Water, Water, Everywhere

But Will Water be Available in Quality and Quantity?

By Paul D. Ohlenbusch

Water is the most important resource we have. Without water, our entire life system would disappear. A lot of issues are in the news such as carbon dioxide, methane, reducing petroleum use, and ozone. Water should be **THE** major issue. Without water, are the rest of the issues really important?

Projections for the United States and world suggest the population will increase 25% and 50% respectively by 2050. Where will the water come from? Will we in agriculture have the water we need to produce food for the rest of the population? Will we have the life style we have now?

In November 2009, the Council for Agricultural Science and Technology (CAST) released an Issue Paper entitled *Water, People, and the Future: Water Availability for Agriculture in the United States.* The paper discusses "the diverse demands for water resources—past, current, and future." How important is the issue "to the economic vitality of the United States - including agriculture - that policymakers, water managers, and water users work collaboratively to achieve sustainable water resource management" is the main theme. The paper indicates currently agriculture uses 40% of the water from U. S. surface and groundwater sources.

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PHOTO BY WARREN BLUNTZER

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In Texas, water quality and quantity are on going issues. Drought has been a major concern for quantity for several years. Water quality has been a key part of city and urban water systems.

Depending on who you listen to, we are in a 13 or 31 year drought that has been described as "extreme drought interrupted by floods." That describes the weather for the last several years. Will it continue? Time will tell. Can we do anything about the amount of water available in the future?

TEXAS WATER RESOURCES - QUANTITY

Texas has five major aquifer systems. They are the Edwards-Trinity, Mississippi Embayment-Texas Coastal Uplands, Coastal Lowlands-Columbia Plateau, High Plains (Ogallala) and Rio Grande-Snake River. In the November-December 2009 *Tracks* issue, Robert Fears discussed the karst systems, which includes the Edwards-Trinity and related systems and their management.

Surface water resources are managed in some water sheds. Examples are the Lower Colorado River Authority (LCRA) and the Brazos River Authority (BRA) (**Figure 1**) which were created to manage the water supply and environment of the basins, develop water and wastewater utilities, and support community and economic development. Both are examples of sellers of surface water to cities and towns as well as agriculture. LCRA has warned farmers downstream from Austin that irrigation water may not be available until Lake Travis and Lake Buchanan are full. LCRA not only sells water but electrical energy produced by gas, wind and hydroelectric means.

Examples of subsurface water authority are the Edwards Aquifer Authority and High Plains or Ogallala Aquifer (**Figure 2**). The Edwards Aquifer Authority controls much of the recharge and artesian zones of the aquifer. Most of the Edwards Aquifer is used for urban water sources. In 2009, the cities, San Antonio and others, severely restricted urban water use into the fall until above average rainfall recharged the aquifer.

The High Plains Aquifer is primarily used by agriculture for irrigation. It has been declining and wells have reduced production or have gone dry. Livestock wells have been drilled deeper to get water.

