

# “Stream Restoration - Function Based Hydraulic Structures & Bioengineering Design”

(with an emphasis on understanding Native Plant Communities & Invasive Exotics, in-the-field design, and planting a demonstration test plot)

(UB INTENSIVE MODULE CLASS FOR THE ECOLOGICAL ENGINEERING PROGRAM)

**WORKSHOP INSTRUCTORS:** Dave Derrick, Research Hydraulic Engineer with the Corps of Engineer’s Engineering Research and Development Center’s Coastal & Hydraulics Laboratory (ERDC-CHL) Vicksburg, MS., and the inimitable Paul Fuhrmann, Native Plant Community Ecologist with Ecology and Environment, Inc., Lancaster, NY, and an assorted cast of other zanies & partners.....

**DATES:** June 11-15, 2007

**FIELD TRIP SITES:** - MANY, MANY SITES. Maps will be provided during class.

**CLASSROOM:** U.B. campus, Room ???

**CLASS NOTES:** All lectures will be available on CD on the first day of class.

## CLASS OVERVIEW AND GOALS

- \* Provide an understanding of riparian area importance, function, threats, management, and restoration techniques
- \* Provide an understanding of how hydraulic, bioengineering, and environmental considerations are usually complimentary in nature
- \* Teach bioengineering-based bank protection methods (effects on stream energy and flow, & applicability and constraints), and how to choose the appropriate method or combination of techniques
- \* Clarify the importance of project constructability, monitoring, and maintenance
- \* Divided into groups, the class will assess real-world project performance of at least two complex constructed stream restoration projects
- \* Reinforce classroom lectures by a hands-on demonstration of many hand-planting methods on at least two existing restoration projects
- \* Utilizing a number of adventitious rooting species and RPM plants, students will establish test demonstration plots on one stream.

## AGENDA

### DAY 1 – MONDAY-JUNE 11, 2007

- 8:00-8:15 Instructor Introduction and Overview of Workshop Schedule
- 8:15-10:00 Native Plant Communities – Importance and function - Fuhrmann
- 10:00-11:00 Invasive Exotics – Impacts, spreading, control, and adverse effects on native communities, control, NY State Invasive Exotics Task force working group – Fuhrmann
- 11:00-12:00 Soil health, soil testing, fertilization, living soils (mychoriza, etc.), mulch - Fuhrmann

- 12:00-1:00 LUNCH**
- 1:00-1:45 Case Study: Seneca Bluffs, An Urban Invasive Exotics Restoration Project and Pocket Park, Buffalo Creek, Buffalo, NY - Fuhrmann
- 1:45-2:00 Field Equipment and Safety - Fuhrmann
- 2:00-2:30 Travel to field site
- 2:30-5:00 **Field Site Evaluation-Seneca Bluffs Restoration Project** - Fuhrmann, Derrick, and others

## **DAY 2 – TUESDAY-JUNE 12, 2007**

- 8:00-8:15 Review and questions from Day 1 – Fuhrmann
- 8:15-10:00 Everything Outside the Active Channel - The Importance of the Riparian Buffer Zone, Watershed Management Problems, Rain Gardens, Sediment Issues, etc.– Derrick
- 10:00-12:00 Bioengineering Philosophy and Methods for Streambank Protection Using Native Plant Species – Derrick
- 12:00-1:00 LUNCH**
- 1:00-2:30 Case Study: Cattaraugus Creek at Savage Road-Highway Protection Project Including Plants & Planting Techniques – Derrick
- 2:30-3:15 The RPM Plant Propagation Method - Fuhrmann
- 3:15-4:45 Case Study: Monkey Run - Grade Control, bioengineering demo & railroad protection – Derrick
- 4:45-5:00 Schedule, preparation, clothing & tools needed for field site trips on Days 3 & 4

