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EFFECTS OF VASCULAR AND NONVASCULAR MACROPHYTES ON SEDIMENT REDOX AND SOLUTE DYNAMICS[1]

MARY L. JAYNES[2] AND STEPHEN R. CARPENTER
Department of Biological Sciences, University of Notre Dame, Notre Dame, Indiana 46556 USA

Abstract. Oxygen release from the roots of submersed vascular plants influences redox (oxidation-reduction)-related solute dynamics in lake sediments. In a northern Michigan lake we found significant differences in pH, redox potential (Eh), and phosphorus and iron fractions among sediments, depending on whether they supported no vegetation, the vascular macrophytes *Isoetes braunii* and *Myriophyllum tenellum,* or the moss *Drepanocladus exannulatus.* Eh and total P were significantly higher, and filterable P was significantly lower, at vascular plant sites than at bare or moss-covered sites. An in situ transplant experiment of the three macrophyte species into three different sediment types showed that the vascular plants raised sediment Eh, lowered pH and filterable Fe and P percentages, and enhanced sediment P retention. Sediments with moss transplants remained reduced and high in filterable Fe and P, and released more P to overlying water than sediments with vascular transplants. Vegetation changes from tracheophytes to bryophytes, such as occur during lake acidification, could lower Eh and increase Fe and P mobility in sediments.

Key words: Drepanocladus exannulatus; *iron:* Isoetes braunii; *macrophyte-sediment interactions; Michigan;* Myriophyllum tenellum; *phosphorus; redox potential; rhizosphere oxidation; sediment phosphorus cycling.*