



Integrated Planning Opportunities Alternatives Analysis – Riparian Restoration

Springfield, Missouri

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Introduction

The City of Springfield (City), Greene County, and City Utilities of Springfield have developed an approach for integrated planning to best protect local environmental resources in an evolving regulatory landscape. The Integrated Plan (IP), titled “A Citizen Focused Approach,” provides a holistic plan designed to prioritize investments based on the most effective solutions to address the most pressing problems that matter most to the community. Implementation of the IP includes a four-phased approach, which is designed to be iterative: 1) Assessment (What is the current status of the environment?), 2) Vision (Where do we want to be?), 3) Tactical (How will we get there?), and 4) Adaptive Management (What adjustments need to be made?).

Identifying and prioritizing the most effective solutions using the Sustainable Return on Investment (SROI) approach is a critical component of the tactical phase. The SROI process is an economic analysis method for analyzing triple bottom-line (i.e., economic, social and environmental) outcomes of investments and policies. This approach provides a comparison between the general cost of a solution to the benefits achieved so that a more informed investment decision can be made.

The SROI process was used here for estimating the sustainability value of riparian restoration, including social and environmental benefits and financial costs. The methodology entailed projecting the value of impacts over a 25-year planning horizon and applying a discount rate to bring future values into today’s dollars. A description of this opportunity and details of the SROI analysis are provided below.

Opportunity Description

Riparian areas refer to vegetated or partially vegetated areas adjacent to rivers and streams. As the transitional area between aquatic and terrestrial ecosystems, riparian areas provide important ecological functions including the removal of nutrients and other pollutants through uptake and filtration. Other benefits of riparian areas including shading the water (algae and temperature control), providing wildlife habitat, controlling streambank erosion, carbon sequestration, and improved aesthetics. The City is interested targeting areas that lack riparian vegetation for restoration efforts. These efforts may involve performing minor grading and planting trees and native vegetation within 100 feet of a creek. For purposes of this analysis, the City identified approximately 156 acres of City owned undeveloped land suitable for riparian restoration.

Environmental and Social Benefits

A primary benefit of riparian restoration is improved water quality. Water quality improvements were determined using a water quality index (WQI) approach. The WQI is a composite scoring system that evaluates the conditions of a waterbody on a scale of 0 to 10 based on different community priorities and indicators. The economic value of a change in water quality is determined by the number of people that benefit and an individual’s “willingness-to-pay” for that change. A one point change to the WQI is worth about \$40 for a direct user and \$14 for in indirect user.



South Creek Restoration Project

HDR evaluated the change in the WQI due to impacts from riparian restoration efforts on physical habitat, trash, sediment, and nutrients levels in Springfield urban streams. Riparian restoration efforts will significantly improve physical habitat by providing additional vegetative protection and bank stability. On an area-wide basis, physical habitat is estimated to improve by approximately 9%. Vegetation from restoration efforts is also estimated to filter out 2.1% of trash runoff to area streams and reduce overall sediment and nutrient loadings by up to 0.3% (Table 1).

Table 1. Estimated Pollutant Reductions due to Riparian Restoration Efforts in Area Waterbodies

Indicator	Percent Reduction
Trash	2.1%
Total Suspended Solids	0.3%
Total Phosphorus	0.2%
Total Nitrogen	0.3%

Improved physical habitat and reductions to trash, sediment and nutrient loading will have a positive impact on a number of community priorities including aquatic life, waterbody aesthetics, and primary and secondary contact recreation. In terms of the WQI, it was estimated that riparian restoration of undeveloped land will increase it by 0.060 points in Springfield urban streams (Figure 1).

In addition to water quality benefits, riparian restoration will have a positive impact on property values. Properties located within 500 feet of restored riparian areas were estimated to have a 2.5% gain in property value.

