

## **Ripple Effect # 60**

### **“LIDAR: What Is It?”**

We don't often think electronics and water at the same time, in the same thought. Pipes and water, yes, but not water and a sophisticated combination of laser, global positioning and digital imaging technologies.

But that's exactly what LIDAR—Light Detection and Ranging—is. And LIDAR has more to do with water, especially in the Red River Basin, than you might first think.

Today, we'll look at what LIDAR mapping is, before exploring in a future *Ripple Effect* what LIDAR has the potential to do for you and for communities throughout the Red River Basin.

LIDAR technology integrates airborne laser and global position system (GPS) technologies to map the earth both horizontally and vertically with an astounding degree of accuracy. Most LIDAR mapping results in vertical accuracy of less than 6 inches and horizontal accuracy of slightly more than 3 feet.

We have long had horizontal maps, of course, and these maps often contain some signs of vertical differentiation. But only LIDAR can produce the precise vertical information so important to those of us who live in and around a former lakebed, subject to flood events and requiring draining to keep agriculture flourishing.

Like much other mapping, LIDAR is done from an aircraft. What makes LIDAR different from other forms of mapping is the carefully predetermined grid pattern in which the aircraft flies and the use of laser technology to measure land elevations. Laser equipment aboard the aircraft measures vertical height via beaming light and measuring the time it takes for the light to return (thus the “Light Detection” in the name) and the ability to measure vertical elevations to an accuracy of 6 inches or less.

Integrated with the laser is a global positioning system, so while the laser is measuring distance to the earth, the GPS measures the horizontal location (thus the “Ranging” in the technology's name) and the ability of the technology to maintain accuracy of location to within 3 feet.

A third integrated technology is digital imagery, so that maps can be generated of the areas covered.

All of this data is recorded and can be retrieved from the database designed to hold it in two formats: in numerical form (the form necessary for serious engineering) and, where digital imaging has been used, in visual maps showing vertical elevations using topographic lines and color coding. Given the preciseness of the mapping, the size of the data set is large—a map of the full Red River Basin on the US side would result in approximately 6 terabytes of data.

Despite the size of the data, numerous public and private examples indicate that storing and disseminating this amount of spatial data is quite possible.

So, getting back to water, what could we accomplish in the Red River Basin with LIDAR mapping? In a future *Ripple Effect*, some of the ways LIDAR technology could take water management in the Basin to new levels will be explored..

Until the next Ripple Effect,

The Red River Basin Commission (RRBC)

The RRBC is a grassroots organization that is a chartered not-for-profit corporation under the provisions of Manitoba, North Dakota, Minnesota, and South Dakota law. Our offices in Moorhead, MN and Winnipeg, MB can be reached at 218-291-0422 and 204-982-7254, or you can check out our website at [www.redriverbasincommission.org](http://www.redriverbasincommission.org).

