

## **IMPACTS**

### **Restoring Natural Ecosystems in Urban Settings**

#### *Issue*

Because wetlands provide such ecological benefits as water quality improvement, flood abatement, wildlife habitats, and support for biodiversity, the U.S. government requires that developers destroying wetlands mitigate this destruction by restoring or creating wetland elsewhere. Our ability to successfully restore and create sustainable wetland is still very limited and much research is urgently needed, especially in watersheds where urbanization process has strongly altered the hydrologic process.

#### *Partners*

Texas Agricultural Experiment Station

Dept of Rangeland Ecology & Management, TAMU

Texas A&M University

City of Garland, Texas

Lake Lewisville USACOE Aquatic Ecosystem Research

As developers work to keep pace with population and industry expansion in the Dallas-Fort Worth metroplex, more and more land is being degraded, and an increasing number of natural ecosystems are being destroyed. Rowlett Creek, a major spawning ground for white bass, has been particularly susceptible. Flooding brought about by urbanization has likely chiseled the creek bed progressively deeper over the past 30 years, lowering the area's water table and altering the types of vegetation that can survive on the creek's upper banks. The Texas Agricultural Experiment Station is partnering with the City of Garland, just northeast of Dallas, to create a 75-acre bottomland forest wetland complex from a "borrow" pit used by the city to excavate cover soil for the Castle Drive Landfill, which was closed during the spring of 2003. The site is located adjacent to Rowlett Creek and will provide an inlet for floodwaters and allowing cleaner water to flow into Lake Hubbard downstream. The city's 30-year commitment to maintain the site as a closed landfill will allow ongoing research on wetland restoration by the Experiment Station, which will assist the Army Corps of Engineers in future wetlands mitigation in urbanizing watershed.

- The researchers created a simulation model of the proposed wetland to determine the best design. The chosen design incorporates open-water marshes, flat bottoms, a series of sloughs and ridges, and an oxbow lake. It includes an adjustable inlet from and outlet to Rowlett Creek. Birds and animals will be attracted to the area, and the wetlands will absorb floodwaters from Rowlett Creek, bringing with them fish that are swept in during flooding.
- In late February and early March of 2004, some 13,000 tree seedlings were planted in 90 research experimental plots and surrounding areas at the site. Fifteen kinds of wetland trees associated with bottomland forests were planted, including pecan, oak, sycamore, water hickory, and black walnut.

- For part of the experiment, researchers planted hardy, fast-growing “pioneer” trees early in the restoration and later plan to plant more-desirable species, after partially thinning the pioneer trees.
- Researchers are also testing tree seedlings to determine the effect of various flooding scenarios on young trees using mesocosm experiments. This data will help researchers make better decisions about which species to plant in urban wetlands.
- An experiment of designed planting of aquatic plants vs. a control of a natural colonization was implemented in a set of sloughs in the summer of 2004. Aquatic plant materials have been developed at the Army Corps of Engineers’ Lewisville Aquatic Ecosystem Research Facility (LAERF) for this experiment and future large-scale planting- at the site.
- The planting design for the wetland site will be finalized in 2006, based on experiment results.
- Short, medium, and tall prairie grasses are being planted at the top of the landfill.
- The wetlands project involves graduate and postdoctoral students, who are gaining hands-on experience in planning and developing urban wetlands. It has also attracted volunteers from the local communities—including students, master naturalists, and interested citizens—who helped to plant the young trees in February and March. The wetland will provide an outdoor classroom for students for years to come and will attract nature lovers from all walks of life.
- Researchers conducted a watershed modeling study to evaluate the impact of future urbanization on stream hydrology and flooding and to predict the future of the wetlands under various urbanization scenarios.
- Researchers plan to establish parallel long-term monitoring of the nearby Spring Creek Forest Preserve, a mature bottomland forest wetland complex that is subject to the same effects of urbanization as the Castle Drive site. This study should provide valuable data on ways both natural and restored wetlands respond to urban growth.

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