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Geomorphic control of nitrogen dynamics in freshwater reservoirs of central Indiana

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Several municipalities in central Indiana obtained drinking water from stream-fed reservoirs, and these surface water sources are prone to nitrate (NO_3^-) enrichment. Given the health hazards associated with NO_3^- ingestion, there is a need to document N transformations in these drinking water systems. The pool of NO_3^- in water reservoirs is controlled by N inputs, *in-situ* N cycling processes and N transfer from the sediment to the water column. To evaluate the potential for reservoir sediment to act as a sink or as source of NO_3^- to the water column, N transformation processes were assessed using sediment from three water reservoirs near Indianapolis. Processes considered in this evaluation included N mineralization (formation of NH_4^+ from organic N), nitrification (formation of NO_3^- from NH_4^+) and denitrification (conversion of NO_3^- into N gases). Sediment samples from all 3 reservoirs exhibited high NO_3^- removal capacity, but denitrification rate (mg N_2O-N kg^{-1} d^{-1}) in the Geist (3.6) was on average 1.5 - 3 times lower than in the Eagle Creek (6.7) and Morse (10.4) reservoirs. Results also showed higher H/C ratio (0.25), respiration rate (51 mg mg CO_2-C kg^{-1} d^{-1}), N mineralization (0.43 mg N kg^{-1} d^{-1}) and nitrification rates (4.5 mg N kg^{-1} d^{-1}) in samples from the Geist than in samples from the other reservoirs (0.18, 41, 0.12 and 2.2, respectively). These results will be discussed in conjunction with reservoir NO_3^- concentration profiles and hydrologic events in order to assess the magnitude and direction of NO_3^- exchange between the sediment and the water column at these reservoirs.