

Water Quality Benefits for Riparian Buffer Restoration

- 1). Benefit of Land Use Change
- 2). Benefit of Nutrient Removal from Nonpoint Source Runoff
- 3). Benefit of Nutrient Removal from Periodic Overbank Flood

General Assumptions:

1. Life expectancy of Riparian Buffer is assumed to be 30 years. (Life expectancy for stormwater detention pond is 20 - 30 yrs)
2. Restored Riparian Buffer is assumed to be natural.

Effectiveness of Riparian Buffer	Annual Effectiveness (kg/ha/yr)	Annual Effectiveness (lb/ac/yr)	Effectiveness in 30 yrs (lb/ac)
Benefit (1)	11.08	9.89	296.57
Benefit (2)	70.09	62.54	1,876.08
Benefit (3)	3.75	3.35	100.37
Total	84.92	75.77	2,273.02

Detailed Benefit Descriptions and Assumptions:

- 1) Benefit is due to change land use.
 - Assume existing land use export coefficient is a composite export coefficient with a value of 12.98 kg/ha (agriculture and urban).
 - Wetland export coefficient is 1.9 kg/ha.
 - The annual nutrient output is decreased by 11.08 kg/ha annually by land use changing.
- 2) Benefit is due to nitrogen removal from nonpoint source runoff.
 - Nutrient contribution/buffer treatment area ratio is approximately 10.8 (based on studies examined by Gannon 1997).
 - In flow loading is calculated by nutrient contribution area x composite export coefficient.
 - In flow loading is 10.8 ha x 12.98 kg/ha = 140 kg/ha/yr.
 - Nutrient removal due to this benefit is calculated by in flow loading x removal efficiency
 - *Gannon, Richard. 1997. Effectiveness of Wetland Riparian Areas for Treatment of Agricultural Pollution Sources: A Literature Review. (Draft)
 - The nitrogen removal efficiency is 50% based on various literature.
 - * Kadlec, Robert H. and Robert L. Knight. 1996. Treatment Wetland
 - * Moshiri, Gerald A. 1993. Constructed Wetlands for Water Quality Improvement. Lewis Publi.
 - * Mitsch, William J. 1994. Global Wetlands: Old world and New. Elsevier
- 3) Benefit is due to nitrogen removal from overbank flooding
 - Nitrogen concentration is assumed to be 2.5 mg/L. Assume overboard is 1 ft. Flood frequency is assumed to be once every year.
 - Nutrient removal due to this benefit is estimated by in flow concentration x area (1 ha) x overboard height x removal efficiency.

Formula for Calculating Nitrogen Offset Reductions on Riparian Buffer Restoration Sites:

*Size (Acres) * 75.77(lbs/Acre/Year) * 30 Years = Total Pounds of Nitrogen Removed from Riparian Buffer Project*