What Are the Texas Evapotranspiration (ET) Networks ?

What is an ET Network ?

Evapotranspiration (ET) is a measurement of the total amount of water needed to grow plants and crops. This term comes from the words *evaporation* (i.e., evaporation of water from the soil) and *transpiration* (i.e., transpiration of water by plants). Different plants have different water requirements, so they have different ET rates.

There are several different weather networks in Texas. ET Networks are different from other weather networks because of the sensors and tools used to provide irrigation and watering recommendations to end users. An ET Network typically:

- Consists of special weather stations (see Figure 1) designed specifically to measure the parameters needed for the calculation of reference evapotranspiration (ET_o);
- Calculates and uses ET_o to determine plant water requirements and irrigation watering recommendations; and,
- Disseminates this information to end users through on-line access, on-line tools, emails, and other methods.

Figure 1. ET Weather Station

What is ET_o ?

ET_0 is the water requirements of a cool season grass growing four inches tall under well-watered conditions. ET_o is used along with crop coefficients and plant factors to determine the actual water requirements (or ET) of crops and plants.

ET_0 depends on the climate and thus varies from location to location. Special weather stations are used to collect the climatic data for calculating ET_0, including temperature, dew point temperature (relative humidity), wind speed, and solar radiation. Many existing weather station networks such as that of the National Weather Service cannot be used for ET_o calculations, primarily because they lack solar radiation sensors and do not meet ET weather station siting criteria. For proper ET_o calculation, ET stations should be sited in open grassy areas, away from buildings, trees, and hardscapes that could affect sensors.

ET Networks in Texas

The only State-wide ET Network in Texas is the TexasET Network which began in 1994 and now has 35 weather stations located statewide. The TexasET Network has been self-funded through revenue from short courses and contracts/grants and depends on local sponsors to cover the costs of the weather stations. However, future continuation is in doubt due to the lack of sustained funding sources. In recent years, there been an increase in interest from cities and municipal water districts. The TexasET Network website:

- Displays daily weather and ET_0 data, heat units, and other data;
- Offers interactive, easy-to-use calculators that allow users to determine the irrigation water requirements of crops and landscapes; and,
- Provides several other tools (e.g., for downloading data and setting up automatic email notifications of customized weather data and irrigation recommendations).

In 2013, the Irrigation Technology Program of the Texas A&M AgriLife Extension Service and the North Texas Water Municipal Water District piloted the Water My Yard ("*WaterMyYard*") program. The weather stations for this program are those included in the TexasET Network. The *WaterMyYard* program:

- Is designed specifically for home yards of warm season grasses such as St. Augustine, Bermuda, Zoysia, and Buffalo; and,
- Sends out weekly emails with recommended irrigation system runtimes (as opposed to total inches of water needed).

The *WaterMyYard* program employs simple, intuitive, on-line tools to allow residents to set up a profile which requires minimum understanding of ET and the other parameters needed to calculate irrigation runtimes. Users are encouraged to use "catch can" tests in order to determine precipitation rates, or they can select their precipitation rate based on their equipment and spacing. The city of Irving joined the *WaterMyYard* program in the Fall of 2013. Other cities and water districts have also expressed interest in the program.

The South Texas Weather network was created in 2013 through a USDA-NRCS Conservation innovation grant and consists of six weather stations, with four located in the Lower Rio Grande Valley and two at AgriLife Research Centers in South and West Texas. ETo, weather data, and heat and chill units may be downloaded from the website. The site also has a soil water balance program and irrigation scheduler for sugarcane, citrus, cotton, corn, onions, and watermelons. The user selects the crop, weather station, and soil type with a scroll down bar, and the program then automatically sets allowable depletion and rootzone depths. The user can use the default values for planting date and the date to end calculations or enter their own dates. The future of the network is in doubt as there is no funding currently identified to continue the program following the end of the grant in February 2017.

The Texas High Plains ET Network (TxHPET) grew out of the North High Plains PET (potential evapotranspiration) Network initiated in 1994 and the South High Plains PET Network which followed a few years later. The TxHPET Network was discontinued in 2010 due to lack of funding for its 17 weather stations and personnel. In 2012, it received a two-year grant from the Texas Water Development Board through the Panhandle Planning Commission to re-activate its website (among other activities) and to create a "portal" for public access. The revised TxHPET Network consisted of 10 weather stations and posted on its website the 3-day and 7-day water requirements for major crops being grown. Water requirements were determined using three typical planting dates used in the Texas High Plains. However, with no long-term funding, the TxHPET Network now no longer exists.

Other Related Weather Station Networks

There are several other related weather station networks in Texas which do not meet the definition of an ET Network as listed above, including the following:

- The Crop Weather Program for South Texas (CWP) was launched in 2000 originally to provide the detailed weather data needed for use in a cotton growth model by farmers. The CWP currently consists of 32 weather stations located in the Coastal Bend and South Texas region. The CWP reports daily ET_o, but it uses models to produce water recommendations for cotton. It also provides crop management information for sorghum and corn but without irrigation recommendations. As of November 2012, the CWP had 1,466 registered users. The CWP has been supported by Cotton, Inc. and Texas A&M AgriLife Research since its inception.
- The West Texas Mesonet (WTM) project was established in 1999 to provide free real-time weather and agricultural information for residents of the South Plains region of western Texas. The network covers 54 counties in Texas and New Mexico, and has grown to include seventy-seven surface meteorological stations, one radar wind profiler, six boundary-layer SODAR (SOnic Detection And Ranging) systems, and one upper-air sounding system. The WTM posts daily ET_o values, but it does not have a notification program or tools for determining irrigation water requirements, and not all stations are located in appropriate areas for ET determination.

For maps, publications, and additional information, go to:

- TexasET Network, http://TexasET.tamu.edu;
- The TexasET Network and Website User's Manual, http://texaset.tamu.edu/Resources/Documents/Texas%20ET%20Manual%20(Updated%202013).pdf;
- *WaterMyYard*, http://watermyyard.org/;
- South Texas Weather Network, http://southtexasweather.tamu.edu;
- CWP, http://ccag.tamu.edu/agronomy/crop-weather/; and,
- WTM Project, http://www.mesonet.ttu.edu/.

For additional Frequently Asked Questions (FAQs) related to groundwater quantity, groundwater quality, septic systems, water wells, administrative entities, and publications, visit the Texas Groundwater Protection Committee's FAQ webpage at http://tgpc.texas.gov/frequently-asked-questions-faqs/.