UK Cooperative Extension BAE Logic Model for Urban Water Resources Management and Design: Stream Restoration, Carmen Agouridis, Ph.D., P.E.

Situation Analysis

Largely because of Clean Water Act requirements, the field of stream restoration experienced exponential growth during the last few decades, with over 37,000 projects conducted in the U.S. alone during this time period (Bernhart et al., 2005). Federal requirements for compensatory mitigation (i.e. no net loss of streams or wetlands due to physical impacts for a project) mean the number of stream restoration projects will continue to grow (Cunninghman, 2002). Over $3 billion is spent annually in the U.S. for stream and wetland mitigation projects to meet these requirements (Austin, 2007). In 2015, Kentucky's compensatory mitigation program (Fee In Lieu Of), which is managed by the Kentucky Department of Fish and Wildlife Resources, had receipts of $20.4 million. In addition to compensatory mitigation driven projects, a number of other projects are funded through grants, private and non-profit groups (USEPA, 1995).

Stream restoration is an integral part of stormwater management, particularly in urban environments. Streams draining urban lands consistently suffer from "urban stream syndrome," which is characterized by flashy hydrology, elevated concentrations of nutrient and contaminants, altered morphology, decreased amounts of organic matter, and poor biotic richness (Walsh et al., 2005). Coupled with land-use restrictions, restoring a stream to its "natural" state is rarely feasible, leaving many communities seeking alternative solutions. With increased levels of urbanization occurring across the U.S. and worldwide (70% of the world's population is expected to live in urban areas by 2050), it is imperative that science-based management strategies, which incorporate social and economic aspects, be developed for urban and urban-fringe streams.

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Inputs	Outputs		Outcomes/Impact		
	Activities	Participation	Initial/Short Term	Intermediate Term	Long Term
• Time • Funding • Equipment • Laboratory (water quality) • Personnel • Landowner collaboration • Consultant collaboration • Agency (federal, state and local) collaboration	• Fact sheets and Cooperative Extension publications • Refereed journal articles • On-site visits and consultations • Workshops • In-service trainings for agents • Presentations at state/ national conferences • Web-based resources	• Consultants • Extension agents • College students • Watershed stewards • Federal, state and local government employees	Participants will gain knowledge about one or more of the following: -Geomorphology -Stream assessments -Water quality -Riparian (streamside) buffers -Stream restoration -Resources to contact for design/construction assistance	Participants will: -Assess geomorphology, habitat quality, and/or water quality of streams using techniques learned -Implement stream restoration methods -Adopt the use of riparian (streamside) buffers -Use research-based information to make decisions -Contact design/construction experts for assistance, as needed	Improved compliance with regulations Improved water quality Improved stream health Improved natural environment Improved communication amongst entities