Mitigation of Impaired Stormwater Quality in Los Laureles Canyon, Tijuana, Mexico
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Background/Problem Statement

Rapid industrialization and population growth along the San Diego-Tijuana border has led to impaired water quality in the Tijuana River Watershed. During storm events, runoff mobilizes contaminants such as pathogens, sediment, and refuse/debris, transporting them through the watershed, eventually depositing these pollutants in the Tijuana River Estuary and Pacific Ocean. Resultant stormwater plumes cause environmental degradation, adverse human health effects, and lost revenues due to beach closures.

Watershed Modeling

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Los Laureles Canyon

Location
Sub-watershed of the greater Tijuana River Watershed
Straddles the San Diego-Tijuana border

Climate
Mediterranean, semi-arid
Temperature ranges from 9-18°C annually
Rainfall ranges 20-110 cm annually

Landuse
Rapid population growth along the border
50% urbanized in 2007 with projections predicting complete urbanization within 30 years

Social Aspects
Highly urbanized with makeshift dwellings on steep, unvegetated, easily-erodible slopes
Currently 40,000 residents
Very little infrastructure

Methods
1. Problem identification
2. Analysis of sewage management options
3. Analysis of stormwater management options
4. Formulate recommendations

Structural BMPs

Erosion Control

Many BMPs designed to improve water quality would be inhibited by the large quantity of sediment that travels through Los Laureles Canyon. Low-cost erosion control structures including tire retaining walls and terracing could reduce the sediment load entering water quality improvement structures. These erosion control efforts should be installed upstream of quality BMPs to achieve greater effectiveness.

Channel Stabilization

Currently much of the channel that runs through Los Laureles Canyon is not reinforced and is highly erodible during storm events, potentially harming humans and impairing water quality. Grade control and channel stabilization techniques can decrease stormwater velocity and erosion, thereby preventing channel movement. Stabilizing the channel will also allow for the installation of off-line water quality mitigation BMPs that would not be compatible with a dynamic channel.

Water Quality Mitigation

The selection of water quality improvement BMPs was limited to technologies that did not require existing infrastructure, were low-cost, low-maintenance, multi-use and tamper resistant. Detention basins, infiltration basins, and vegetated swales were identified as three technologies that would trap sediment and refuse and may reduce pathogen transport by promoting stormwater infiltration. These BMPs will require maintenance to maintain their effectiveness.

Erosion control

Many of the residents in Los Laureles Canyon live on steep, erodible slopes that make the foundation of their properties unstable. Providing these residents with information on low-cost or no-cost techniques for stabilizing the area around their homes will reduce erosion and increase the safety of these structures. Ongoing erosion control projects include: installation of tire retaining walls, planting of native vegetation, installing rainwater collection systems, terracing, and installing locally made permeable pavers.

Community Workshops

Conducting community workshops can empower the residents of Los Laureles with the knowledge and tools necessary to make a positive impact on the water quality in the canyon. Example of workshops include:

- How to construct a rainwater collection system
- How to reinforce a tire retaining wall
- How to collect and propagate native seeds

Small-scale Wastewater Treatment

Engineers without Borders—San Diego is currently working on the construction of a small wastewater treatment project for the community of San Bernardo in Los Laureles Canyon.

Recommenda