



The Interconnected Futures of Rangelands and Riparian Areas

Rangeland stream and riparian ecosystems are very important to the water issues facing Texans today and into the future. Healthy streams and riparian areas are among the most productive resources found on Texas rangelands. Healthy rangeland stream and riparian ecosystems provide clean water, sustain flow in rivers and act like sponges to soak up and store flood waters, recharging shallow water tables and reducing downstream flood damage. They also improve wildlife habitat and livestock productivity through increased soil infiltration and water capture during storms. To provide these benefits, most of the streams and rivers in Texas need to be properly managed and/or restored to healthy conditions.

Stream Equilibrium: It's all about the Energy! *or "How to Predict a Stream's Future"*

I grew up fishing and swimming the Colorado River, Sims Creek and Cherokee Creek in Central Texas. When I go back to look at these streams today, they have changed very little over the years. There may have been some minor bank erosion here and there but overall very few changes.

A river has the job of carrying water and sediment from the watershed to its final outlet. If the stream has reached a balance of carrying both the water and sediment load it can be said that the stream is in dynamic-equilibrium. Such is the case of the streams I grew up with that have changed very little over time.



A healthy rangeland riparian system like this one benefits both the adjacent rangeland as well as downstream neighbors. A stable stream like this one is neither aggrading or degrading, but instead has sediment inputs that balance the stream's energy.

Read on to find out more.

Currently, many riparian systems are managed essentially as drainage ditches, intended merely to drain and rapidly move water downstream, reducing local flooding and allowing for agriculture and other development in the floodplain. Although straightened, cleared, and cemented channels can reduce local flooding, stream hydrographs usually show increased intensity and frequency of floods in existing channels and floodplains where such degradation has taken place. People seldom think of floodplains as one of the major, natural water holding areas, but they are. Floodplains act as sponges soaking up above-normal water flows and allowing them to slowly percolate through the soil profile. This provides a slow release of water back into the streams that keeps them flowing between rainfall events. Where possible, floodplains should be restored to conditions that allow them to flood every few years, which provides the greatest water storage capacity benefit and increases baseflows.

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There are many streams in Texas, though, that are no longer in balance and have excessive erosion or sedimentation. Every stream has a threshold and once it crosses that threshold, it begins to change its form in order to reach a new equilibrium.

For us to have a basic understanding of what is happening in our streams, there must be a basic understanding of the forces that are forming them. In 1955, Lane developed a relationship describing these forces. He suggested that a stream's discharge and channel slope is proportional to its sediment load and sediment size.

$$(Sediment\ LOAD) \times (Sediment\ SIZE) \propto (Stream\ SLOPE) \times (Stream\ DISCHARGE)$$

In the most basic sense, this is a balance of energy. The energy is created as the water moves down the slope of the channel.

Predict the Future continued on page 2.

Let's make it a little personal. Imagine that you are the water going down the stream carrying the sediment. You (DISCHARGE) are walking down a trail (SLOPE) made of sand (sediment SIZE) carrying two buckets half full of sand (sediment LOAD). Let's say you can carry the buckets indefinitely, but you do not have any energy left over to carry any extra. You would be in equilibrium. The channel is neither aggrading (filling up) nor degrading (cutting down).

Now let's make the trail steeper (straighten the stream). You have more energy and can carry more sediment. You need more sediment in the buckets to offset the newfound energy. However, the only place to get the sediment is from the channel bottom or bank. As you load the sediment into the buckets, you are causing the stream to degrade. As the channel cuts down over time, the grade will reduce until it requires less sediment and the channel will once again reach equilibrium.

Let's say we add extra sediment into the stream by changing the land use from rangeland to cropland or by overgrazing. Now your buckets are full of sediment. You no longer have the energy to carry all the extra sediment. The only thing you can do is dump part of the sediment out of the buckets so you can keep going. By dumping the sediment you will cause the channel to aggrade (fill up).

Let's change the trail from sand to cobble rock. It is easy for the water to move a grain of sand, but more difficult to move the cobble. Likewise as you carry the buckets of sediment over the cobble trail it is much harder work. Now you must lighten your load of sediment to continue down the trail. Again by dumping the sediment, you will cause the channel to aggrade.

Urbanization increases the discharge from the watershed, but also reduces the amount of sediment as the watershed builds out. We have now increased the energy in the stream and reduced the amount of work it has to do. To utilize this much extra energy, the stream needs extra sediment so it gets it from the channel bottom and banks. We have now set the channel up to degrade.

