Determing Water Quality Impacts of the Galeton Dam and Berger Lake in Potter County, Pennsylvania

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Abstract
Small dams and reservoirs are prevalent contributors to water quality impacts in streams across Pennsylvania. Due to the generous Pennsylvania Fish and Boat Commission reports on limited fish passage and depleting fish habitat, the town of Galeton, Pennsylvania is facing a decision to revamp, replace, or remove their “town’s center piece”, the Galeton dam and Berger Lake. The town has already hired YSM Landscaping, to write a geomorphic assessment, which gave great insight into sedimentation, but does not look into basic water quality parameters.

This proposed study focuses on collecting water quality data on Pine Creek, attempting to help decrease high tensions and support important decisions occurring in Galeton. The ten sample locations will be upstream, around, and downstream from the dam, and studied monthly for one year by student volunteers. The water quality parameters will include physical, chemical, and biological tests. The results can help to determine the impacts of possible thermal pollution and/or habitat fragmentation occurring within Pine Creek.

After reviewing similar research studies, the water quality parameters most impacted should be temperature, dissolved oxygen, and macroinvertebrates. Although this is the expect results, prior research also emphasizes that every dam site is unique in its impacts. This proposed research will have social implications of determining the specific impacts of the Galeton dam and Berger Lake, attempting to help determine the best solution for the community and waterway.

Rationale
The data taken during this study can either help support or oppose the agency’s claims (Detar & Kristine, 2017). Having a wide variety of locations along Pine Creek makes the data more reliable in determining water quality. The parameters chosen also take into account Land Studies Inc.’s geomorphic test results of high sedimentation in Berger Lake (Geomorphic, 2017). The results may have social and environmental impacts if the data shows pristine or distressed water quality, hopefully helping in the decisions Galeton face.

Proposed Research
Chemical, physical, and biological parameters will be studied every month for one year. Every sample period will record the physical parameters: discharge, channel width, water appearance/smel, land use, cross section shape, embeddedness, deposition, riparian buffer width, and instream cover. Chemical tests will include air temperature, water temperature, dissolved oxygen (DO), pH, total dissolved solids (TDS) conductivity, turbidity, and alkalinity. Lastly, the biological parameters will include macrohabitat quality score and observation of fishes. The sampling will occur at the following ten locations (see Figure 3 and S).

Preliminary Analyses
To reach an “expected analysis” research by Ignatius and Rasmussen was studied and analyzed (2016). Their article, “Small Reservoir Effects on Headwater Water Quality in the Rural-Urban Fringe, Georgia Piedmont, USA”, focused on nine small dam sites, taking physicochemical measurements (Ignatius & Rasmussen 2016). Sample locations compared water quality upstream, within, and downstream of reservoirs. When looking at the upstream-downstream water quality difference, the DO had an average decrease of 4.9 mg/L, as the average water temperature increased 77% (see Figure 6). There was also showed water quality changes for pH, turbidity, alkalinity, and conductivity.

Conclusion
The conflict in Galeton, Pennsylvania needs to be addressed as an environmental and social concern to reach the best possible conclusion. With tension between citizens and agencies, the two parities need all more information. Water quality data can help give everyone the hard evidence they need to start working towards the best solutions available. No matter what, the current situation will need to change, so why work together to find the happy medium, which will enhance both Pine Creek and Galeton.

References