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A comparative study of dissolved inorganic nutrient fluxes between sediments and water column in temperate estuarine ecosystems.

Dan Baird[1], Birgit Goeck[1], Harald Asmus[2] & Ragnhild Asmus[2]

[1]Department of Zoology, Nelson Mandela Metropolitan University, Port Elizabeth, South Africa. [2]Alfred Wegener Institute for Polar and Marine Research, List, Island of Sylt, Germany.

Dan.baird@nmmu.ac.za

This paper presents results of benthic nutrient fluxes in a warm temperate estuary (Swartkops Estuary in South Africa), a subtropical estuary (Mngazana Estuary in South Africa), and a cold temperate system (the Sylt-Romo Bight, Northern Wadden Sea, Germany). Temperature appeared to be the main controlling factor in the rate of flux, although other factors such as benthic infauna, microphytobenthos, salinity, and the organic content of the sediments were also taken into account and their effects also assessed. Fluxes on nitrogen species and of phosphate between the sediments and overlying water were measured *in situ* by means of the bell jar incubation method. Strong autotrophy occurred in the Mngazana Estuary during summer, signified by a GGP/R ratio of 1.9, while the system becomes heterotrophic in winter. The sediments in this system acted as a sink for most nutrient during both summer and winter. Generally low concentrations and rates of flux occurred in this typical sub-tropical estuary. The Swartkops estuary were consistently heterothrophic, while the sediments function both as a sink and source for the different nutrient species. It was mostly a sink for phosphate and nitrate, and a source of silicate and ammonium to the overlying water. The Sylt-Romo Bight was generally heterotrophic, but strongly autotrophic during summer (GPP/P ratio 1.4). Fluxes were strongly affected in all systems by temperature, although macro-infauna significantly affected fluxes of nitrite and nitrate. We present seasonal flux rates of nutrients for the different systems as measured during the study period January 2001 to June 2004.