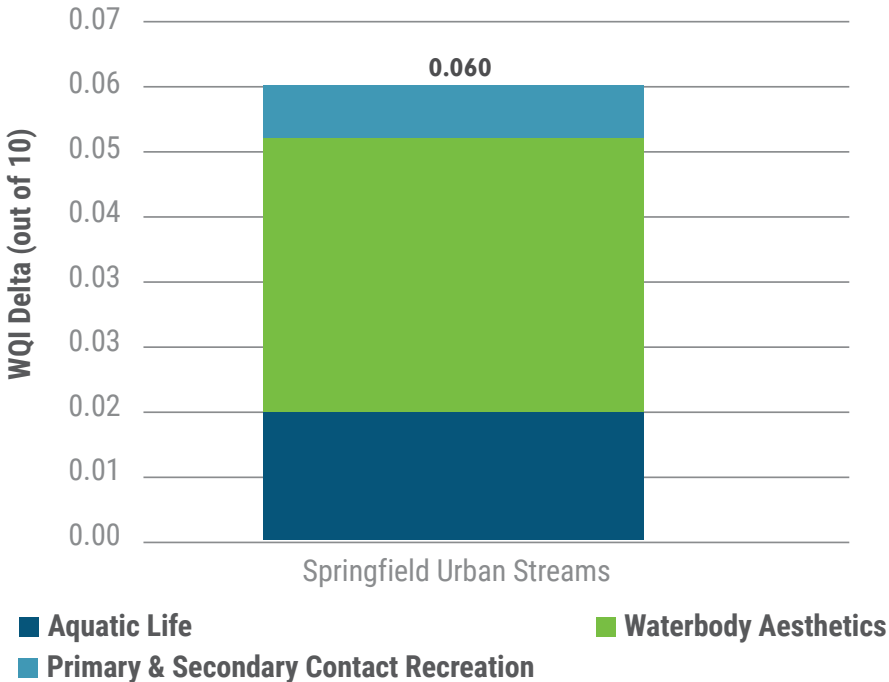


Figure 1. Changes to the Water Quality Index from Riparian Restoration

Cost Considerations

For the SROI analysis, costs were based on planting trees, shrubs, and other native vegetation within City owned undeveloped areas subject to the City’s stream buffer requirements. Approximately 156 acres of riparian corridor were identified that meet this criteria. Targeting open areas first was considered the most cost effective approach for riparian restoration efforts. In consultation with the City, HDR developed a range of capital and maintenance costs for use in the SROI analysis (**Table 2**). Costs are assumed to vary depending on the source of labor (in-house City versus contracted) and the type of vegetation (trees only or use of native vegetation). Presumably, a mix of labor sources and types of vegetation would be utilized at different locations.

Table 2. Range of Estimated Riparian Restoration Costs

	Capital Costs per Acre	Annual Maintenance Costs per Acre*
Low	\$1,000	\$750
Median	\$3,200	\$1,250
High	\$5,400	\$1,750

*Includes the cost of trash removal from riparian zone

SROI Results

Table 3 presents final results of costs and benefits of riparian restoration. The present value capital costs amount to about \$0.5 million. The total value of O&M costs are more than six times that amount, at about \$3.3 million in present value terms. However, these costs are more than offset by improvements water quality and property value gains, which total about \$7.5 million. Overall, the total net value of riparian restoration would generate about \$3.7 million more in benefits than total lifecycle costs with a benefit-cost ratio of 2.0.

Table 3. Summary of Present Value Costs of Riparian Restoration (\$2018, Millions)




Types of Benefits and Costs	Present Value of Impact
 Environmental	
Water Quality Improvements	\$4.6
 Social	
Property Value Gains	\$2.9
 Costs	
Capital Expenditures	(\$0.5)
Operations & Maintenance Impacts	(\$3.3)
Totals	
Financial Lifecycle Cost	(\$3.8)
Total Social, Environmental Benefits	\$7.5
Total Value - All Costs and Benefits	\$3.7
Benefit-Cost Ratio	2.0

Figure 2 provides the best estimate of value created relative to cost by accounting for several uncertainties that can raise or lower the perspective on total value. Taking into account these uncertainties, it is estimated that the benefit-cost ratio could range from about 1.4 to 3.0 with a 10% chance of it being above or below this range.

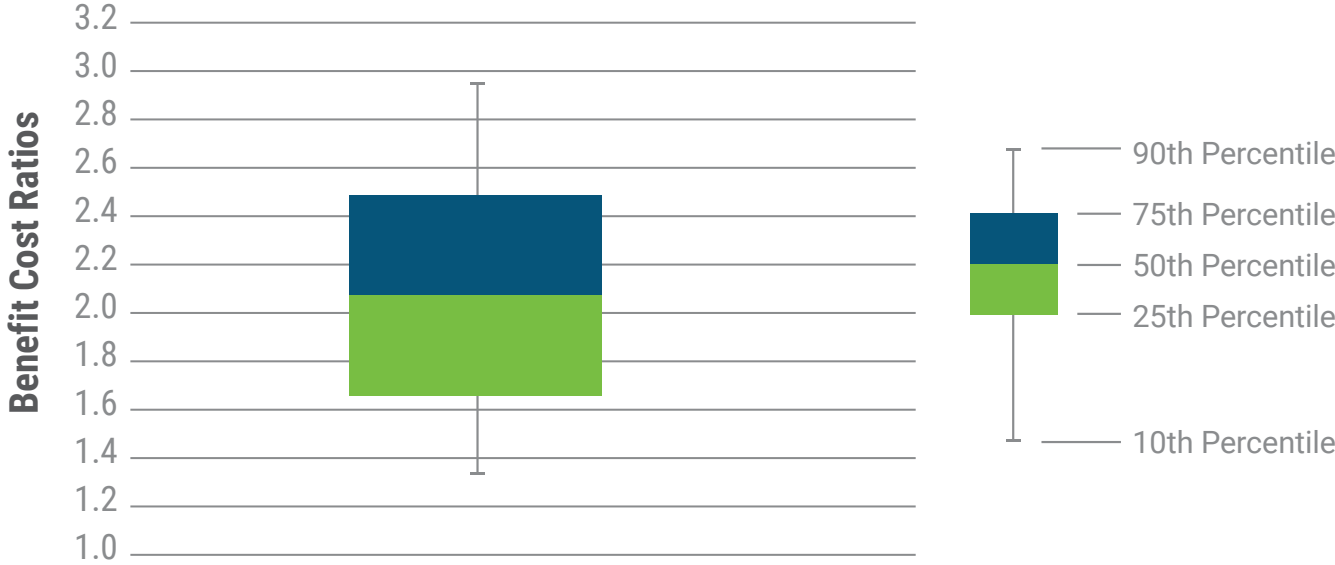


Figure 2. Range of Potential Benefit Cost Ratios for Riparian Restoration

Summary

Riparian restoration efforts will likely realize benefits that would outweigh the costs. Targeting City owned undeveloped stream corridors for riparian restoration projects would result in approximately \$4.6 million in water quality improvements and approximately \$2.9 million in property value gains. Whereas, the total lifecycle cost is about \$3.8 million in net present value. Accounting for uncertainty, the benefit-cost ratio potentially ranges from 1.4 to 3.0, with an average of 2.0. It should be noted that these costs and benefits represent an aggregate of about 156 acres. Presumably, the cost effectiveness of riparian restoration will vary depending on the area.