

Ripple Effect #81

Grasslands and Flood Reduction

Although it looks as though the Red River Basin may make it through spring melt without significant flooding this spring, flood events have been all too frequent lately. Research by Dr. Phil Gerla, a hydrologist from the University of North Dakota with a long history in private and academic work studying the behavior of water in soils, suggests that grasslands may reduce or delay the peaks flows we see here in the Basin.

Dr. Gerla spoke recently to a group of professors and students from North Dakota State University's Soil Science department, sharing the results of his research on how conversion from fallow areas to grasslands affects water runoff.

The study began with the challenge of locating a comparison area that included undisturbed grassland in the Red River Basin, which has been 98% cropped. He located an ideal comparison site in the Glacial Ridge area of Minnesota, where he found a plot of natural grassland that had been protected by a natural fen and that bordered cropped land with similar soil.

So what are differences between runoff from cropland and runoff from natural prairie grasslands? Dr. Gerla answered the question on three scales: that of just the local site, that of the local watershed, and that of the Red River Basin as a whole.

To find out what was happening at the local site, Dr. Gerla monitored the moisture in the two sample areas. He found that the cropland showed a significantly larger moisture range, from wet to dry, than grassland – and also had less resistance to drought. In other words, cropland is wetter than grasslands during wet conditions and dryer than grassland during dry conditions.

A major reason for this difference can be explained by the difference in root systems of natural prairie grasses and cultivated crops such as wheat or alfalfa. Images of the roots of native grasses alongside roots of cultivated crops reveal a striking distinction in density and depth of roots between prairie grasses and cultivated crops such as wheat or alfalfa.

On the scale of the local watershed, Dr. Gerla discovered that cropland showed 30 – 50% more direct runoff than grassland. Moreover, he found that holding

back water in one section of the natural grassland could significantly reduce the peak flow on the local watershed.

As for the impact of grasslands for the whole Red River Basin, the study suggests that grasslands consistently offer more storage and increased time of holding waters, thus reducing peak runoffs. Although this reduction may be negligible in very large flood events, applying what the study reveals about grasslands' ability to hold water has the potential to trim flood peaks in normal flood events by controlling local contributing watersheds.

Dr. Gerla's study suggests that projects such as the Glacial Ridge Prairie Restoration and similar projects in Manitoba are contributing far more than increasing biodiversity and recreation opportunities within the Red River Basin. They are providing vital protection for the Basin's citizens and industry, including its agriculture future.

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.

