US Army Corps of Engineers®

Urban Flood Demonstration Program

Revegetation and Bank Protection in the Las Vegas Wash

Figure 1. Las Vegas Wash

Products

This research effort will produce a comprehensive technical report on successes and failures of revegetation from the Las Vegas Wash with recommended management strategies for future such efforts.

Benefits

Restoration of riparian ecosystems has become an important issue in the western United States. The main goal of restoration is reversing the riparian loss and degradation that streams have undergone over the past century (Goodwin et al. 1997) due to growth, excess flows and climate change. Riparian vegetation strips are widely used by river managers to increase streambank stability, among other purposes. The effects of vegetation on bank stability are rarely quantified, and generally underemphasized in the importance of hydrologic processes (Simon and Collision 2002). There is a growing recognition of the important influence exerted by stream flows and channel processes on riparian vegetation structure and composition. Streambank retreat occurs by a combination of hydraulic-induced bank-toe erosion and bank mass failure. In addition to its effects in modifying hydraulic scour, and its undoubted benefits in terms of environmental quality, vegetation is widely believed to increase the stability of streambanks (Thorne 1990; Simon and Darby 1999). The hydrologic behavior of streambanks is particularly important in incised and arid or semi-arid channels since these banks are normally unsaturated and are, therefore, sensitive to increases in moisture content.

Issue

Increased flows in the Las Vegas Wash (Wash) associated with increased growth have altered surface and subsurface hydrology and accelerated erosional processes. Millions of dollars have been spent on restoration, such as revegetation, building of erosion control structures, bank protection, etc. to protect from erosion and bank failures. Of all the efforts,

revegetation has been one of the main components in the Wash for streambank stabilization and creating riparian buffers and increasing wild life and biodiversity. The lessons learned from the revegetation efforts in the Las Vegas Wash offer unique opportunity for stream and river managers. To improve success rates of restorations, greater information sharing is needed from existing efforts.

Description

The project goal is to document successes and failures of revegetation efforts in the entire Las Vegas Wash (12 miles) by quantifying the hydrologic and mechanical effects of revegetation on streambank stabilization and erosion control processes. The Las Vegas Wash has over 15 weirs already built for erosion control and bank protection and more are being planned. Type and extent of vegetation in these areas vastly differ. The information and experience from the Wash will be useful for future restoration projects, especially in riparian areas of arid regions. This task will add to our past and existing studies on lessons learned from the Las Vegas Wash, e.g., *Stone toe bank stabilization measures: Lessons learned at Las Vegas Wash, evaluation of bendway weir bank stabilization techniques*. This will provide information on the role of vegetation to stabilize the channel, bioengineering and stabilization and demonstrate the process and techniques.

The study will be documented using three comparative vegetation analyses. First, a direct comparison of revegetated sites will be made by estimating mechanical and hydrological effects of vegetations. The second task will be to analyze the degree of revegetation achievement. The final task will comprise a trajectory analysis. Trajectory analysis is a promising strategy, still under development, for interpreting sets of comparative data. In this strategy, data collected periodically at the restoration site are plotted to establish trends. Trends that lead towards the reference condition confirm that the restoration is following its intended trajectory. This analysis is more relevant for monitoring the riparian vegetation since it needs a long time frame for growth and establishment. The following specific tasks will be performed to fulfill our accomplished goals.

Task 1. The first research task will be to collect detailed data on existing and prior to restoration vegetation data, soil types, extent of bank stabilization, erosion control structures, and past bank failures etc. This will include field measurements (both lateral and longitudinal) as well as remote sensing and lidar data. Data collection efforts will be coordinated with the Southern Nevada Water Authority (SNWA).

Task 2. Vegetation succession trend will be reported based on vegetation stability factors and quantitative database. Mechanical and hydrologic effects of different vegetation density, types and their effects on bank stabilization will be estimated. Also, natural revegetation after the construction of erosion control structure will be estimated.

Task 3. Revegetation impact on bank stabilization and failure will be documented by combining ecological, hydrological and mechanical processes and the current state of the banks. Trajectory analysis for future trends will be established.

Task 4. A comprehensive technical report on successes and failures of revegetation from the Wash with recommended management strategies for future such efforts will be prepared.

Las Vegas Wash provides a unique laboratory-like setting for stream restoration due to its geology and urban growth. The lessons learned from the revegetation efforts in the Wash will be valuable for improving existing design criteria for future restoration efforts. This work unit will be undertaken in collaboration with ongoing work efforts by the USACE and SNWA. Specific tasks will be closely coordinated with the USACE project management to ensure maximum benefit to the USACE field offices and stakeholders.

Sponsor

Urban Flood Damage Reduction and Channel Restoration Development and Demonstration Program for Arid and Semi-Arid Regions (UFDP)

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