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Nutrient Plant Uptake and Phosphorus Deposition in Constructed Stormwater Wetlands

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Abstract Text:

As the use of constructed wetlands to treat stormwater runoff becomes more frequent, strategies for maintaining their ability to remove pollutants over time must be examined. Two potential strategies are addressed by this research, plant harvesting and soil replacement. By harvesting plant biomass, nutrients that would otherwise be deposited back into the wetland during senescence are removed. Soil replacement would involve removing wetland top soil that is presumably saturated with phosphorus and replacing it with a layer of new soil. To analyze these strategies a stormwater wetland located in River Bend, North Carolina, has been instrumented to collect flow and water quality data. The wetland treats a 100 acre watershed located in the Neuse River Basin in Eastern North Carolina. To monitor flow and sample water quality, the inlet and outlet have been outfitted with ISCO automatic samplers. To quantify nutrient plant uptake, harvesting was performed just before senescence. This information will be used to perform a nutrient balance and determine the significance of nutrient plant uptake with respect to total nitrogen retention and removal from the wetland system. To determine if particular wetland plants uptake a greater amount of nutrients, five wetland species native to North Carolina were harvested separately from two well established wetlands in Smithfield and Greenville, North Carolina. Pickerel Weed (Pontederia Cordata), Lizard Tail (Saururus Cernuus), Wool Grass (Scirpus Cyperinus), Arrow Head (Sagittaria L.) and Softstem Bulrush (Schoenoplectus Tabernaemontani) were the five plant species chosen for analysis. Phosphorus accumulation over time is being monitored by analyzing soil samples every two months. Preliminary data collected in June of 2007 through present confirms that the wetland has reduced peak flows and improved water quality. By November, the plant analysis will be complete and conclusions regarding plant uptake will be drawn.

Impact Statement: