The Thompson Bend Riparian-Corridor Project:

An Innovative Environmental Solution to a Major Navigation and Flood-Control Concern

By Terrie J. Hatfield

At a bend in the Mississippi River, south of Cape Girardeau, Missouri, and north of Cairo, Illinois, the river flows in a broad, sweeping, reverse curve. This large, meandering loop has created an agriculturally rich, 10,000-acre, peninsula-like land mass known as Dry Bayou-Thompson Bend, located just above the Mississippi River's confluence with the Ohio River.

At first glance, this bend would not appear to present any major problems but, over time, the Dry Bayou-Thompson Bend reach of the Mississippi has experienced such severe and damaging erosion that, during and after flooding, the river has begun to scour and cut a new channel across the peninsula in an attempt to change its course. Now, this change has yet to cause the mighty river to go off in a different direction but, if it were left alone and allowed to have its way and continue this cut-off formation, navigation would become impossible along this 17-mile reach of the river. A new channel, cut across the neck of the peninsula, could not support even the smallest of tows, and the existing channel would be too shallow for navigation most of the time. The velocities would increase manyfold, due to the increased slope upstream and downstream of this reach of river, as the Mississippi would attempt to regain an equilibrium state.



The Thompson Bend project area during the 1995 flood

It was evident that if an efficient solution were not soon developed, a navigation crisis—potentially catastrophic to navigation, agricultural, and flood-control concerns—would occur. Southbound traffic would come to a halt at the beginning of the bend, and northbound traffic from New Orleans, Louisiana, could not progress north of Cairo. This midpoint 17-mile reach, if destroyed, would cause a break in the continuous 2,300-mile navigation channel. Navigation on the "Mighty Mississippi," the inland waterway system's busiest highway, would become nearly impossible for transporting a variety of products from the northern United States to the European market. Channel development would be an extremely time-consuming and very costly effort. The magnitude of the scour was such that it was also threatening the integrity of the mainline, Commerce to Birds Point Federal Levee, which protects hundreds of thousands of square miles of property.

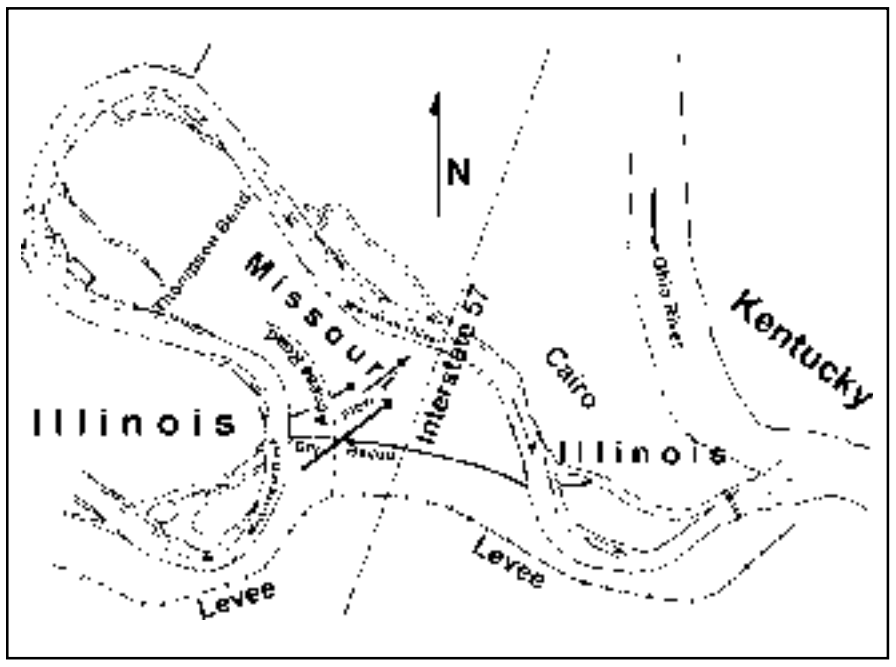
A nonstructural, environmentally beneficial way to stop the erosion and repair the damage was needed, but the technology to resolve this kind of problem did not exist. So a 14-year period of trial and error and innumerable experiments began. During this time, the Great Flood of 1993 occurred, in addition to the major flood

of 1995, plus many other high-water events of varying duration. Although these events caused setbacks, they also provided valuable opportunities to collect data and evaluate the work that is now known as the Thompson Bend Riparian-Corridor Project.

The result of these many years of hard work was the successful creation of the tree-screen/riparian-corridor concept, which consists of a buffer strip of trees planted between the riverbank and the floodplain. This methodology at this magnitude is a revolutionary and unprecedented blending of various sciences and technologies in an environmentally sensitive and friendly, cost-effective, and mission-essential manner. The project included obtaining permanant easements from the landowners; planting cottonwood clones and other hardwoods specifically bred for their fast growth and water-resistant attributes; and strategically placing various forms of other types of vegetation. The trees will be selectively harvested, in agreement with an arrangement with the landowners and local levee board, so they do not cause too much shade and prevent undergrowth. (A major side benefit of this part of the process is that it also provides timber as a cash crop for the landowners.) Consistent and continuing application of this technology, including ongoing tree planting, has maintained the river in its natural, original channel, and navigation has been sustained around Thompson Bend.

This erosion-control method has been so successful that it is considered by the Corps of Engineers' Mississippi Valley Division to be a prototype demonstration for the entire Corps. The concept is changing the way the Corps deals with severe erosion problems along the nation's waterways, while providing benefit to the environment.

The innovative concept was severely tested by the Great Flood of 1993. Even though approximately 40 percent of the trees were killed in the flood, they stayed anchored in place. The idea worked far beyond expectations. No one realized when they started that a 100-foot wide tree screen would cut flood velocities in half. However, when measured with a Global Positioning System and an Acoustic Doppler Current Profiler, flows measuring 8 to 8 1/2 feet per second going into the screens measured 4 to 4 1/2 feet per second coming out. This led to far less erosion and scour, increased deposition and, eventually, healing. The tree screens planted in the original Dry Bayou high bank in 1986 held even through the 1993 and 1995 floods.



Map of Thompson Bend

Projects such as the Thompson Bend Riparian-Corridor Project are essential to continue the Corps of Engineers' mission of maintaining a safe and dependable navigation channel, while working with the environment in such a way that everyone benefits. The Mighty Mississippi has been around for a long time and will be around for a longer time than any of us can imagine. It is a very big river and, if we all work together to develop viable solutions to the problems it causes, everyone will benefit.

Ms. Hatfield has been with the Defense Department for more than 35 years, most of that time spent as a position classification specialist. She learned of the Thompson Bend Riparian-Corridor Project while conducting classification reviews in the Engineering Division's Hydraulics Branch. Currently serving as a public affairs specialist and editor of the district newsletter, Terrie now has the op-portunity and the vehicle to translate some of the district's most outstanding engineering successes into feature stories as a very effective way to convey these achievements to both technical and nontechnical audiences.

Note: The hydraulic engineer who developed the innovative solution to this erosion problem was Jerry Rapp. His technical paper "Preventing a Cut-Off of a Mississippi River Bendway With Tree Screens" was a finalist in the Permanent International Association of Navigation Congress competition and was published in 1989. His technical expertise has become widely recognized in the development of various vegetative solutions for a wide range of overbank and bank-line erosion problems. His research and innovative and environmentally beneficial designs have earned him "expert" status throughout the Corps's Mississippi Valley Division and with other elements of the Corps and a number of environmental agencies and interests, including those in foreign countries.