Soil Erosion in the Panama Canal

The Panama Canal is a well-traveled 48-mile-long waterway through which nearly 10,000 ships per year travel to pass between the Atlantic Ocean and Pacific Ocean. The canal was completed in 1914, and since then, there have been limitations to the sizes of ships that are able to traverse the canal. Only a class of ships called Panamax are built to specifications that are considered the current capacity of the Panama Canal. If ships are unable to utilize the canal, they must travel around the southern tip of South America, adding approximately 8,000 miles to their voyage.

A massive expansion project of the Panama Canal began in 2006 and is projected to continue through 2014. The plan to expand will require that substantial amounts of soil be excavated from the channel to widen and deepen the canal so that post-Panamax vessels can pass through.

Environmental concerns surfaced because of the large amounts of soil being excavated during the expansion project. One of the biggest concerns of the Panama Canal Authority (Authoridad del Canal de Panamá—ACP) is land erosion. Due to the lack of vegetation after excavation, the soil left behind is vulnerable to erosion. Panama has an annual average of 75 in. of precipitation. This high amount of rainfall prompted a necessary plan of attack against severe erosion before it occurred.

When accelerated erosion takes place, excessive amounts of eroded soil end up in the waterway. It is of vital importance to dredge the canal to remove the sediment that has run off into the canalway. This is an expensive process, and it inevitably interrupts the movement of ships. ACP launched an evaluation of various erosion control options to find the most effective resolution.

Hamilton Mfg. Inc. got wind of the project that was underway in Panama and set out to put its product to the test. NaturesOwn X9000 is a bonded fiber matrix hydro-mulch that is designed and manufactured to excel in erosion control in the toughest of climates and environmental conditions. In this particular case, X9000 was applied in the jungles of Panama during the rainy season to slopes of 3:1 to 2:1. The coverage was 4,000 lb per acre, and it was sprayed in a two-step process for the most effective coverage.

The matrix had very little (less than two hours) drying time before it started to rain. During the weeks following the applications, several heavy rainfalls hit Panama. Despite the intense precipitation and short drying time, X9000 was able to hold the soil, seed and fertilizer in place to ensure successful germination. The righthand photo shows the area approximately five weeks after X9000 was applied.

ACP and a group of engineers from Worchester Polytechnic Institute prepared an evaluation of the various methods they implemented in response to the probable soil erosion of the canal. The evaluation stated: "Of the six sites, four sites had BMPs (silt fencing; hydroseeding; terracing; and hydroseeding with silt fencing), one had natural vegetation (control area) and one had clay soil. Relative soil height at each of the erosion bridges was monitored over 18 days and extrapolated to yearly loss rates." Engineers found that "the sites with hydroseeding had a statistically lower soil loss rate than the site with silt fencing or the site with no BMP."

The outcome of the Panama experiment was a successful erosion control project in some of the most extreme conditions. SWS

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