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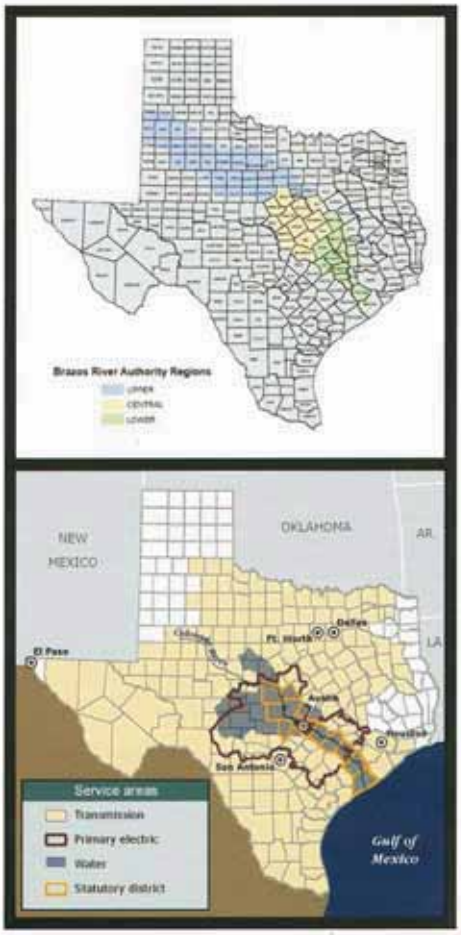
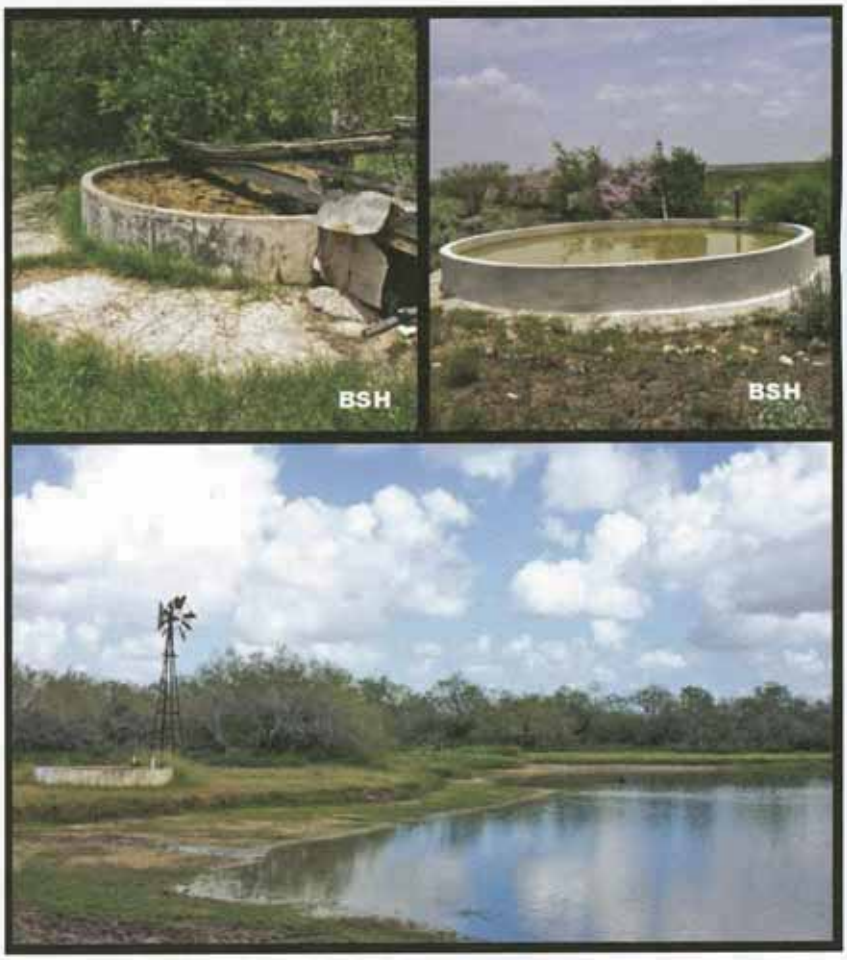


Figure 1 (left) The Brazos River (top) and LCRA areas.

Figure 2 (right) The Edwards and High Plains (Ogallala) Aquifers locations.

Water quality and quantity of your sources are important regardless of their being old or new, surface or subsurface.



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TEXAS WATER RESOURCES - QUALITY

Water quality data is not easy to find for specific areas. Even water quality for specific urban areas or towns have limited availability. What can be said is that the water for urban areas and towns seems to require more treatment to maintain required quality levels. Concerns for bacteria such as E. Coli, salmonella, and E. Coli 0157:H7 are increasing. Other human and animal pathogens are also of concern. Monitoring for these is done for all urban areas or towns.

What about private or livestock surface water sources? To really answer this question would require a lengthy article but I will try to summarize the issues and maybe provide some insight as what you need to consider.