## **DAY 3 – WEDNESDAY-JUNE 13, 2007**

### **FIELD INVESTIGATIONS-“Every stream is a classroom” – Fuhrmann and Derrick**

- 8:00-9:00 Travel to Arcade, NY
- 9:00-10:30 **Field Site Evaluation – Investigate the Monkey Run stream realignment project, Arcade, NY.** This stream was straightened in the 1860’s & twice in the 1960’s. Active headcuts were incising sections of the stream (hydraulically disconnecting the stream from its historic flood plain). The stream was also overwidened by approximately 1/3 (Channel Evolution Model Type III). This project re-meandered the main channel (6 bends and 5 riffles compared to 2 bends previous).
- 10:30-11:30 **Field Site Evaluation – Spring Brook, North of Arcade, NY** – As fine of a functioning trout stream that I have observed in Western New York. Culvert problems at the DS end though.
- 11:30-12:30 **Travel to Catt @ Savage and LUNCH on the Traffic Control Stones.**
- 12:30-2:00 **Field Site Evaluation - Investigate Catt Creek at Savage Road** (project constructed Oct 2004). Resistive, redirective, and bioengineering all performing in concert to satisfy project performance goals. Also control of invasive exotics for the Catt Creek Project will be discussed.
- 2:00-4:30 **Field Site Evaluation -Travel to and Investigate McKinstry Creek realignment and restoration project-540 ft long project (9 bends, 9 crossings) constructed June–July 2005.** and the proposed (possibly under construction) 2,700 ft long DOT Rt. 219 stream mitigation site (47 bends with wetland, vernal pool, & riparian corridor & aquatic habitat creation)
- 4:30-5:30 Travel back to UB

## **DAY 3 – THURSDAY-JUNE 14, 2006**

### **FIELD INVESTIGATIONS-“Every stream is a classroom” – Fuhrmann and Derrick**

- 8:00-8:30 Travel to Cazenovia Creek, South Buffalo, NY
- 8:30-9:30 **Field Site Evaluation -Cazenovia Creek at Stephenson Street Bridge, South Buffalo, NY.** – Transforming a sheetpile and concrete-lined straightened channel in a highly urbanized densely-populated watershed with severe ice jam and flooding problems into a better functioning waterway.
- 9:30-10:30 **Field Site Evaluation** -Travel to, and investigate **the new Corps of Engineers Ice Control Structure, Cazenovia Creek, West Seneca, NY** – An newly constructed structure designed to protect downstream urban areas from ice damage and ice induced flooding.
- 10:30-11:30 **Field Site Evaluation – Irish Gulf, Boston, NY** – A deeply incised channel (remind me to take everybody to the 7 ft tall US sheetpile grade control structure) with vegetated gabions and Bendway Weirs (urban surroundings)
- 11:30-12:30 LUNCH @ George’s???**
- 12:30-2:00 **Field Site Evaluation – Spooner Brook - DOT sponsored fish ladder with riparian vegetation, Springville, NY.** After devastating flooding in 1998 this steelhead stream required a fish ladder for fish passage to highly productive upstream spawning areas. The fish ladder also has to function as a barrier for the invasive Sea Lamprey
- 2:00-3:00 **Field Site Evaluation – Connoisarauley Creek, South of Springville, NY.** A stream that could use a complete realignment, or not!!!
- 3:30-4:00 **Field Site Evaluation – Cattaraugus Creek @ Creek Road, and just DS a House** falling in. What to do at either site????
- 4:00-5:00 Travel back to campus

## **DAY 5– FRIDAY-JUNE 15, 2007**

- 8:00-9:00 Innovative Ideas to Restore Function to Aquatic and Terrestrial Areas with an emphasis on the Eighteen Mile Creek Project, Newfane, New York-Short video and Lecture-Derrick & Fuhrmann
- 9:00-9:45 What happens when your road rotates 45 degrees and slides down the hill a bit? You call in the Swedish concrete cement beater/mixer of course!! Geotechnical Problems and solutions (including max. vegetation) on the Tonawanda Creek at Westphalia Road Project – Mike Mann, Geotechnical Engineer with McMahon and Mann Engineers
- 9:45-12:00 **Field Site Evaluation**-Travel to and investigate **Tonawanda Creek at Westphalia Road** geotechnical failure
- 12:00-1:00 LUNCH**
- 1:00-2:30 **Field Site Evaluation**-Travel to and Investigate the **Eighteenmile Creek Project, Burt, NY.**
- 2:30-3:30 Travel back to campus and wrap-up workshop

### **Students should:**

- Bring a laptop computer with CD drive to all classroom lectures
- Wear field clothes all days and a set of work (or gardening) gloves
- Bring hip boots or waders (or old sneakers and shorts) all days
- Bring a camera, rain gear, bug spray, & sunscreen, all days