Abstract

The relationship between physical hydrodynamic processes and nutrients dynamics was investigated in Mida creek, a groundwater influenced mangrove-fringed creek in Kenya between March 1996 and May 1997. The research involved spot and time-series measurement of nitrate–nitrite, ammonia, silicates, phosphates, salinity, temperature, sea-level as well as tidal currents at seven stations located in the front, middle and backwater zones of the creek. Groundwater level as well as total dissolved solids' concentration, salinity, temperature and nutrients' concentration were also measured once every month in shallow wells (water-table < -5 m) located in the upper region of the creek. Results of the study show that nutrient concentrations vary with the tide and that, though there is no river drainage, they are of the same magnitude as in mangrove creeks with substantial river runoff. The peak concentrations of NH_4^+–N (5.45 μM), NO_2^-–NO_3^- (5.63 μM), PO_4^{3-}–P (0.58 μM) and SiO_3^{2-}–Si (81.36 μM) in the creek occurred during flood tide, 2–3 h before high waters. The (NO_2^- + NO_3^-)–N concentrations declined rapidly during ebb tide, reaching the minimum levels during low water. Contribution of groundwater seepage to the net nutrients flux (particularly on nitrite–nitrates) is largest in dry seasons. The study shows that groundwater outflow sustains the mangroves during periods of severe salinity stress and nutrients deficiency in dry seasons. This is essentially by limiting salinity increase and by boosting nutrient supply in dry seasons.