Evaluating Nutrient Function Across Diverse Wetland Restoration, Construction, and Enhancement Projects: The H2Ohio Wetland Monitoring Program, Ohio, USA

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To assess the nutrient removal function of wetland restoration, enhancement, and creation projects being implemented as part of the H2Ohio Initiative, the Ohio Department of Natural Resources has established an independent monitoring program implemented by teams from six Ohio universities. The H2Ohio Wetland Monitoring Program takes advantage of a unique opportunity to investigate nutrient cycling in diverse wetland projects under a unified framework. We are developing tools for nutrient budgeting and indicators of wetland nutrient function using a tiered sampling approach. Indices of soil and water nutrient status and wetland hydrology are measured in all monitored wetland projects, while we collect more intensive, high-resolution data for comprehensive nutrient budgeting in selected, representative "Focal Projects." This tiered approach balances evaluation of broad, state-wide restoration program trends and robust, mechanistic understanding to inform management. The H2Ohio Wetland Monitoring Program has now produced baseline data from monitoring surface water nutrient concentrations, soil nutrient status, and basic hydrology in approximately 30 projects. In 2022, the H2Ohio Wetland Monitoring Program's first year of routine monitoring data collection, teams of scientists visited at least 45 distinct wetland projects, collected over 1700 water samples and over 600 soil samples. In select Focal Projects, we have mapped soil characteristics using geophysical tools, surveyed vegetative communities, deployed integrated sensor networks, tested rates of nutrient exchange betweed sediments and surface waters, and built 3D hydrodynamic models for more detailed understanding. A centralized data management and quality control system ensures data quality, long term storage, accessibility, and shareability in accordance with open science best practices. Surface water nutrient concentrations and soil nutrient status reflect the heterogenous hydrologic regimes, landscape connectivity, and land use histories of the diverse wetland restoration projects. Coordinating and leveraged research projects expand the scope of this monitoring program to meet broader goals throughout the Great Lakes.

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