from all sides) or closed-grown (trees competing for light with other trees), and season of the year.

If you are like most people, you want a single number. The study included a large, open-grown tree that used more than 40 gallons in a single day. However, average water use by large trees was 7 gallons per day for closed-grown trees and 18 gallons per day for open-grown trees. Sorry, that's three numbers!



Dr. Dave Engle, Director

Perhaps the most revealing finding of the study was that in 2011, a severe drought year, redcedar woodlands in north-central Oklahoma transpired all of the water that entered the soil, mostly eliminating watershed streamflow and groundwater recharge. They also found that trees transpired water every day of the year including the coldest days of the winter. This contrasts to water use by dominant herbaceous plants and deciduous trees and shrubs of Oklahoma that go dormant and cease transpiring water after the first killing freeze of the fall.

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OWRRI News: Advisory Board Meets to Select 2014 Funded Research Projects (by Mike Langston)



Dr. Mike Langston,
Assistant Director

On August 29th, the OWRI's Water Research Advisory Board (WRAB) met in Oklahoma City to review the pre-proposals that were submitted to the annual Water Research Grants Competition and select those that will continue in the competition.

Each year the OWRI conducts a grants competition for water research projects that address the needs of Oklahoma. The funding for this program originates with Congress as authorized by the Water Resources Research Act, but funding each year depends on an appropriation from Congress. Since 2005, this has resulted in \$92,335 coming to the Institute. Of that, \$75,000 is used to fund three research projects. For the past six years, the Oklahoma Water Resources Board (OWRB) has matched that \$75,000 dollar-for-dollar, resulting in three awards of \$50,000 each.

A 2012 Oklahoma legislative act changed the OWRB's funding for this research, and they will no longer be providing these matching funds. For 2014, the leadership of the Oklahoma Agricultural Experiment Station will provide matching funds for research proposals within the Division of Agriculture Sciences and Natural Resources at OSU. Other universities in the state have been invited to do the same.



The WRAB meets twice each year, winter and summer. The full-day summer meeting began with presentations by researchers whose work was funded in 2012. Dr. Chris Zou's and Joseph Dale's (Natural Resource Ecology and Management, OSU) presentation titled *Quantitative assessment of climate variability and land surface change on streamflow decrease in the Upper Cimarron River* was followed by Drs. Garey Fox and Ron Miller (Biosystems and Agricultural Engineering, OSU) who presented *Sediment and Phosphorus Loading from Protected and Unprotected Streambanks*. Finally, Drs. Cindy Cisar and Jonathan Fisher (Natural Sciences, NSU) presented *Impact of Wastewater Treatment Plant Effluent on Nitrogen Cycling by Stream Bacteria*.

After lunch the Board began discussions of the 28 one-page pre-proposals received for the 2014 grants competition. The charge to the 22 board members was to select those pre-proposals that best suit the water research needs of our state. The Board selected 11 to continue on to the full-proposal phase of the competition.

The researchers have been notified that they have until October 25th to submit the ten-page proposal. Each proposal will be sent out for peer review in November. A committee composed of Board members will consider the reviews and select five proposals to be presented at the Board's winter meeting in early January where three will be selected for funding.

The WRAB members are listed on water.okstate.edu. All meetings are open to the public.

Governor's Water Conference & Research Symposium



The Future On Tap

October 22-23, 2013
Sheraton-Reed Conference Center
Midwest City, OK

Oklahoma's water resources propel the wheels of economic development and growth. But undoubtedly, water challenges lie ahead. Due to persistent drought and recent projections indicating that statewide demand for water will increase by at least one-third over the next 50 years, it's clear that water stress will continue to mount. Innovative water policies and programs will be required to sustain and protect our water resources and the growth and prosperity those resources afford every Oklahoman. Speakers and conferees at the 34th Annual Governor's Water Conference and Research Symposium will explore sensible solutions to these threats to secure a rich water legacy for future generations of Oklahomans.

A block of rooms has been reserved at the Sheraton Hotel (adjacent to the Reed Conference Center) at a standard room rate of \$124/night. Space is limited so conferees are encouraged to make reservations as soon as possible. Click here or call (405) 455-1800 or (888) 627-8566.