Removing the riparian vegetation from the stream banks can cause excessive bank erosion. We have now increased the sediment load and potentially increased the size of the sediment. This is an increase in the amount of work needed to move the sediment; however, without extra energy to accomplish that work, the only thing the stream can do is dump the sediment in the stream, causing the channel to aggrade.

Now with your understanding of Lane's relationship, you can predict the potential reaction of a stream if you make changes in the watershed or to the stream itself. Likewise, if you find a stream that is already aggrading or degrading, you can evaluate the stream and its watershed and determine what may have caused the change in the stream. If you know what caused the change, you can develop a plan to help the stream to recover. Remember: it is all about the energy.

This article provided by Kenneth Mayben, P.E., TRA's VP, who works for the NRCS out of Weatherford.

Greetings Riparians! You'll see from just a quick glance at this issue that the Riparian Essentials Workshop held in June in Denton is our big news. It was held in conjunction with the annual conference for the Texas chapter of the Society for Ecological Restoration (TxSER). We had a good turnout for our morning classroom session and then a very informative afternoon fieldtrip visiting a number of sites along Hickory Creek in Denton. We saw good and bad examples of riparian management, running the gamut from trapezoidal concrete channels without vegetation to functioning stream segments with vegetation stabilizing the banks and providing wildlife habitat and flood control. Many, many thanks to the speakers (Steve Nelle, Kenneth Mayben, Nikki Dictson) and the organizers of the field trip (Kenneth Mayben and Kenny Banks and Joetta Smith from the City of Denton). Special thanks also go to Kevin Anderson for handling the bulk of the workshop organizing (registration, advertising, refreshments, compiling packets, certificates, and more), to Mike Gonzales for the workshop brochure, and to Tranelle Jones of TxSER for vital help with meeting logistics.



Kenneth Mayben discusses stream equilibrium during the June workshop's field trip.

The unique mission of our organization is to protect and promote riparian areas and to educate people about their importance. To accomplish this TRA has set a goal of conducting several workshops around the state each year. The Denton workshop was another step toward meeting that goal, and there are other workshops scheduled before the end of the year. The TRA workshops to date have provided a broad educational overview of watershed and riparian function and have provided an opportunity for workshop participants to network, sharing their respective expertise and perspective. We anticipate that there is also a need for specialized workshops, focusing on specific topics or problems, which would cover more detailed and technical material. If you have an idea for a workshop or if you have expert knowledge to share, please let one of the board members know about it.

Again, one of the strengths of this organization is the opportunity for networking. Not everyone can attend a workshop, so please use the newsletter. Let the rest of the membership know what is going on in your region of the state. Tell us about your project successes and failures, what methods worked and didn't work. Alert us about policy changes that may enhance or hamper our restoration efforts. Every effort helps!

Until next time, Sue Watts

Rangeland and Riparian, continued from page 1...

All rangeland rivers are influenced by the cities, farms, and industries within their drainage areas. Management of upland rangeland, streams, and riparian zones affects not only public and private landowners, but also livestock, wildlife, aquatic life and everyone downstream. Lawmakers have passed the Clean Water Act and other regulations to protect public waters from harmful inputs. While the water within streams and streambeds belong to the public, in Texas, private landowners manage the majority of rangeland watersheds and riparian zones. Naturally, they manage these areas based on their own goals for the property; unfortunately, this does not always lead to the best riparian management practices. For example, clearing of riparian undergrowth by landowners to provide greater stream access, visibility and increased forage production exposes the soil to the erosive force of flood waters. Such clearing along the riparian area and streams reduces not only the amount of wildlife habitat, but also the vegetation structure needed to slow water movement. Streams managed in this way are characterized by increasingly frequent high peak flows and lower baseflows, which degrade stream banks and riparian zones and reduce their benefits. Similar effects are created by municipalities that clear undergrowth and maintain landscaped parks along streams and rivers to "improve" their aesthetics, land values, and recreation potential, and by increasing population density and intensified human activity. During storm events, the impervious surfaces within urbanized areas increase overland flows into stream channels, usually without much filtering or opportunity to infiltrate. Managing streams solely for localized needs can unintentionally pass problems such as these on to those living downstream.



An unhealthy rangeland stream supports insufficient vegetation to hold soil in place or filter runoff as it enters the stream from adjacent land.

