Understanding Creeks and Rivers

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We Texans have loved our creeks and rivers for many generations. When the early settlers arrived in the early and mid 1800's, they naturally established near the best and most reliable sources of water. Before that time, Native Americans were closely associated with and dependent on life-giving creeks and rivers for thousands of years. Since these times, Texans have continued to use and enjoy and benefit from the estimated 190,000 miles of creeks and rivers in the state.

Although most outdoor type people will proclaim their love and appreciation of creeks and rivers, most would admit they don't know a great deal about how these special parts of the landscape work. African ecologist, Baba Dioum penned an oft quoted truth:

"We will conserve only what we love;
We will love only what we understand;
We will understand only what we are taught."

Without a genuine knowledge about the workings of nature it is questionable whether we can ever truly love or conserve natural resources.

In Texas, our knowledge and concern about the workings of creeks and rivers and riparian areas is fairly recent. In fact, the term "riparian" is relatively new if not unknown to many people. The riparian area is the narrow band of land that lies immediately adjacent to creeks, rivers, ponds and lakes. It is the transition area between the dry uplands and the water itself. The term "creek bottom" is a more familiar term that is somewhat analogous to the riparian area. Riparian areas have unique water, soil and vegetation attributes that make them much different than adjacent upland areas. Although the riparian area only comprises one to five percent of the total landscape, its contributions and value are much greater than its relatively small size.

The values and benefits of a healthy riparian area are many and varied. Birders often find the greatest variety and abundance of bird life in the riparian zone where they find travel corridors, diverse cover, food and water. Turkey enthusiasts understand the critical importance of riparian roost areas; wood duck hunters appreciate the riparian woodlands that provide nest cavities and food. Fishermen appreciate the value of stable channels, deep pools, undercut banks, submerged logs, shade, water quality and other riparian / aquatic habitat features. Livestock ranchers place great value on the abundance of high quality grazing that often exists in the riparian area. Campers, canoeists, hikers, and just about everyone seems to especially enjoy the richness and beauty of an intact creek / riparian area.

Yet, even though we appreciate and value creeks, rivers and the associated riparian area, we seldom think about the inner workings that support these values. When the creek / riparian area is functioning properly, all of the natural processes will be in balance, which in turn, will insure that the values we desire will be produced and maintained.

The astute naturalist, hunter, or landowner understands that nature is always more complex than it appears on the surface. Discovering the intricacies of the natural world is not only enjoyable and challenging, but is essential in providing the basis for the proper management and stewardship of the land.

To fully understand the complexities of the riparian landscape would require specialized knowledge about hydrology, vegetation and the physics behind the erosion and deposition of soil by moving water. Few people possess this depth of knowledge, but a basic understanding is not difficult to grasp.

To properly understand creeks and rivers, one must first appreciate the value of flooding and the necessity of a floodplain. Flooding is not something bad that happens to creeks and rivers; it is an

essential part of the creek and river system. Without frequent and recurring floods, a creek is simply a drainage ditch or a canal. In fact, periodic flooding is what ultimately provides many of the values and benefits that we desire. Out-of-bank flooding, where the water fills the channel and spills out on to the active floodplain should typically occur about every one to three years. This is the kind of flooding that maintains the ecological integrity of the creek.

There is a great deal of common sense physics involved in a properly functioning riparian area. First and foremost, in a healthy riparian area, there will be dense riparian vegetation growing on the banks and floodplains. These plants have phenomenally strong and extensive root systems. The root systems of riparian plants usually have five to ten times more root density and root mass compared to upland plants. For example sideoats grama, an upland grass, has about 4,000 pounds of roots per acre; while knotgrass, a riparian grass, has about 24,000 pounds of roots per acre. Furthermore, knotgrass has been shown to have an astounding ***19 miles of roots per cubic foot of soil***. This extreme network of intermeshing roots helps to bind riparian soils together during flooding to minimize bank and channel erosion. In some parts of Texas this critical rooting is provided primarily by riparian trees and shrubs while in other areas it is provided mostly by grasses, and sedges.

In addition to the extensive root systems, dense riparian vegetation also helps dissipate the energy of floodwaters. As the energy of water is interrupted by a thick growth of shrubs, trees, grasses and sedges, the velocity of water is reduced, which in turn reduces the erosive potential along the banks. As the velocity of floodwater is reduced, the ability of water to carry sediment is also reduced, which allows some of the sediment to settle out on the floodplain. This sediment (mud, silt, sand, gravel) that is deposited during flood events, becomes assimilated into the banks and floodplain by the new growth of riparian plants. Each new unit of sediment that becomes trapped in the riparian area provides additional water storage capacity. This is sometimes referred to as the “riparian sponge”. Due to the pore space contained within soil, a cubic foot of soil has the capacity to store two to four gallons of water. The more sediment that is captured and stabilized by riparian vegetation the more water can be stored along the banks. This riparian sponge gets refilled each time floodwater spills out of the channel. After the riparian sponge is filled, it helps sustain plant growth and excess water slowly seeps back into the channel to help maintain normal base flow. This concept of storing water in the banks and floodplains is an important contribution of a functional riparian area.

Besides the water that is stored in riparian soils and captured sediments, flooding also provides for the recharging of shallow aquifers that are associated with creeks and rivers. As the water is slowed down by the vegetation, and as the waters spread out across the floodplain, these shallow water tables absorb and store immense volumes of water. Then, after the floodwaters recede back into the channel, the newly refilled water table is what sustains the flow of creeks between runoff events.

When these necessary physical processes are occurring and in working balance, then, the desired values that we appreciate are provided and sustained. If you want good water quality, sustained base flow, good fish habitat, good wildlife habitat, good livestock forage, make sure that these physical processes are happening: dense vegetation dissipating energy; roots providing bank and channel stability; trapping of sediment in the floodplain; storage of water in banks and floodplain.

For riparian areas that are not functioning properly, there is good news – riparian areas have the amazing capacity to restore themselves naturally. In most cases, man does not have to “fix” damaged creeks or rivers with extensive or expensive solutions. Usually, all that man needs to do is to address those things that may be hindering this natural recovery. Dense, healthy riparian vegetation is the key to maintaining or restoring good riparian condition.

The benefits and values of functional riparian areas are important to all Texans, not just landowners, fishermen and birders. The next time you take a walk in a creek bottom begin to notice some of the attributes that support a functional riparian area; it will help you develop a deeper appreciation and understanding of this remarkable part of nature.