Sedimentation Control along the Diez Lagos Irrigation Drainage Canal at Sunland Park, NM

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Riparian regions of the arid southwestern parts of the United States which used to stabilize stream banks and control soil erosion have deteriorated over time due to canalization of rivers and streams for the purpose of conveying water mainly for irrigation. The deterioration of riparian regions have resulted in less diverse vegetation or no vegetation, the soils have become more prone to erosion. While much work has been done studying the effect of vegetation on erosion in arid environments, there is little research in the rehabilitation of native vegetation as a control on erosion. Such research is being conducted at Sunland Park, NM urban Test-Bed site. The site is located 40 miles southeast of New Mexico State University in Las Cruces, near El Paso, Texas and is 3.6 miles north of the Mexico-USA border. This study is part of a larger study to rehabilitate an urban riparian area along the Diez Lagos irrigation return drain which flows parallel and eventually discharges into the Rio Grande.

To study the rate at which the sedimentation is occurring at the site, both Global Positioning System (GPS) and elevation information were collected. Erosion measuring stakes were placed with varying distances of 10 m, 25 m, and 50 m within the site. AutoCAD was used to analyze GPS coordinate data and information about elevation in the study area to make a connection to the location in the field where different data values could be collected and stored as a Geographic Information System (GIS). There was a total of 629 points taken in the field and 75 stakes used for erosion measurements. Sieve analysis shows the highest percentage of soil retained was found between 0.15 mm and 0.177 mm. From the sieve analysis, the size class which made up the majority of sediment from 26 soil samples taken from throughout the study area constitutes fine sand.

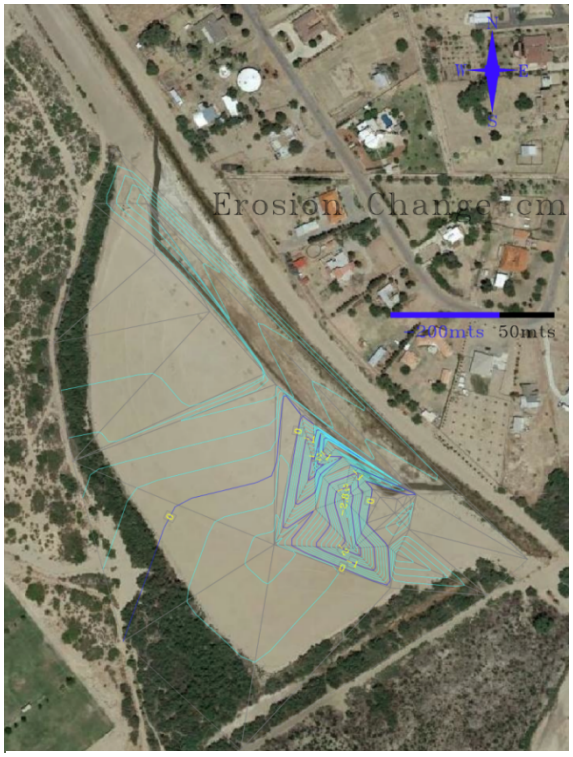

Figure 1. This map shows changes in soil height caused by erosion over the period of a month.

Surveying the changes in soil height surrounding stakes in the field site shows some erosion had taken place over the period of a month. Also there was one significant storm with high precipitation during that time period. See

Figure 2. Out of the 75 stakes, 53 showed no change in height, making up 70.6% of the stakes. A total of 18 stakes had -1 cm or less in a change of height which consisted of 24% of the stakes. There was a total of 4 stakes with erosion over -1 cm change in height, making up 5.3% of stakes. Meteorological data on daily precipitation was collected from Santa Teresa Airport located 5.95 miles northwest of the study area. A precipitation total of 10.1 cm was recorded between June 10th and July 19th, 2015. The two precipitation highs were on consecutive days with 75 mm on 7/10/15 and 16 mm on 7/11/15.

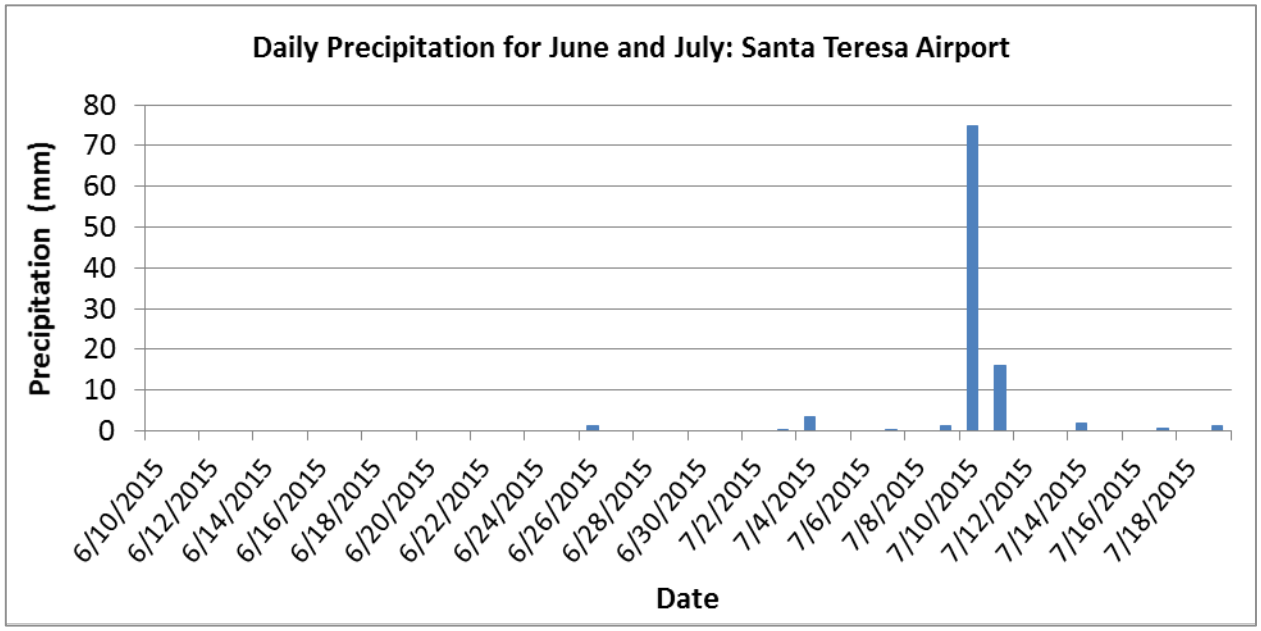

Figure 2. Daily precipitation measured at Santa Teresa Airport, 5.95 mi from the Test-Bed Site

The majority of erosion occurred in the area with the lowest elevation along the southern end of the Diez Lagos channel. This is typical of hydrological transport processes. The change in soil height was caused by surface runoff that had drained throughout the study area to the lowest elevations towards the channel as it increased in volume and velocity. Dense saltgrass vegetation along the drain helped with soil retention in the lower elevations preventing more sediment from entering the channel. Due to the magnitude of this project, surveying changes in soil height for a prolonged period of time could give more representative information about the interactions between vegetation and sediment transport. As more data on erosion rates is collected overtime, a model that shows sediment flow can be developed and used for erosion control. Studying the geomorphic processes of sediment and the effectiveness of native vegetation for stabilizing soil in riparian areas will be very important to similar watershed restoration efforts in the future.