NITROGEN CYCLING IN BACKREEF SEDIMENTS (ST. CROIX, U.S. VIRGIN ISLANDS)

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The sediments of the turbulent backreef area of Teague Bay, St. Croix, U.S.V.I., were examined for grain size, concentrations of inorganic nitrogen dissolved in sediment pore waters, Eh, organic carbon, rates of ammonium production, and fluxes of NH_4^+ and $NO_3^- + NO_2^-$ from the sediments. The sediments were mostly oxidized and characterized by low N concentrations (typically <5 µM) and low organic carbon (<0.6%). Local pockets of higher NH_4^+ concentrations were correlated with reducing sediments. The mean ammonification rate was 41.2 µmol/1 sediment/d. Ammonium fluxes were highly variable, predominantly positive, with a mean of 71 µmol/m^2-d. Nitrate + nitrite fluxes were more erratic and had a mean of -5 µmol/m^2/h. The ammonification rate was used to predict an ammonium flux which compared well with the mean measured flux. The occurrence of lower-than-predicted fluxes and of NH_4^+ concentrations up to 79 µM in reducing sediments could indicate that nitrification coupled to denitrification occurred in certain areas of the backreef and that nitrogen was lost from the ecosystem.

The nitrogen requirements for two benthic macroalgae (*Caulerpa sertulariodes*, *Acanthophora spicifera*) found on the backreef were calculated from biomass, oxygen productivity, and C/N data. Comparison of the requirements to the NH_4^+ production rate and benthic N fluxes revealed that the algae are probably N-limited when growing on the backreef. A nitrogen fixation rate was measured for *Caulerpa* and its associated epibiota using an acetylene reduction technique. The range of rates measured was 102-329 ug N/g dry

weight-h, which could supply a significant proportion of *Caulerpa*'s N requirement, assuming an efficient mechanism exists for transferring the fixed N.