First, Texas water quality, both surface and subsurface, is relatively good but indications are it is changing. In reviewing stream water quality data from the US Geological Survey, the trend seems to be as the surface water flows downstream, the poorer the quality is. This stands to reason because the soils it flows over, the small streams entering, and the communities along it will add materials and the latter often removes water for local use.

The real problem is what is being added along the way. The sources include industry, agriculture, homes, streets, retail centers, and a lot more. Almost everything we do can potentially add to what is in our water. Turf grass, including golf courses, homes, parks, and similar sites can add fertilizer, pesticides, petroleum products, and much more. Agriculture can add similar materials. And the list goes on.

What about private livestock and wildlife surface water sources? If you have a pond the water quality is impacted by two factors. The first is what the runoff into the pond may pickup such as silt from erosion, fertilizer and pesticides used on the area, and evaporation. Through evaporation, the concentration of dissolved and suspended materials increases. It's a chemical thing! The water evaporates but the materials stay. The next runoff event adds more and the process goes on. Eventually, over years, the water can have a taste or smell.

What about private or livestock subsurface water sources? With wells, the aquifers are a concern. As with

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the surface water, materials can move into aquifers through soil and rock formations. An increasing source of contamination is old water wells that haven't been properly plugged, the casing has deteriorated, or surface water can flow into it. Add to this the old oil wells that haven't been properly plugged or the casing has deteriorated. Old wells still in use can have problems, especially if the casing has deteriorated, water can run into the well from another strata, or a septic system is up slope of the well.

Evaluating wells, both new and old, should be done regularly to track the water quality, water level, and casing condition. Water quality for human and animal use can be done through your local health department for bacteria or Texas AgriLife Extension Soil, Water and Forage Testing Laboratory for chemical content you can visit http://soiltesting.tamu.edu/webpages/forms.html. One concern is that here are no water quality standards for livestock and other animals. However, National Academy of Science and CAST have recommended maximum levels for some contaminants (**Table 1**). Salinity has different ratings and is in **Table 2**. If you are interested in checking your well's water level and casing condition, contact your local well repair or drilling company.

GETTING INVOLVED IN THE WATER ISSUES

The CAST Issue Paper mentioned above suggests the "multiple issues require attention - water quality, environmental water needs, municipal demands for water, water resource availability, agricultural water use—and no

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Table 1. Recommended limits of concentration of some potentially toxic substances in drinking water for livestock.

	Safe Upper Limits (mg/l)			
	US EPA[a] (for humans)		Recommendations	
Substance	Primary	Secondary	NAS[b]	CAST[c]
Arsenic	0.05		0.2	0.5
Barium	1.0		not established	
Boron				5.0
Cadmium	0.01		0.05	0.5
Chromium	0.05		1.0	5.0
Chloride[e]		250		
Cobalt			1.0	1.0
Copper		1.0	0.5	0.5
Fluoride	4.0	2.0	2.0	3.0
Iron		0.3	not established	no limit[d]
Lead	0.05		0.1	0.1
Manganese		0.05	not established	no limit
Mercury	0.002		0.01	0.01
Molybdenum			not established	no limit
Nickel			1.0	
Nitrate-N	10.0		100	300
Nitrite-N			10	10
Salinity			See Table 2	
Selenium	0.01			
Silver	0.05			
Sulfate		250		
Total Dissolved Solids		500		
Vanadium		0.01		1.0
Zinc	5.0	25.0		25.0

a U.S. Environmental Protection Agency
b National Academy of Sciences
c Council for Agricultural Science and Technology
d Data available are not sufficient to made definite recommendations.
e The Texas Department of Health has different values. Source: Texas AgriLife Extension - L-2374

Table 2. Guide to using saline waters for livestock.Recommended limits of concentration of some potentially toxic substances in drinking water for livestock.

