Jersey Water Works (JWW) has recently convened a Water Workforce Task Force. In an effort to learn more about water workforce through existing programs, we are featuring the William Paterson Research related to water.

William Paterson and Columbia University Researchers and Students Examine Water Vulnerabilities and Water Justice in the NY/NJ Watershed Region

By William D'Andrea, Nicole Davi, Marianne Sullivan, and Lilian Milanés

Researchers from William Paterson University of New Jersey [WPU] (Drs. Nicole Davi, Marianne Sullivan, and Lilian Milanés) and Columbia University [CU] (Dr. William D'Andrea) were recently awarded a National Science Foundation grant to examine social, behavioral, health, and climatic aspects related to water resources in the NY-NJ Watershed (see Map #1). This three-year grant will examine water vulnerabilities based on regional climate changes, legacies of environmental pollution, environmental justice issues surrounding lead-service line replacement, how water vulnerabilities correlate with socio-economic patterns in the NY-NJ Watershed, and perceptions of water vulnerabilities. Water vulnerabilities can be defined as water sources that have been impacted by legacies of pollution, lead service lines, misconceptions of water quality and safety, and encounters with climate change (via drought, flooding, hurricanes or other natural disasters). Water vulnerabilities disproportionately impact underserved, working-class, and minoritized communities. This team's research aims to study various angles of these water vulnerabilities throughout the NY-NJ Watershed in efforts to understand how water vulnerabilities can be addressed and ultimately improve local water for impacted communities.

Map 1: The NY-NJ Watershed comprises all areas that drain into Hudson Bay. The legacy of heavy industrialization and the heavy population density in the Watershed has resulted in a legacy of polluted waterways. Map credit: Pirani et al., 2018.

Throughout the first year, the team has started to develop a climate history of the region by coring and analyzing lake sediment and tree rings. D'Andrea and Davi are building paleoclimate histories of the Catskill region using lake sediments and tree-rings as archives of past changes in climate, vegetation, and precipitation in the Catskills during the past 15,000 years. These paleoclimate records will provide a greater understanding of how much climate and precipitation patterns in this important region (home to NYC's drinking water reservoirs) can change over time, and how it might respond to ongoing global warming. D'Andrea and his team sample lake sediment by coring down through the ice to reach the sediments at the bottom of the lake. The chemistry and fossils found in the lake sediment tell researchers about the environment and climate of the past (see photo #1). Davi uses a hand drill to take pencil-sized samples from trees in order to evaluate annual ring-width variability and the connection that each ring has to past drought (see photo #2).

Photo 1: Drs. Nick Balascio and Tobias Schneider taking a core of Perch Lake.

Photo 2: Dr. Nicole Davi taking tree-ring samples in the Catskills. Photos credit: Billy D'Andrea

Within the social science spheres of this research, the team has begun researching environmental justice issues in lead-service line replacement and surveying residents in Paterson on their perceptions of drinking water. Sullivan's research includes investigating environmental justice aspects of New Jersey's lead service line replacement initiative to develop lessons learned that can be applied in other states and localities. Sullivan is interviewing key informants across the state to understand how equity can be prioritized, both at the community and water system levels. Milanés' portion focuses on connecting directly with people within these spaces of water vulnerabilities, particularly within Paterson, NJ. With an intersectional lens (which focuses on the impacts of race, class, and gender on people's lived experiences), Milanés uses surveys, individual and focus group-style interviews to talk and learn directly with Paterson community members, their perceptions of local tap water.

This grant establishes a partnership between WPU (a Hispanic Serving Institution and Minority Serving Institution) and Columbia's Lamont-Doherty Earth Observatory, and provides undergraduate research and learning opportunities for WPU students. The team will offer a project-related course at WPU in the fall of 2023 that focuses on water vulnerability and justice, and exposes students to careers in water. Additionally, they are looking forward to working with the Jersey Water Works collective to establish connections for water workforce development and research.

For more information on this research or the course mentioned in this blog, please reach out to either William D'Andrea (dandrea@ldeo.columbia.edu), Nicole Davi (davin@wpunj.edu), Marianne Sullivan (sullivanm19@wpunj.edu), or Lilian Milanés at (milanesl@wpunj.edu).

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