Nitrogen and phosphorus availability in surface and ground water in the Cumberland Marsh Region, Canada: impacts on productivity in constructed wetlands

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The Cumberland Marsh Region (CMR), located on the coast of the Bay of Fundy, is a major feeding ground for waterfowl and contains significant coastal wetland systems. At this site there is concern over the mobility and toxicity of metals in lake sediments, and management practices that may influence these processes. As well constructed wetlands may support significant populations of migratory waterfowl, however wetland senescence appears to be a limiting factor in the viability of this habitat. This study focuses on evaluating nitrogen (N) and phosphorous (P) in both surface and ground water, and the effect of these nutrients on wetland productivity. Research was conducted near Aulac, New Brunswick, and included collection and analyses of surface and ground water samples, identification of natural and anthropogenic nutrient sources, and consideration of the influences of regional geology and geomorphology. Water analyses were carried out weekly over a 3-month period on ten constructed freshwater wetlands, one altered freshwater wetland and three ground water sites. Preliminary results indicate that the impact of regional N and P sources on the sampled wetland sites is relatively low, and P loading is primarily autochthonous. These observations are supported by low N readings (<3 mg/L) at all sites with little seasonal variation, and higher (eutrophic) P levels that fluctuate without external input (40−300 µg/L) most notably in newly constructed wetlands. Although land use may not be an important contributor to N levels in surface water, a spike in ground water levels suggests that significant anthropogenic sources exist. Conductivity was variable, ranging from 805 µS/cm to detection limit, suggesting that allochthonous sources from local geological deposits and/or seawater may contribute other nutrients. Future research will investigate sediment archives in old constructed wetlands using the paleolimnological method to assess the temporal and spatial variability of wetland productivity in the CMR. Wetland productivity proxies and water chemistry will be analyzed to better understand factors that govern wetland senescence.

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