Cleaning Up after the Flood:

Guidelines to Protecting Long-Term River Health on a Hill Country Landscape

Photo courtesy of Ryan McGillicuddy, Texas Parks and Wildlife Department.

Natural Recovery

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What is a riparian area?

A riparian area is defined as the transition zone between the aquatic ecosystem (e.g., stream) and the terrestrial ecosystem (e.g., upland environment). These areas include the streambanks, wetlands, floodplains, and other associated waterways that are adjacent to the stream. Although riparian areas make up a small percentage of the Texas landscape and are well-known for their aesthetic and economic value, riparian areas perform key ecological functions and provide a durable buffer against natural disturbances.

Key Ecological Functions of Your Riparian Area

Rivers and creeks rely on healthy, functioning riparian areas (e.g., floodplains) for maintaining their water quality and quantity. A riparian area that has adequate vegetation, landform, and large woody material will exhibit the following physical functions:

- Dissipation of stream energy
- Stabilization of banks
- Reduced erosion
- Trapping of sediment
- Absorption and storage of surface water
- Floodwater retention
- Groundwater recharge
- Sustain baseflow to the adjacent stream

These functions directly uphold the most valued aspects of our streams, including water quality and quantity, aquatic habitat, recreational value, and aesthetic beauty. Research has shown that a well-vegetated and stable riparian area plays a significant role in maintaining the balance of sediment loss and deposition.

What is baseflow?

Baseflow is the typical amount of water flowing through a stream. It can be sustained by groundwater seepage and stored water that is slowly released from the banks. Baseflow can be increased with improved riparian management.

Spikerush, a colonizer plant. Photo courtesy of Your Remarkable Riparian, 3rd edition.

Native Riparian Vegetation

Root systems of native riparian plants are typically much denser and stronger than plants found in the upland environment. For example, one of the most common native riparian plants in Texas, spikerush, can contain as much as 22 total root length miles per cubic foot of soil! These incredible adaptations are some of the most critical factors in maintaining stable stream banks. Some extremely resilient native riparian plant communities can withstand the most extreme flood or drought events. For example, a streambank lined with a buffer of mature bald cypress trees, a woody understory, and some herbaceous cover will exhibit some of the highest stability and resilience possible.

Three broad types of riparian vegetation contribute to stability:

- Colonizer plants: quickly spread and establish a mat of new root systems by stolons or rhizomes (e.g., spikerush, knotgrass, sedges, water primrose, water hyssop).
- Stabilizer plants: typically upright, taller vegetation with dense root masses (e.g., Emory sedge, switchgrass, eastern gamagrass, saw grass, bushy bluestem).
- Woody plants and trees: contain larger diameter roots whose systems mimic that of rebar (e.g., bald cypress, sycamore, black willow, little walnut, button bush, indigobush amorpha).

"Wood is Good"

Some of the other main features present in a healthy, functioning riparian area are large woody materials or large rocks. These features help slow down floodwater, provide increased stability to the banks, and trap sediment which aids in the recruitment of new vegetation. Large woody materials leftover from an uprooted or mortally damaged tree may look unsightly at first, but its presence, if lightly modified or left alone, can greatly aid a landowner in recovery and restabilization efforts, especially where soil cover has been lost. For example, an uprooted tree, with the root wad intact, may be left in the stream with the root wad facing upstream. Downed wood such as this will often eventually become assimilated into the soil profile, adding additional structural reinforcement. Tree stumps already assimilated into the streambank can be left alone to preserve stability, even if the remainder of the tree has been damaged or lost.

Did you know?

Some important riparian trees can sprout from live cuttings. Some of these include cottonwood, willow, box elder, and button bush. For example, simply cut a branch pruned from a willow to create a stick with a length of 10 to 18 inches. The ideal branch is about ½ inch in diameter. Place the cut end of the branch directly into moist soil at a depth of 6 to 8 inches. This resilient tree is easily propagated by this method and will undergo rapid rooting after being planted. Consult a local horticultural specialist or forester for more information.

The full-on removal of woody material from riverbanks, whether by floodwaters or by human activity, can be a major hindrance to recovery of the landscape. Long-term effects of this can include the loss of the water table due to increased erosion and, the loss of water-storing sediments on the floodplain, continually worsened erosion, and increased intensity of downstream flooding. See our woody debris notes below for more information.

Downed wood can play an integral role in restoration of the landscape, however, deference should be given during response and recovery efforts following natural disasters. It will be inevitable in some situations that considerable wood removal is necessary, particularly during recovery efforts, repair of critical infrastructure, risk prevention efforts, and during cleanup of trash. Careful consideration of how wood is removed or replaced during or after these processes can greatly aid in restoration.

