**Synergistic response of nitrogen removal by rivers following field-margin management and engineering interventions to protect water quality.**

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Widespread adoption of management and engineering interventions are needed to reduce export of anthropogenic nitrogen from the Mississippi River Basin (MRB) currently harming the marine ecosystems of the Gulf of Mexico. Interventions that reduce both peak storm flows and nitrogen concentrations, such as wetlands, could also promote greater N removal by surface waters because the resulting hydraulic and biochemical conditions enhance N removal effectiveness. We quantify the potential for one intervention, restoration of riparian wetlands, to enhance N removal by the Mississippi R. watershed as well as the added (“synergistic”) removal by the river network resulting from the decreased loading. In our preliminary analysis, we find that absolute removal of nitrogen from rivers declines with wetland restoration, because loading to streams declines. However, the relative amount of removal from the river network and reservoirs increased by 2% from 24% to 26%. These relatively modest increases in removal proportions at the scale of the MRB translate to mass reductions on the order of 10s of Gg y-1, a substantial amount to be managed by additional or alternative interventions. Spatial arrangement of wetland interventions could further enhance the synergistic effect of N removal by rivers and should be considered when implementing basin-scale interventions. We are exploring a hypothesis that restoration efforts that focus on entire subcatchments, particularly downstream subcatchments, may better enhance removal of anthropogenic nitrogen by the river when concentrated geographically at areas of high loading than when the same actions are distributed throughout the basin.