Total soluble salts content of waters (mg/l) Comments	COMMENTS
Less than 1,000	These waters have a relatively low level of salinity and should present no serious burden.
1,000 to 2,999	These waters should be satisfactory. They may cause temporary and mild diarrhea in livestock unaccustomed to them, but they should not affect their health or performance.
3,000 to 4,999	These waters should be satisfactory, although they may cause temporary diarrhea or be refused at first by animals unaccustomed to them.
5,000 to 6,999	These waters can be used with reasonable safety. It may be well to avoid using those approaching the higher levels for pregnant or lactating animals.
7,000 to 10,000	Considerable risk may exist in using these waters for pregnant or lactating livestock, the young of these species, or for any animals subjected to heavy heat stress or water loss. In general, their use should be avoided, although older livestock my subsist on them for long periods under conditions of low stress.
More than 10,000	The risks with these highly saline waters are so great that they cannot be recommended for use under any conditions.

Source: Texas AgriLife Extension - L-2374

MANAGEMENT NOTES
FOR MARCH THROUGH MAY

Water is critical. If drought is still with you, carefully monitor winter water sources to insure availability. Develop options if sources appear to be less than optimal. Also, begin evaluating water needs for next year.

Monitor rainfall history for the past 12 months, the forecast for the next 3-6 months, and current soil moisture status. Even if current soil moisture is good, projected plant growth will probably be below average if the previous growing season had drought conditions. Plan for below average growth in 2010. (It could fool me!)

Monitor the status of grazing and browse use to date. The amount of use on highly desirable species over winter is critical. If use is heavy, plan to reduce 2010 stocking rates to allow the preferred species to recover and improve.

Finalize the grazing and economic management results for 2009 and make adjustments to the 2010 and 5-year management plan based on past weather together with current and potential economic conditions.

Finalize plans for 2010 broadleaf and woody plant control.

Evaluate the need and safety conditions for prescribed burns in 2010. Finalize the burn plans if growth and burning conditions appear they will be safe.

Develop management options for 2010 seeded areas that need improvement as well as long term management.

Consider updating or starting a land resource record. If you use photographs, establish points that you can go back to and photograph at least every year

Above all, manage for today and the future based on what has happened in 2009, not just today. Management is not easy! Develop a management plan if you don't have one!

PHOTOS BY PAUL D. OHLENBUSCH

Demands for recreation, country living, flood control, and surface water sources continue.

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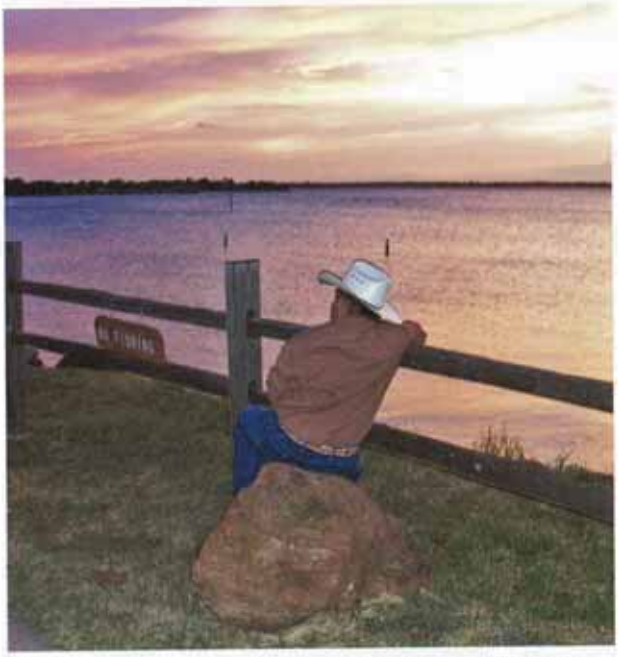
issue can be addressed individually. "Agriculture is increasingly losing the water availability battle, especially for surface water. I would suggest agriculture should be united and involved in the issues. To remain on the sidelines could result in lower food production, financial problems, and more. **GET INVOLVED!**

Note: Documents used in developing this article can be found on my web site (www.grassbydesign.com/TDA).

***Next time**, a look at two books and some articles that have different approaches to managing rangelands for grazing and wildlife but end up with similar management concepts.*



Will agriculture watch the sun set as others determine who will get water first or will agriculture get involved?