# Developing online modules to teach about water quality in areas of natural gas development using hydraulic fracturing

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The Shale Network is a loose affiliation of scientists working with government agencies, universities, private businesses, and watershed groups to share water quality data in the northeastern area of shale gas development. The team publishes data online to the Shale Network database as part of the CUAHSI Hydrologic Information System (HIS) and promotes use of these data by scientists and non-scientists. One goal of our work is to develop online modules that teach students to access water quality data in Pennsylvania and relate the water quality impacts to shale gas development. Several modules have been developed and published online. For example, one module investigates methane emissions into private water systems and one investigates bromide releases to public drinking water supplies. Each module emphasizes place-based learning and use of the HIS to explore water quality data. The modules also encourage scientists, students, and nonscientists to understand how difficult it is for investigators to determine the cause of water quality impacts in real-world situations. The modules have been used to teach highschool students, college undergraduates, scientists, government personnel, and the public about issues as they occurred in Pennsylvania, but the modules would be of interest to any educators interested in teaching about the water – energy nexus. The Shale Network team also hopes that such modules will encourage data providers to share their data online through portals such as HIS. Such cybertools make discovery of water quality data easy, and allow more time to be allotted to analysis of the data that are available.