Because the health of a stream at any point reflects the natural and man-induced disturbances made both locally as well as in the entire watershed above it, it is necessary that stakeholders throughout the watershed work together and become involved with planning and management of the watershed. Human intervention to repair damaged ecosystems requires a systems approach to the entire landscape, watershed basin and stream. In the changed and altered landscape of Texas, the emphasis should be placed on restoring and keeping stream and riparian areas healthy.

Efforts to raise awareness of Texas' water problems have focused on water availability, but neglected that healthy streams and riparian systems are essential for meeting this need. Riparian zone management, whether private or public, directly affects both the stream and its downstream water users. [A Texas Field Guide to Evaluating Stream and Riparian Health](#) has been written to help citizens recognize healthy stream and riparian systems and the impacts to Texas' public and private resources that result from various management decisions. It can be obtained through the TCE Bookstore at the following website <http://tcebookstore.org>. By understanding the ecological processes, key indicators and impacts of disturbances, landowners and other citizen-stakeholders can evaluate stream and riparian systems and improve their management to produce a clean and healthy water resource for the future.

This article contributed by Nikkoal Dictson, Extension Program Specialist at the Texas Cooperative Extension.

Calendar of Riparian Events

October. Rangeland Watershed Health Workshops held around the state. See your County Extension Office for more info.
- October 12. Fredericksburg, TX.
- October 25. Odessa, TX.
- October 27. Sonora, TX.

October 19-23. Texas Native Plant Society Annual Conference. Alpine, TX. Varied presentations will cover native plants, ecology, management, and more from riparian to mountain ecosystems. Visit <http://www.npsot.org/> for more info.

October 29. Canyon Lake Spillway Geology Field Trip. Cibolo Nature Center in Boerne, TX. An opportunity to walk in a new canyon created by the floods of 2002, and see exposed dinosaur tracks, fossils, and how water moves underground. Register for the hike at 830-249-4616.

October 29-November 2. Water Environment Federation's annual Technical Exhibition and Conference. Washington, D.C. For water and wastewater professionals from around the world to learn the latest practices, solutions and regulations in their field. For more info: <http://www.weftec.org>

November 6-10. Water Quality and Technology Conference and Exposition. Québec City, Québec, Canada. Water quality professionals from around the globe attend to hear about research, regulations, and technological advances for keeping drinking water safe. For more information, visit <http://www.awwa.org/conferences/wqtc>

November 7-10. American Water Resources Association 2005 Annual Conference. Seattle, WA. Conference will cover all aspects of water resources management. <http://www.awra.org/>

November 17-28. 2005 Texas Invasive Plant Conference. Lady Bird Johnson Wildflower Center, Austin, TX. A professional level meeting to help develop a coordinated, state-wide response to non-native invasive plants; provide a venue for sharing information about prevention, early detection, control & management, restoration, and research; and raise public awareness of the problem. For more info: <http://www.texasinvasives.org>

Pilot Regulation of Quarries on the Brazos River

When legislators completed the 79th Session this year, a portion of the Brazos River breathed a little easier. SB 1354, authored by Senator Craig Estes (R, Wichita Falls), provides protection of water quality in watersheds threatened by quarry activities in the stretch of Brazos below Possum Kingdom in Palo Pinto Co. to the Parker-Hood Co. line. The bill names this stretch the “John Graves Scenic Riverway,” after the man who authored the 1960 classic, *Goodbye to a River*, a book that documents Graves’ canoe trip and pays tribute to a rugged frontier life along the Brazos River.

The bill develops a pilot permitting program from 2005 to 2025 that only applies to the watershed of 115 miles of the Brazos. It authorizes the Texas Council on Environmental Quality (TCEQ) to require an individual discharge permit from existing quarries located within the 100-year floodplain or one mile of a navigable stream or lake in the watershed. Quarries in this watershed farther than one mile from the protected water bodies must obtain a general permit for discharging. The legislation also prohibits construction of any new quarry, or expansion of an existing quarry, within 1500 feet of the water. There is a provision for permitting quarries between 200 and 1500 feet if they meet certain performance criteria. According to Mike Stewart, President of Texas Aggregate and Concrete Association, the requirements are so stringent that it is unlikely any quarry operations could meet them.

