**US Army Corps of Engineers’ Albuquerque District Restores Rio Grande Ecosystems with River Engineering**

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**R**iver engineering is the process of planned human intervention in the course or flow of a river with the intention of producing a benefit, like reduced flooding or easier passage.

While involved in river engineering today, the Corps has increased the emphasis on protecting and restoring the environment.

The employees in the Corps’ Albuquerque District engineered levees along the middle Rio Grande about 50 years ago, after the river had been significantly channelized from development and irrigation works. The levees were created in response to historical instances of catastrophic flooding and loss of life, but they locked the river and kept if from finding its natural path. Before this work and the installation of dams at key positions upstream of Albuquerque, the Rio Grande would transport and deposit sediment as it meandered across the Rio Grande Valley making the soil ripe for planting.

“Meanders are nature’s way of slowing the flow of a creek, stream or river, and they result in helping to protect the floodplain from erosion,” said District Hydraulic Engineer Steve Boberg. “Near Albuquerque, river engineering of the Rio Grande has created a perched river bed above the Valley floor and has hydrologically disconnected the river from the floodplain. If a significant flood occurred, much of the water would not easily return to the river’s channel.”

Boberg said rivers naturally meander as they take the path of least resistance, which results in the river bed eventually obtaining an equilibrium slope. If a river runs into a large obstacle it will typically go around versus through the obstacle, under normal flow conditions. As a river meanders, the velocity of the water is variable because the water towards the outside of a meander moves at a faster rate than the water on the inside of a meander. Therefore, a river’s shape changes over time, due to the different forces of the water and the obstructions the water encounters.

One result of channelizing and disconnecting the Rio Grande from the floodplain was increased urbanization and development. Another was the drying of fertile land to either side of the river and an increase in the potential for fires. Yet another was loss of wildlife habitat contributing to increased hardship on endangered species like the Rio Grande silvery minnow and the southwestern willow fly catcher.

In response to these changes, the Albuquerque District and partner agencies are now involved in several Rio Grande restoration projects to find ways to reconnect the River’s active channel with the outer banks, while keeping the levees.

“We have to remember why we did the river engineering in the first place,” Boberg said. “The levees were necessary to protect against severe flooding, and we have to make sure the restoration work does not reduce the effectiveness of these protections we have in place.”

At a cost of more than $20 million, the restoration work will include removal of invasive plants, seeding, planting, thinning, removal of jetty jacks (very large iron jacks positioned along the banks to catch debris), bank lowering and introducing high flow channel braids.

According to Boberg, channel braids are small, semi-circular channels that are excavated on alter-nating sides of a river to encourage slow river flow and enhance wildlife habitat. The placement of the channels look like a braid when viewed from above and help return curves and meanders to the river during high flow.

Ecosystem restoration became a Corps’ mission in 1990 with a goal to restore degraded ecosystem structure, function and dynamic processes in its areas of operation to a less degraded, more natural condition. In 2002, the Corps reaffirmed its commitment to the environment by formalizing a set of “Environmental Operating Principles” that are applicable to all of the Corps’ decision making and programs. These principles foster unity of purpose on environmental issues, reflect a consistent tone and direction for dialogue on environmental matters and ensure that employees consider conservation, environmental preservation and restoration in all Corps’ activities.

For the past 10 years, the District has been a member of the Middle Rio Grande Endangered Species Collaborative Program, which has, in accordance with state and federal laws and Rio Grande compact obligations, promoted the conservation and the recovery of the Rio Grande silvery minnow and south-western willow flycatcher. The program has contributed to Endangered Species Act compliance for all program parties and has encouraged water development and management activities.

All signatories of the collaborative program agree successful recovery of endangered species depends on each member’s cooperation to provide sufficient water and habitat to maintain viable populations.

Sufficient water is paramount yet a challenge in this arid climate, because nearly every drop of water in the District’s operating area is closely accounted for via four water compacts. The four compacts are: Arkansas River Compact, Rio Grande Compact, Pecos River Compact, and Canadian River Compact.

A tight collaboration between several agencies, driven by the formal interstate compacts, has eliminated water wars and has helped protect a historic way of life for everyone along the major rivers in the Albuquerque District.

The four water compacts were set up to “remove all causes of present and future controversy regarding the equitable distribution of waters” within the states. Compacts ensure that each state gets its agreed share of the water and provides for mathematical reimbursements when a partner doesn’t.

Typically, each compact administration has a set of “engineer advisors” to the compact commissioners. The engineer advisors meet prior to the formal compact meetings and invite various federal, state and local agencies to provide updates on ongoing compact activities and water operations in preparation for the formal meetings. The Albuquerque District provides a report during the federal agency presentations portion of the formal compact meetings to explain Corps’ activities within the respective river basins.

The Corps’ lakes and dams in the Albuquerque District’s area of operations play a critical role in supplying water for communities and farms, preventing or reducing flooding and providing recreational opportunities for the public. However, the District does not own any of the water and, unless flood operations are occurring, typical water releases are based on downstream demands by stakeholders.

Despite being the “middle-man” in the water purveyance business, the District’s personnel have sole authority to ensure flood and storm damage reduction infrastructure is maintained so the public is less at risk. And, in times of disaster, the District is ready to provide emergency assistance.

According to the U.S. Geologic Survey (USGS), flooding is the most common, costly and deadly natural disaster in the United States each year, and flash flooding is a real problem in the desert. Water doesn’t quickly soak into dry and compact desert sand, and heavy rains tend to bring flood conditions with little to no warning. Remarkably, USGS con-firms more people drown in the desert each year than die of thirst.

All of the Corps’ myriad missions, from restoration to disaster response, have one thread of commonality; they are conducted by people who are motivated to deliver high quality solutions. The Corps’ motto of “Building Strong” means putting people first, while working to solve local engineering (including river engineering) challenges.