Field-margin wetlands alone can't fix the Gulf of Mexico's dead zone, say researchers

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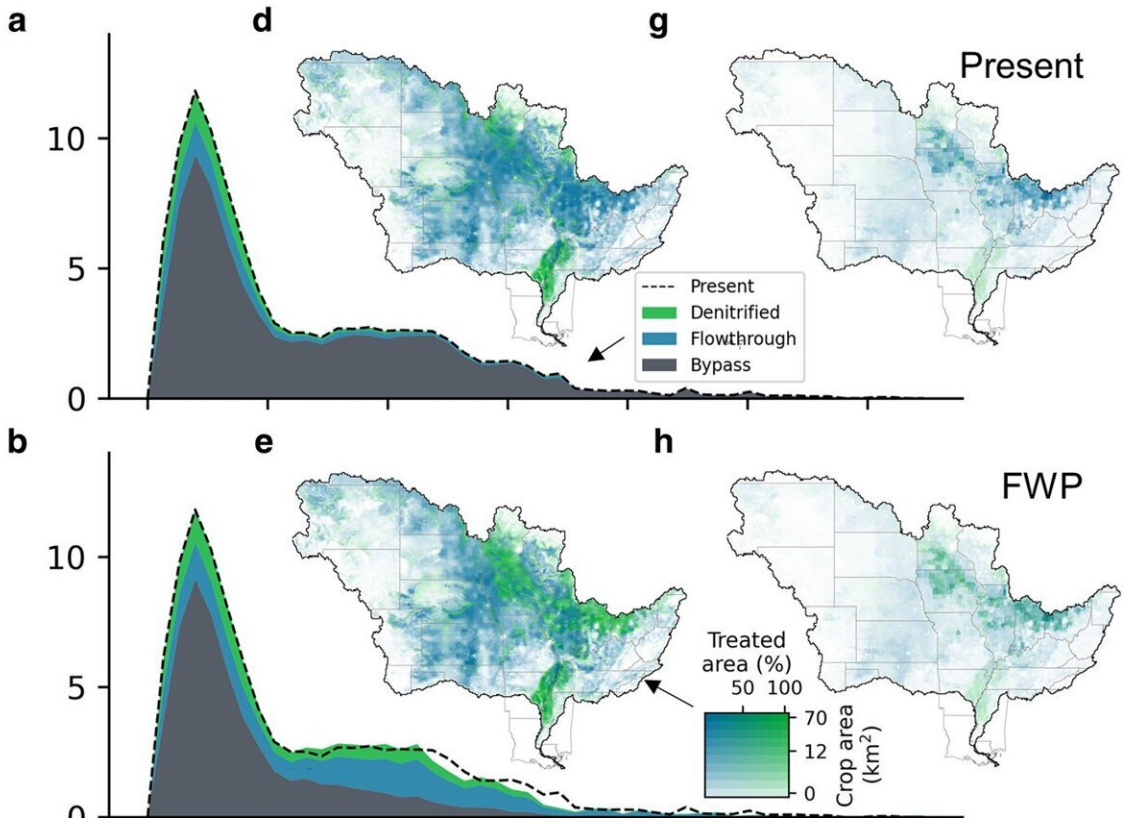

The spatial distribution of present and restorable wetlands explains the amount and distribution of wetland nitrate removal. Credit: *PNAS Nexus* (2024). DOI: 10.1093/pnasnexus/pgae129

Each summer, a hypoxic dead zone forms in the Gulf of Mexico, making some marine habitats unlivable. The dead zone is caused by

nutrients—primarily from agricultural fertilizers—flowing into the Gulf from the Mississippi River. Restoring wetlands at field margins has been proposed to intercept some of the runoff, as wetland plants and soils are capable of absorbing nutrients like a living sponge. But estimates of nutrient removal by restored wetlands have varied widely.

Shan Zuidema and colleagues took a whole-system approach to modeling the potential for wetlands to ameliorate the flow of nitrate to the Gulf. The paper is published in the journal *PNAS Nexus*.

The authors found that wetland restoration through existing federal programs could not, in isolation, reduce nitrate by the 45%–60% needed to prevent the formation of the dead zone in the Gulf of Mexico. Even if fully utilized, these programs could, at most, reduce nitrate export to the Gulf by 30%.

One reason for the gap is that many croplands are not suitable for wetland restoration, and the runoff from these croplands enters deeper flow-paths that cannot be intercepted by surface-level wetlands. According to the authors, additional management options, including other wetland restoration strategies, are also necessary to eliminate the dead zone in the Gulf of Mexico.

The authors include one suggestion: Restoration of wetlands along or in rivers could potentially catch additional nitrate from agricultural lands not suitable for edge-of-field-wetlands.

More information: Shan Zuidema et al, Existing wetland conservation programs miss nutrient reduction targets, *PNAS Nexus* (2024). DOI: 10.1093/pnasnexus/pgae129

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