Dr. Paula Mouser, Assistant Professor in Civil, Environmental and Geodetic Engineering at The Ohio State University recently completed a project funded by the Ohio Water Resources Center. This project entitled "**The Constructed Wetland Dilemma: Nitrogen Removal at the Expense of Methane Generation?**" evaluated environmental conditions leading to nitrogen removal wetlands without generating excessive greenhouse gas emissions.

Figure 1 Student Mike Brooker on the site collecting wetland sediments for the laboratory incubation experiments

This research product involved laboratory microcosm experiments for three biomes and two depths incubated at two different temperatures relevant to global warming. Sediments for incubation studies were collected from OSU's Olentangy River Wetland Research Center (Figure 1). Dr. Mouser's findings suggest that wetland biome and soil depth greatly influence the methane flux potential at higher temperatures due to the availability of labile carbon substances and the presence of methanogenic archaea. While all biomes efficiently removed nitrogen, the shallow, open water sediments produced the greatest amount of methane while deeper vegetated sites produced the least. The prevalence of methanogens at the open water site and its ability to thrive under cooler and warmer temperatures suggest that designing wetlands with open water areas may contribute a larger greenhouse gas footprint than wetlands designed with more vegetated areas. Deeper sediments lacked either the microbial community producing labile carbon (e.g. acetate) or the appropriate carbon substrate for methanogenesis to occur (Figure 2).

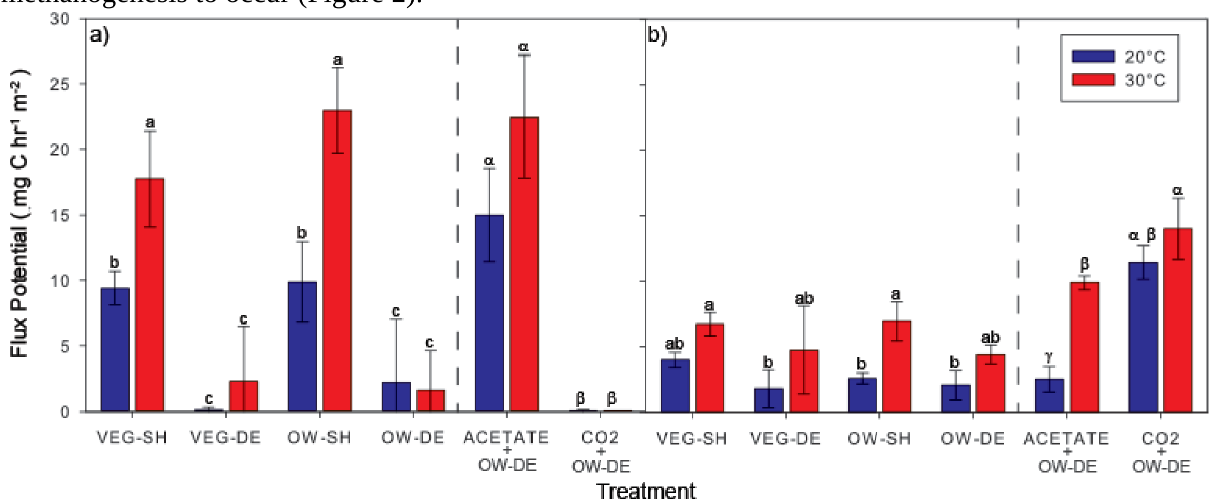

Figure 2 Methane (a) and carbon dioxide (b) flux potentials calculated from the biomes and amendments at two temperatures. VEG represents sediment collected from vegetated site, OW sediment from open water site, SH is shallow sediment and DE is deep sediment. Letters represent levels of statistical differences between each set.

<u>Researcher:</u> Dr Mouser is investigating the role that microorganisms play in mediating biochemical reactions in environmental systems using biotechnology methods. Her focus has been on deciphering the complex relationship between bio-physio-chemical processes in subsurface environments impacted by waste disposal activities and industrial processes. Applications of such research include improving detection and remediation strategies for the protection of water resources, and optimizing restoration activities for contaminated sites.