SB 1354 also addresses the responsibility of offending quarries in the event of unauthorized discharges. It requires all permit applicants to submit a plan of action for restoring the water body to its background condition, and additionally, requires evidence of sufficiently funded bonding or proof of financial resources to accomplish the restoration of the water quality. This is not the same as a plan to restore the disturbed land after the mine is closed; however, a plan for that kind of mining reclamation is a requirement for those applicants wishing to obtain a permit in the area between 200 to 1500 feet from the river. The bill identifies penalties, fines, and procedures to force closure and also tasks TCEQ, Texas Parks and Wildlife, and the Brazos River Authority to cooperate on monitoring of water quality and conducting visual inspections, including aerial flyovers. The bill is available: <http://www.capitol.state.tx.us/cgi-bin/db2www/tlo/billhist/actions.d2w/report?LEG=79&SESS=R&CHAMBER=S&BILLTYPE=B&BILLSUFFIX=01354>

The years of 2003 to 2005 saw a major increase of interest by citizens and their elected officials in the impacts of quarries and mining. At the urging of his Burnet County constituents, Senator Troy Fraser (R, Horseshoe Bay) proposed unsuccessful legislation in 2003 aimed primarily at air quality issues from rock quarries and crushers. The effort to find political support for greater protection of rivers from mining sediment runoff got a boost from a well-placed landowner on the Brazos. Alice Walton, daughter of Sam Walton of Wal-Mart fame, bought a ranch on the Brazos in the 1990’s. She became alarmed when the water quality in the river took a dramatic turn for the worse. Walton and some neighboring landowners formed the Brazos River Conservation Coalition and sought help from the TCEQ. In frustration, Walton contacted Governor Rick Perry, and things began to happen fast.



The Brazos River at the Allied Mine site in July 2004.

In 2003, Perry responded by appointing an Advisory Committee on Rock Crushers and Quarries and urging TCEQ to step up enforcement. The nine-member committee, chaired by Troy Fraser, included senators and state representatives, a Burnet County commissioner, and two representatives of the aggregate industry. The committee’s work focused on issues that are currently not considered in the state permitting process:

- The impact of local truck traffic on state and county roads in the vicinity of quarries and rock crushers
- The impact to air quality beyond the immediate vicinity of quarries
- The impact to ground and surface water
- The impact of blasting on ground and surface water
- Land reclamation, after mining operations have ceased.

While the Advisory Committee agreed on many recommendations for new legislation, the differences resulted in the submission of two reports to the governor in January, 2005: the Interim Report and the Dissenting Report. The Interim report supported a new quarry permitting process that would require submitting site plans, transportation plans, reclamation plans, blasting plans and documentation, and an approved air quality permit. The site plan would include, among other things, hydrologist recommendations to prevent negative effects on ground and surface water. A reclamation plan must show a timetable, grading, and revegetation. The applicant would post bonds to assure the reclamation would occur within three years of mining cessation. Another recommendation called for high daily penalties for unauthorized discharging without a stormwater permit.

One of the major sticking points for the dissenters involved the transportation plan and its provision to obtain a recommendation from TxDOT on the adequacy of roads leading in and out of quarries. The dissenters also wanted to see further study by the legislature before recommending reclamation requirements and penalties. Both reports can be downloaded from the following site:

<http://www.senate.state.tx.us/75r/senate/members/dist24/acrcq.htm>.

A Listserv Primer

The Riparian Listserv is a service of the University of Texas, created to encourage the exchange of information on riparian issues among the citizens of Texas. You do not need to be a member of TRA to subscribe. Notices about recent riparian research, conferences, training, and activities are posted daily. The listserv also provides a forum for finding, sharing, and discussing riparian-related information and issues. TRA member business is generally conducted through a membership email list and snail mail.

To subscribe to the Riparian Listserv, send an email to: listproc@lists.cc.utexas.edu. Leave the subject line blank. In the body of the email, type: SUBSCRIBE RIPARIAN your first name your last name (for example: SUBSCRIBE RIPARIAN JOHN DOE). Soon afterwards, you should receive an email response confirming your request and providing general listserv info.

To receive listserv postings in a daily digest instead of receiving individual emails for each posting, send an email to the address above, leaving the subject line blank. In the body of the email, type: set RIPARIAN mail digest.

To remove yourself from the Riparian listserv, follow the instructions for subscribing, except in the body of the email, type: UNSUBSCRIBE RIPARIAN. Again, a confirmation email will be sent when your request has been processed.

To post messages to the listserv, direct your email to riparian@lists.cc.utexas.edu.

