NITROGEN CYCLING IN PORE WATER AND SEDIMENT AT THE BASE OF A STANDING RECHARGE BASIN

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The artificial recharge basin located to the northwest of the Stony Brook University campus; north of North Loop Road and south of Rte 25A; is the subject of much interest primarily due to its status as a "standing water" recharge basin. The water in this basin has a relatively long residence time of approximately 4-20 days, attributed to the clogging of the base with decomposing organic matter and fall out from the atmosphere. It has been observed that water entering the recharge basin has a significantly higher nitrate (NO_3-N) concentration (0.88 mg/L), than that leaving the system (0.55 mg/L in a strategically located well). This implies that there is some process within the system that promotes the removal of this nutrient. Previous studies have suggested that such a process is likely to be occurring at the sediment-water interface, as the nitrate concentration throughout the water column seems to be consistent, and conditions are oxic. In addition to this, there seems to be no seasonal constraint on this mechanism, in that the loss of nitrate from the system occurs throughout the year. Such a trend indicates that biological activity might not play a significant role in the elimination of nitrates, as one would expect a significant decrease in flora and fauna within the basin throughout the colder seasons. This study aims to give some insight into the activities which take place in standing water recharge basins, and hence generate useful applications for increasing the efficiency of nitrate removal in other applicable systems, such as in the treatment of wastewater. In an attempt to elucidate the mechanisms occurring at the sediment-water interface, cores were collected from the basin. An oxygen gradient was determined, as well as the percentage of total nitrogen and carbon. Pore water was analyzed for ammonium concentration, alkalinity and dissolved inorganic carbon (DIC). Results of this analysis indicate that conditions at the bottom of the basin are effective in removing nitrate, but the exact mechanism could not be determined. A mass balance calculation based on nitrate water analyses, confirm that sedimentation could not be the sole means via which this nutrient is lost from the system. It is apparent that denitrification is occurring, however further work needs to be undertaken to get a more comprehensible understanding of the processes in operation.

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