Abstract

This paper focuses on the nutrient dynamics of a tropical estuary on the northeastern Brazilian coast, studied using the LOICZ biogeochemical budgeting protocol. We describe the methodology and assumptions underlying this model. Input data (monthly for rainfall, evaporation, river discharge, and concentrations of salt, phosphorus and nitrogen) were obtained during field campaigns in the Barra das Jangadas Estuary (BJE) over a 5 years period (1999 to 2003). Mass balance results indicate large inputs of nutrients to the system. The model shows that the seasonal variation of the Net Ecosystem Metabolism (NEM) indicates that the system passes from a stage of organic matter liquid production and mineralization during the dry season (-0.5 mmoles C m⁻² d⁻¹) to liquid mineralization during the rainy season (-19 mmoles C m⁻² d⁻¹). We suggest that the system varies slightly between autotrophy and heterotrophy during the year due to the rainfall regime, human activities in the basin (density population and sugarcane plantations), and associated DIP riverine loads. High per capita loads of N and P indicate a high population density and high runoff. The application of flux balance modeling was useful to understand the nutrient dynamics of this typical small tropical estuary.

Keywords

Brazil, Barra das Jangadas Estuary, seasonal variations, heterotrophy, autotrophy, carbon dioxide.