



**Title:** Demonstrating Stream Restoration: Natural Channel Design, Stormwater Management and Exotic Species Control in a Rapidly Developing Watershed

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**Organization:** North Carolina State University

**State:** NC      **Region:** Southern

**Year of Funding:** 2002

**Theme:** Environmental Restoration

**Situation:** North Creek is severely degraded due to straightening and downcutting, has lost connectivity with its historic floodplain, and is overburdened by invasive vegetation such as kudzu and Japanese Honeysuckle. North Creek is a focus of NC State University's Centennial Campus, a growing research and advanced technology community of university, corporate and government R&D facilities. The project is an opportunity to educate youth, policy makers, and the public and campus community about protecting and improving surface water quality, riparian corridor health, stormwater runoff control, and watershed management.

**Objective:** The objectives include the establishment of an outdoor field study area to demonstrate how current and future development can be done in concert with watershed protection and water quality improvements. Restoration of sections of the degraded stream and its associated wetlands and riparian area are being done to reduce downstream flooding and pollutant movement, and improve aquatic and wildlife habitat.

**Methods:** Biological controls using goats and chemical control using selective herbicides are removing the exotic species. Revegetation with native species is restoring the riparian area. Stream restoration utilizes natural channel design. Off line wetlands are being installed and enhanced. Planned greenways are being integrated into the stream corridor restoration. Numerous course projects, as well as youth projects are being utilized to inspire fresh approaches and as educational tools. Fact sheets and workshops on invasive species control are developed.

**Partnerships:** The Outdoor Field Laboratory is featured in numerous undergraduate/graduate course projects in the NCSU departments of Biological and Agricultural Engineering, Forestry, Landscape Architecture, Soil Science, Animal Science, and Crop Science. Other stakeholders include the numerous public and private organizations housed on Centennial Campus, such as the NC Wildlife Resources Commission and adjacent landowners.

**How project integrated research, ed, outreach:** Graduate research programs are being conducted to document the extent of the sediment loss from streambank instability and associated habitat and biological integrity impacts, as well as restoration improvements. The project is being conducted under the Soil & Water Environmental Technology (SWET) Center which provides training programs for educating students, environmental professionals and industry/government decision-makers on technologies related to soil and water resources, waste management, land use and ecosystem restoration. Outreach to the facilities components of the University, as well as public and private sectors is on-going.

**Resources were leveraged by the project:** This project is partially funded by a USDA-CSREES Water Quality grant. In addition to the numerous faculty and student contributions, the facilities arm of the University has increased commitment to learn and share knowledge and funds for improved riparian area management, storm water management, and landscaping. The NC Wildlife Commission will utilize the corridor in its youth programs on environmental and watershed management.

**Results:** Prior to restoration, the BEHI assessment index measurements rated the stream as extreme bank erosion potential with little or no vegetation cover. In some cases, the streambank erosion has been documented through cross-sectional surveys at over 5 lateral feet annually. Suspended sediment exceeds 1000 mg/l during large storms. Elevated concentrations of Zinc, valadium (common from tires) and titanium, chromium and other metals from brake lines, as well as elevated levels of lead, copper and nickel were measured. Polycyclic aromatic hydrocarbons (PAH) concentrations are moderate, exceeding concentrations that cause acute aquatic toxicity in the presence of sunlight. The dominant aquatic species are mosquitoes. Biological and chemical kudzu control is equally effective.



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