Early registration (through 5 pm on October 4) is \$180 per person. Regular registration (beginning October 5) is \$230.

Taken from OWRB's site at www.owrb.ok.gov/news/waterconference.php. Visit the site for more information and to register.

Rainwater Harvesting 101 (by Jason Vogel)

The recent dry years has raised interest in alternative water sources. One simple way to increase water supply on a small scale is rainwater harvesting. Simply put, rainwater harvesting is the process of capturing and storing stormwater runoff for later use. Harvested rainwater can be used for watering livestock, flushing toilets, washing cars, or even drinking water if properly treated. This untreated water may even be healthier for plants than tap water.

There are six main parts of a rainwater harvesting system: conveyance system, storage, overflow pipe, outlet pipe, delivery system, and first-flush diverter (optional). When planning your system, it is important to understand the role of these parts. Checking local plumbing, building, neighborhood, and environmental codes is also a good idea.

The conveyance system is typically just the gutter system on a building. Storage systems might include rain barrels and cisterns (a cistern being larger than a rain barrel). A one-inch rainfall on a typical home's roof can produce a great deal of water (about 60 gallons for each 100 ft² of roof), so the limiting factors in these systems are often space, cost, and aesthetics of a large container. A full storage vessel is very heavy, so be sure to support it well. Also, cover any openings with screening so that mosquitoes cannot breed in the tank.

An overflow pipe is used to divert water away from building and storage tank foundations after the tank is full. An outlet pipe and delivery system will move the water to the point of use. If topography allows, a gravity system may be used and is less expensive than a pump.

The final, and often overlooked, consideration for rainfall harvesting systems is water quality. Dust, bird droppings, sticks, and other potential contaminants can build up on your rooftop between rains and cause sediment build-up in the system. Gutter screen, a roof washer, and a device called a first flush diverter can be helpful to remove some of these contaminants from the first part of the runoff. Besides improving water quality, these devices can reduce sediment in the system. Current research at Oklahoma State University indicates that many factors can impact the first-flush volume including rainfall intensity, days since the last rainfall, and roofing material.

Overall, a rainfall harvesting system can be fun and relatively easy to build. For more information on rainfall harvesting, please visit the OSU Low Impact Development web site at lid.okstate.edu.

Dr. Jason Vogel, P.E., Assistant Professor and Stormwater Specialist, OSU Biosystems and Agricultural Engineering

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Of course, research always uncovers additional research questions. Drs. Zou and Will say that research is needed to determine the effect of redcedar removal on water yield and water quality. They also contend that research is needed to determine the effects on water of planting marginal lands cleared of redcedar, mostly rangeland with shallow soil, with a dedicated biofuel/bioenergy feedstock, such as switchgrass, as compared to restoring the native plant community. Finally, the researchers eventually want to scale up the research to larger watersheds to determine the role redcedar removal might play in augmenting water supply.

So, standby for more research on redcedar and water!



Instrumented watershed encroached by redcedar

News & Events

Upcoming Events:

Environmental Sciences Graduate Program in Stillwater, OK; Fall Semester 2013

Brown bag seminars will be offered throughout the semester and are open to the public.

More @ <http://water.okstate.edu>.

The 2013 Restoration of Our Rivers Conference in Bentonville, AR; October 3-4, 2013

National and regional experts will share how we can improve our watershed.

More @ <http://www.irwp.org>.

Oklahoma Governor's Water Conference & Research Symposium in Midwest City, OK; October 22 & 23, 2013

More on page 2 and @ <http://www.owrb.ok.gov>.

OKLAHOMA WATER RESOURCES CENTER

WWWeb Updates

- ◇ There's an easy way to keep current on water.okstate.edu updates. Subscribe to the RSS feed at <http://water.okstate.edu/updates>.
- ◇ A new page covering water issues in food processing and energy development at <http://water.okstate.edu/programs/industry>.
- ◇ Right-hand navigation menus on projects pages provides a list of relevant links so visitors can find all the info they need.
- ◇ An easy scan of our new QR code quickly connects you to our site
- ◇ New videos go online weekly.

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