Please remember: When using the listserv, please be courteous to other users by not pushing the "Reply" button after viewing a message unless you want your reply sent to everyone that subscribes to the service.

That's about it! We suggest saving this primer for future reference. If you have questions, or encounter problems using the Riparian listserv, email Kevin Anderson.

Newsletter Basics

It's difficult to believe, but this is our third year of producing *TRA Stream Lines*. It is our hope that this newsletter will serve as a means of orienting new members and updating existing members to the developments and activities within our organization. I am sure that *Stream Lines* will evolve with the TRA, and I welcome your comments and suggestions for improvement, topics, and features (as long as you're nice). I also hope that you will contribute ideas, articles, and calendar entries for future issues.

We plan to publish this newsletter biannually, in the winter and the summer; the deadlines for submittals will be November 1st and May 1st, respectively. I encourage you to submit articles on topics you find interesting, but please be sure to make your submittals ahead of the deadline so that the newsletter can be printed on schedule. I will always edit articles for clarity and space constraints. Please send submittals (text as .doc files and images as .jpg files) and comments to Emily Schieffer at 512-451-5240 or eschieffer@lgroupinc.com. Thanks!

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Quarry Legislation, continued from page 4...

To help areas beyond the Brazos, Senator Fraser authored SB 785, Limitations on Certain Rock Crushers (over sole source aquifers), which included some but not all of the provisions of the Advisory Committee report. The bill was killed late in the session.

Other than the Brazos River legislation, quarries statewide currently are required to obtain from TCEQ an air quality permit for managing air emissions, a construction general permit for that type of industry, and an industrial stormwater permit showing how stormwater will be managed if it is discharged from the site. Some quarries do not seek a stormwater permit when operators believe they will not discharge but instead plan to retain all water on site.

The other action related to quarries' effects on rivers that resulted from Alice Walton's call to Governor Perry involved the response from Kathleen Hartnett White, chair of the Texas Council on Environmental Quality. TCEQ created the Clear Streams Initiative. During 30 days in May and June, 2004, TCEQ surveyed more than 300 quarry operations in the state to determine compliance with water quality regulations and permits. Even though TCEQ found large numbers of operations to not be in compliance, the overall conclusion was the "vast majority of the operators inspected had little or no impact on Texas waterways." TCEQ sought cooperation from Texas Parks and Wildlife and the state river authorities to conduct inspections, an arrangement that has been formalized in the Brazos legislation. With the help of the Attorney General's Office, one illegal quarry on the Brazos was forced to close and another voluntarily shut down. The Clear Streams Initiative Report on Investigation/Enforcement Phase is available online at the TCEQ's website.

Kathryn Nichols is a Community Planner with the National Park Service's Rivers, Trails, and Conservation Assistance Program.



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Or check us out on the web at www.texasriparian.org

Membership Update. The Texas Riparian Association is an all-volunteer, nonprofit organization dedicated to encouraging healthy riparian systems in Texas. The TRA's efforts in education, research and healthy watershed management are possible largely through the funds provided by members like you. Please consider joining us or renewing your membership today. Thank you for your support!

Yes, I want to become a member of the Texas Riparian Association and help to encourage healthy riparian systems within Texas!

Name _____ Affiliation (if any) _____

Address _____

Phone (work/home) _____ Phone (cell/pager) _____

Email _____

Please check one of the following annual membership categories:

- | | | | |
|---|------|--|-------|
| <input type="checkbox"/> Member | \$20 | <input type="checkbox"/> Business Member | \$50 |
| <input type="checkbox"/> Student Member | \$10 | <input type="checkbox"/> Sponsoring Member | \$150 |
| <input type="checkbox"/> Government or
Non-profit Member | \$35 | <input type="checkbox"/> Life Member | \$300 |
| | | <input type="checkbox"/> Sustaining Member | \$20 |
- (add to cost of any other membership category)

I would like to serve on a committee! My first choice is:

- Administration (finances, incorporation, by-laws, membership)
- Program (agendas and logistics for conferences, workshops, seminars, meeting planning)
- Outreach (educational materials- except programs- including newsletter, website, brochures)
- Research & Demonstration (library, database, demonstration projects)

Please make checks payable to the Texas Riparian Association and mail with this form to:

TRA c/o Center for Environmental Research
2210 S. FM 973
Austin, Texas 78725-7103

For more information on membership, contact Kevin at kevin.anderson@ci.austin.tx.us