Towards Sustainable Watershed Restoration Projects: Source Reduction versus Interception

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Significant efforts are invested in identifying, prioritizing and selecting restoration projects for implementation. Implementation funds are always in shorter supply than restoration projects. Selecting the 'best' restoration projects for implementation is an iterative process. Many local watershed or government entities (e.g., Township, County) select one or more projects to put forward for grant funding, the granting agency looks at many applications and selects the most promising projects to fund, and the selected projects are implemented. The criteria for identifying and selecting the 'best' restoration projects are varied, perhaps the largest area per unit cost, a suite of water quality benefits, etc.. Most often, source control projects are not scored highly because their unit costs are high and the project area is usually limited. Alternatively, projects which intercept and treat large volumes of storm water score high due to their more modest cost per unit area.

This presentation focuses on a watershed restoration plan, two alternative restoration projects, and a more complicated but still simple evaluation of cost-benefit analysis. The most highly recommended restoration project involved the modification of ~9.4 acres of forested floodplain to retain ~38,000 CY of storm water runoff for a cost of $550,000. A second restoration site which was not selected for submittal to the granting agency involved the restoration of approximately 1,100 lf of stream, the modification of 6.5 acres of forested floodplain to retain ~6,000 CY of storm water runoff, for a cost of $450,000. The former project was estimated to deliver water quality benefits for ~14.50 per CY of water. The latter project was estimated to deliver water quality benefits for ~$75 per CY of water. Based on this analysis, it appears clear the former project has the 'bigger bang' and this was the basis for selecting the project.

However, going beyond this '1st cost analysis', and considering the cause and source of water quality degradation (e.g., hydro-modification and sediment supply), a different analysis yields a much different understanding. In this analysis, the former project does nothing to reduce sediment supply at the source (e.g., eroding stream channel), but effectively interrupts the sediment supply for only ~1 1/2 to 3 ½ years before the storm water storage volume is filled with sediment from upstream channel erosion, and the project is in equilibrium with its sediment supply. This results in a total project cost of ~$160,000 to $440,000 per year for the short life of the project. Over a 50 year project life, this project traps up to 19,000 CY of sediment at a cost of ~$29/CY, but has lost all sediment trapping and hydro-modification capability after 1 ½ to 3 ½ years. Alternatively, the latter project fixes the problem at its source, eliminating between 240 CY and 622 CY of sediment per year for every year with no prospect for loss of this function and it retains a 6,000 CY storm water volume to support hydro-modification. Over a 50 year project life, this project eliminates 12,000 CY to 31,000 CY of sediment at a cost of $37.50 to $14.40 per CY with no loss in function. This source control restoration project appears to be a more sustainable restoration project.

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