Influence of groundwater-coastal water interactions on fate of septic-derived nutrients in a nearshore aquifer

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The mixing and reaction zone near the groundwater coastal water interface can significantly impact the fate of reactive species (e.g. nutrients) affecting their ultimate discharge to coastal waters. While the reaction zone has been well studied in marine coastal environments, its function in controlling chemical inputs to large inland seas (i.e. the Great Lakes) is not well understood. This understanding is required as although groundwater discharge to inland coastal waters is often disregarded, groundwater has been shown to contribute more than 50% of the overall phosphorous (P) load in some lake settings.

The objective of this study was to evaluate the transport and transformation of septic-derived nutrients through a sandy nearshore aquifer and assess their ultimate discharge to the lake. The study combines field investigations with numerical modelling to examine the attenuation of P along its discharge pathway and extent to which P retardation may pose a legacy contamination issue. Further the study examines how dynamic flow and geochemical processes in the reaction zone impact the flux of inorganic nitrogen to coastal waters. Although the study was focused on the reaction zone that exists at the interface of inland coastal waters, the findings provide valuable insights that can be applied to better evaluate nutrient fluxes in marine coastal environments.