Dealing with downstream effects of excessive nutrient runoff from agriculture: How ecologically engineered wetlands can help?

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ABSTRACT: Dealing with downstream effects of excessive nutrient runoff from agriculture: How ecologically engineered wetlands can help

More than 100 years of excessive fertilizer use throughout the civilized world has led to coastal hypoxia, harmful algal blooms (HABs), and major shifts in the ecology of downstream swamps, lakes, and wetlands. This paper explores three large-scale cases in North America where excessive nutrients are impacting downstream ecosystems and ecologically engineered solutions that have either been proposed or are in place to use wetlands as buffer ecosystems to mitigate those impacts. The case studies are the Mississippi-Ohio-Missouri River Basin and downstream hypoxia in the Gulf of Mexico, agricultural stormwater runoff affecting the Florida Everglades, and restoration of a relict wetland (Black Swamp) to mitigate HABs in Lake Erie in the Laurentian Great Lakes. Technical and policy barriers to implementing these solutions will be discussed.

Dr. William J. “Bill” Mitsch has been an eminent scholar and director of the Everglades Wetland Research Park, and Sproul Chair for Southwest Florida Habitat Restoration and Management at Florida Gulf Coast University since October 2012. He is professor emeritus at The Ohio State University where he taught for 26 years and is founding director of the Olentangy River Wetland Research Park. He holds courtesy or honorary faculty appointments at University of Florida, University of Notre Dame, Tartu University (Estonia), and Nanjing Forestry University (China). His research and teaching have focused on wetland ecology and biogeochemistry, wetland creation and restoration, ecological engineering and ecosystem restoration, and ecosystem modeling. He has over 600 publications, reports, abstracts, and books, including five editions of the popular textbook Wetlands. He is editor-in-chief of the international journal Ecological Engineering. In August 2004 he was awarded the 2004 Stockholm Water Prize by King Carl XVI Gustaf of Sweden. He has also been awarded the Ramsar Convention Award for Merit (2015), an Einstein Professorship from the Chinese Academy of Sciences (2010), the Lifetime Achievement Award from the Society of Wetland Scientists (2007), and the Theodore M. Sperry Award from the Society for Ecological Restoration International (2005). Dr. Mitsch has advised to completion 73 graduate students, including 23 Ph.D. students. Seventeen of his former graduate students and post-docs are teaching at colleges and universities.