

# Novel Biogeochemical Approach for Removing Nutrients from Eutrophic Retention Ponds<sup>1</sup>

L. McKercher<sup>\*</sup>, T.L. Messer, A.R. Mittelstet, and S.D. Comfort<sup>2</sup>

**Abstract:** Urban retention ponds are a popular stormwater control measure (SCM) for receiving and treating urban runoff. However, after years, or even decades, of stormwater receipt, retention ponds are likely to become eutrophic when internal nutrient loads of nitrogen and phosphorus over accumulate within pond water and sediment. Eutrophic conditions promote excess algal growth which may result in a plethora of unintended environmental effects (hypoxia, foul odors, fish kills). Thus, additional management strategies are often required to mitigate internal nutrient loading to improve water quality. Our objective was to design a novel biological-chemical approach to remove nutrients from a eutrophic urban retention pond using a 37 m<sup>2</sup> floating treatment wetland paired with slow-release lanthanum composites to remove nitrogen and phosphorus from the eutrophic pond. The design was implemented at the Densmore Pond in Lincoln, Nebraska, USA in 2020 and 2021. Field sampling results showed nitrate-N and phosphate-P concentrations were reduced from 50 µg L<sup>-1</sup> to < 10 µg L<sup>-1</sup> following two years of treatment in 2020 and 2021.<sup>3</sup>

**Additional Key Words:** Rare earth elements, nutrients.

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  2. L. McKercher (\*presenter), Graduate research assistant, University of South Carolina, Columbia, SC 29210; T.L. Messer, Assistant Professor, University of Kentucky, Lexington, KY 40506; A.R. Mittelstet, Assistant Professor, and S.D. Comfort, Professor, University of Nebraska-Lincoln, Lincoln, NE 68583.
  3. Work reported here was conducted near 40.7375015°N, -96.7044619°W.