EDF ENVIRONMENTAL DEFENSE FUND
Finding the ways that work

CLIMATE RESILIENT WATER SYSTEMS

Understanding groundwater and surface water in Texas

The water coursing through Texas' 15 river basins is our state's lifeblood. It provides precious drinking water to millions of Texans, irrigates farmers' fields, generates hydroelectric power, sustains fish and wildlife, and supports outdoor recreation.

However, it is the water beneath the surface of the land — groundwater invisible to our eyes — that sustains it all, supporting the ecology and economy of Texas.

To ensure that Texas' water supplies are secure in the face of increased demand and frequent drought, it is critical to build a greater understanding of the hydrogeologic connection between groundwater and surface water and develop appropriate policies and strategies that will lead to more resilient management of these interconnected water supplies.

Jacob's Well is the second-largest fully submerged cave in Texas and an artesian spring that releases thousands of gallons of water a day. It is the main soruce of flow for Cypress Creek.

Connected water supplies

A 2016 study by the Texas Water Development Board determined that an estimated 9.3 million acre-feet of groundwater flows from major and minor aquifers to surface water in an average year, representing an average of 30% of the water flowing in Texas rivers. Moreover, in many streams and rivers in the Hill Country and West Texas, groundwater is the sole source of flow.

As streamflow is increasingly impacted by groundwater pumping in many rivers and at iconic Texas water sites such as Jacob's Well and San Solomon Springs, state agencies, scientists and policymakers must place greater focus on understanding how groundwater and surface water interact. Understanding these connections is critical to developing solutions to protect surface water right holders, the public's interest in surface water, and landowners' property rights in groundwater.

Science and policy needs

In general, water management in Texas treats groundwater and surface water as separate, independent water sources. However, the Water Code does recognize the potential interconnectivity between groundwater and surface water resources by requiring the Texas Commission on Environmental Quality to *consider* impacts to groundwater when issuing surface water permits and by requiring groundwater conservation districts to *consider* impacts to surface water when issuing groundwater permits and impacts to springflow when adopting desired future conditions.

In practice, *real* consideration of surface water-groundwater interactions is difficult for these governmental entities to make, as they lack highly refined models and local data needed to understand these interactions in a specific river basin.

Although TWDB has developed and is updating groundwater availability models (GAMs) for aquifers across the state, these models do not accurately simulate surface water-groundwater interactions for three main reasons: (1) GAMs were developed to address water issues at relatively large spatial scales, whereas surface water-groundwater interactions occur at a local scale; (2) GAMs use time periods of months to years, whereas accurate modeling of surface water-groundwater interaction requires time periods of hours to days; and (3) GAMs cannot simulate unsaturated flow — the water flowing through the land surface into an aquifer.

Policy Recommendations

Decisions on groundwater and surface water need to be based on science and go beyond a "consideration" by regulatory agencies. Environmental Defense Fund recommends the following steps to build a greater understanding of the critical connections between groundwater and surface water, which is crucial to managing our groundwater resources and achieving water security for future generations of Texans.

- Create a statewide advisory group to develop policy recommendations related to improving understanding of groundwater and surface interactions in Texas.
- Provide more funding for groundwater conservation districts, TCEQ and TWDB to:
    - Develop the science to better define baseflow, bankflow, and underflow within river basins.
    - Conduct field studies and data collection, such as dye tracing and well monitoring in local watersheds.
    - Develop refined models that can be integrated with existing groundwater availability models.
    - Develop policies based on the above data and science that ensure more resilient water supplies to meet greater demand from population growth and lower supplies from drought.

A diver swimming in the clear, spring-fed water of the Devils River.

About EDF

Environmental Defense Fund, a leading international nonprofit organization, creates transformational solutions to the most serious environmental problems. For decades, we've built inclusive environmental coalitions alongside farmers, ranchers, corporate leaders, and other unexpected allies — teaming up on projects where we can make the greatest impact. Please contact a member of our team to learn more about our work:

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