Right Fork Beaver Creek Monitoring Project: Undergraduate Research Experiences in an Applied Setting

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The Eastern Kentucky Environmental Research Institute is conducting a year-long assessment of the Right Fork of Beaver Creek in Floyd and Knott Counties under contract with the Kentucky Division of Water. The year-long study began in March 2007 and consists of one- to two days of monthly water sampling at 33 sites throughout the watershed. Beaver Creek and its tributaries are on the state’s 2006 303(d) List of Impaired Waters for not meeting the designated-use standard for primary contact recreation (swimming) and/or warm water aquatic habitat for conditions including: nutrients, organic enrichment (sewage), pathogens, pH, and sedimentation/siltation. Data from this study will help the Kentucky Division of Water develop a “total maximum daily load” or TMDL report for the watershed that will incorporate details of the impairment(s), watershed characteristics and a general implementation plan to address the impairments and improve conditions in the watershed.

Applied Student Research Experience

To date, more than twenty undergraduates from various disciplines including environmental health sciences, agriculture, geography, mathematics, anthropology, sociology and biology have been trained and employed as field research assistants. The Institute’s efforts to provide a diversity of students with real-world experience in proper scientific practices, methods in watershed assessment and evaluation, as well as a genuine understanding of the changing ecosystem in the Appalachian area are all major components of the value of the research experience with this project.

In addition to the broad range of disciplines these students are studying, we have also seen a variety of different personal backgrounds and life experiences brought to this project, with both traditional and non-traditional undergraduates working on the project. The age range has been 18-40, with each gaining a broad range of skills. Training for the use of multi-parameter field instruments, flow and discharge measurements, proper field collection protocol and an in-depth understanding of water issues facing eastern Kentucky are all part of the real-world knowledge undergraduates are gaining from their involvement.

Thus far, analysis reports from the monthly sampling of each of the 33 sites performed since March of 2007 indicate there are two major sources of pollution in these streams. Data from mineral analysis, specifically looking at aluminum, iron, magnesium, sulfate, chloride, calcium, sodium and potassium, indicate that 24 of the 33 sites have consistently tested “high to extremely high” for at least 6 of the 8 parameters.
In addition, analysis performed on wastewater indicators, specifically E. coli and total organic carbon (TOC), indicate there are “high to extremely high” levels of both of these parameters at every site we test for them and have been every month since we began this project. Testing for E. coli is generally associated with locating areas where straight pipes are draining into the streams, as TOC is usually an indicator of the amount of detergents and household cleaners put directly in the water.

Undergraduates Jason Hodge and Derrick Compton take samples and flow measurements

Example of a multi-parameter field instrument used to take conductivity, pH, temperature and dissolved oxygen readings at each site

This project is scheduled to conclude in the Spring of 2008. After all data has been collected and analysis reports issued, the ERI will begin to take a closer look at the results and possible implications.

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