General rules of thumb on large woody debris:

- Large, beneficial wood for the stream will be greater than 4" in diameter and 6' in length
- Woody debris that poses little to no risk to infrastructure is best left in place
- When debris is obviously hazardous and poses a risk to infrastructure such as bridges, crossings, or homes, it should be removed

Choose Your Battles Wisely

A key component of river-front properties is the recreational opportunity they provide. Figuring out where to focus on revegetation, where to leave root masses or trunks from mature trees, and where to reestablish recreational access points are challenging tasks that can have priceless rewards. Certainly not all the woody flood debris must be left in place following a major flood, but some of the largest woody material, including an uprooted trunk from a mature tree, which prior to the flood, was contributing greatly to stability, should be strategically placed within the riparian area when possible. See the Further Reading section below for further guidance and appropriate contacts for consultation.

Photos courtesy of Ryan McGillicuddy, Texas Parks and Wildlife Department.

Essential Resources

Before considering major or minor modifications to a flood-battered landscape, make sure to follow local and federal rules, including calling your local municipality prior to any digging to ensure known locations of underground infrastructure.

Any construction or fill activities performed within the stream channel (below the Ordinary High Water Mark) requires a 404 permit from the US Army Corps of Engineers (USACE). Guidance regarding these regulations can be found at: www.swf.usace.army.mil/Media/Public-Notices/Article/1667025/special-public-notice-concerning-flood-recovery-and-repair-activities/ or call the USACE Fort Worth District – Regulatory Division line at 817-886-1731.

Any disturbance or taking of streambed materials from streambeds under jurisdiction of the State of Texas must require a Sand and Gravel Permit from the Texas Parks & Wildlife Department (TPWD). Some exemptions may exist for certain activities related to repairing existing infrastructure. Plant installation will not require this permit if non-mechanized equipment is used.

Contact the TPWD Aquatic Resource Permitting and Consultation Program at tpwd.texas.gov/faq/landwater/sand_gravel or 512-389-4589.

Construction or other activities occurring in your county's floodplains may be regulated by your county's designated Floodplain Administrator as determined by the Federal Emergency Management Agency's Flood Insurance Rate Maps. Contact your county's office to receive a permit or exemption.

Further Reading - Technical Resources and Guidance

Restoration Design Guidelines for Texas Hill Country Riparian Areas – This 2016 publication is the seminal guidebook to developing riparian recovery projects, published following the deadly Memorial Day weekend flooding on the Blanco River in 2015. The publication greatly expands on all topics mentioned in this document and describes many applications and case studies that may be appropriate to replicate accordingly on your property. The featured methods accommodate recreational access on site while preserving ecological integrity.

Visit: https://tpwd.texas.gov/publications/nonpwdpubs/media/hill_country_design_guidelines.pdf

Visit: tpwd.texas.gov/publications/nonpwdpubs/media/blanco_river_design_guidelines_2016.pdf

More Resources

Your Remarkable Riparian – The Definitive Guide to Texas' Riparian Plants. Find sales for the guide and online educational resources on various riparian recovery practices on their website.

Visit: nueces-ra.org/remarkableriparian

TPWD: Landowner Assistance and Technical Guidance Program – this program works with individual landowners to provide advice and information to land managers for the conservation and development of wildlife habitat and the proper management of the various wildlife populations which utilize that habitat.

Visit: tpwd.texas.gov/landwater/land/technical_guidance

Texas A&M Forest Service (TFS): Stewardship Planning and Technical Assistance – TFS foresters offer the assistance and expertise so you can make responsible decisions regarding the riparian management of your property. Through developing a stewardship plan, they'll help you tailor your efforts to best fulfill your management goals.

Visit: tfsweb.tamu.edu/forest-land/forest-land-management/stewardship/stewardship-management-plans

TFS: Funding Connector – The Funding Connector online tool serves as a clearinghouse for information about various natural resource programs that offer financial assistance to Texas landowners, communities, and nonprofit organizations to implement conservation practices.

Visit: texasforestinfo.tamu.edu/fundingconnector

Hill Country Alliance: Riparian Management resources – The Hill Country based non-profit that offers educational resources and stewardship workshops to support private landowners with their land management goals. HCA's Riparian Management resources are intended to teach and inspire ways individual landowners and united community can care for rivers together.

Visit: hillcountryalliance.org/our-work/land-stewardship-and-conservation

Mapping Resources

Texas A&M Natural Resources Institute (NRI) – NRI offers an interactive TxMAP for landowners to better understand the natural resources present on their property.

Visit: txmap.nri.tamu.edu

U.S. Geological Survey (USGS) – USGS offers an online resource, the National Map, which allows users to view a variety of spatial layers on your property.

Visit: usgs.gov/tools/national-map-viewer

Texas A&M Forest Service – TFS provides online mapping resources to help landowners study the topography on and around their property.

Visit: texasforestinfo.tamu.edu/mapmyproperty

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Texas Water Resources Institute
make every drop count

TEXAS STATE Soil & Water CONSERVATION BOARD

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