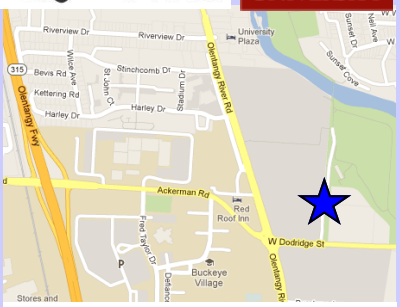
A Water Luncheon Seminar

- Presented by:
  The Water Management Association of Ohio
  and
  The Ohio Water Resources Center

April 19, 2017; 11:30 a.m. - 1:00 p.m.

Wilma H. Schiermeier Olentangy River Wetland Research Park,
The Heffner Building, 352 Dodridge St. Columbus, OH 43202



From St. Rt. 315, exit east onto Ackerman Rd, continue past Olentangy River Rd onto W. Dodridge St, then left into Park driveway.

Hidden Chemical Exchange Due to Lake-Groundwater Interactions

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https://earthsciences.osu.edu/people/sawyer.143

Water and chemical exchange through lakebed sediment affects lake water quality but often eludes measurement because fluxes are highly variable and broadly distributed. Here, I present two examples of the effects of lake-groundwater interaction on lake water quality. In the first case, direct groundwater discharge to Lake Erie acts as a hidden source of dissolved nutrients that may alter N:P ratios in lake water and contribute to algal blooms. Based on geospatial analysis, Lake Erie is particularly vulnerable to groundwater-borne nutrient loading compared to the other Great Lakes. Field measurements from a vulnerable site on Lake Erie show that dissolved phosphorus is elevated in lakebed sediments, while dissolved inorganic nitrogen is depleted, relative to onshore groundwater. The dissolved phosphorus load from the lakebed is interpreted to be sourced from either legacy lakebed sediments, organic matter decomposition, or some combination. The coastal aquifer removes most land-derived nitrogen along flow paths prior to discharge. While the lakebed can be a source of nutrients, it can also immobilize lake water contaminants and improve water quality. The second case study illustrates the removal of the algal toxin microcystin-LR within lakebed sediment. In controlled laboratory experiments, we introduced microcystin to a wave tank with and without lakebed sediments. Over 100 hours, 60% of the added microcystin mass was removed due to interaction with sediment (via adsorption and/or biodegradation), while only 20% was removed in the absence of sediment. Additional reactive transport models show that microcystin removal increases with lakebed permeability and wave height and decreases with water depth. Given a microcystin concentration of 20 ppb (the WHO recreational guideline), sandy lakebeds can remove the equivalent mass in 1 m of surface water under typical nearshore wave conditions within tens of hours. In open water at large depths above a silty bed, removal times are much longer. Wave-driven lake-groundwater interaction is therefore an important control on microcystin fate in energetic coastal areas but not in deep or calm settings where sediment-water interactions are greatly reduced.

Please register by April 17, 2017. Late or on-site registrations cost $5 extra and are not guaranteed a meal. For registered engineers who need Professional Development Hours (PDHs), this presentation offers 1 PDH.

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Please send form and check to: WMAO-Luncheon, 8584 E. Washington St. #206, Chagrin Falls OH 44023.

OR, register online with a credit card at: www.wmao.org.

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