Abstract

This study focuses on sediment exchange dynamics in Mwache Creek, a shallow tidal mangrove wetland in Kenya. The surface area of the creek is 17 km^2 at high water spring. The creek experiences semidiurnal tides with tidal ranges of 3.2 m and 1.4 m during spring and neap tides, respectively. The creek is ebb dominant in the frontwater zone main channel and is flood dominant in the backwater zone main channel. During rainy season, the creek receives freshwater and terrigenous sediments from the seasonal Mwache River. Heavy supply of terrigenous sediments during the *El Niño* of 1997–1998 led to the huge deposition of sediments (10^6 tonnes) in the wetland that caused massive destruction of the mangrove forest in the upper region. In this study, sea level, tidal discharges, tidal current velocities, salinity, total suspended sediment concentrations (TSSC) and particulate organic sediment concentrations (POSC) measured in stations established within the main channel and also within the mangrove forests, were used to determine the dynamics of sediment exchange between the frontwater and backwater zones of the main channel including also the exchange with mangrove forests. The results showed that during wet seasons, the high suspended sediment concentration associated with river discharge and tidal resuspension of fine channel-bed sediment accounts for the inflow of highly turbid water into the degraded mangrove forest. Despite the degradation of the mangrove forest, sediment outflow from the mangrove forest was considerably less than the inflow. This caused a net trapping of sediment in the wetland. The net import of the sediment dominated in spring tide during both wet and dry season and during neap tide in the wet season. However, as compared to heavily vegetated mangrove wetlands, the generally degraded Mwache Creek mangrove wetland sediment trapping efficiency is low as the average is about 30% for the highly degraded backwater zone mangrove forest and 65% in the moderately degraded frontwater zone mangrove forest.