IMPACT OF LAND-BASED ACTIVITIES ON THE LEVELS OF PHOSPHORUS AND NITROGEN SPECIES IN MEX BAY, EGYPT

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Mex Bay, a semi-enclosed coastal Mediterranean basin west of Alexandria, has an area of 19.4 km^2, volume of 190.3 X 10^6 m^3 and a mean depth of 9.8 m. It is heavily polluted by different contaminants from various land-based sources, mainly Umum Drain (UD) and Misr Chemical Company (MCC). The latter discharges 0.035 X 10^6 m^3/ day of untreated industrial wastes and UM discharges 6 X 10^6 m^3 / day of agricultural drainage waters also contaminated with domestic and industrial wastes. Surface and bottom water samples were collected seasonally along transects perpendicular to the land-based sources of pollution. The surface and bottom dissolved inorganic phosphorus (DIP) values decreased markedly seaward far from waste discharges. The annual mean surface DIP concentration was almost three times higher than that for the bottom water, reflecting the direct effect of intensive external input of pollutants first on the surface water. Although the DIP levels in UD were higher than those in MCC, both are considered as the main contributors of DIP to the bay. Similar to DIP, the annual mean surface dissolved organic phosphorus (DOP) value was almost three times higher than that for the bottom water. This is possibly resulted from the excretion of DOP in the surface water from biological activities beside the external contaminated freshwater inputs. The DIP/DOP ratios indicate the predominance of DIP over DOP. Contrary to DIP, the DOP average concentrations in UD and MCC effluents did not exhibit remarkable differences. Particulate phosphorus (PP) dominated the phosphorus forms. The annual mean surface PP value was higher than that for the bottom water. The highest seasonal average surface and bottom PP concentrations in October coincided possibly with the external contaminated freshwater inputs and biological activities. Although UD and MCC discharges exhibited similar high PP values, the effect of UD on the PP levels in the bay was minor compared with that of MCC effluent. Nitrate was the predominant species of dissolved inorganic nitrogen (DIN) in the bay and in its main effluents. The nitrate bottom values decreased seaward contrary to its behavior in the surface water, which might be due to its adsorption onto suspended particles found in abundance in the bottom water. Nitrite was the least dominant species of DIN. Both surface and bottom nitrite values decreased seaward. Nearly similar nitrite averages were observed in both UD and MCC effluents. Ammonium concentrations decreased remarkably seaward, although it showed insignificant correlation with salinity. The annual mean surface values of the DIN species were higher than those for the bottom water, confirming the direct influence of the dumped wastes first on the surface water. The UD and MCC had extraordinary high absolute ammonium values. Compared with DIN, the dissolved organic nitrogen (DON) gave higher values, due mostly to its utilization at a much lower rate than the DIN forms. The DON values in UD and MCC effluents were nearly similar. Particulate nitrogen (PN) showed elevated levels and land–based sources were its major contributors to the bay. This is indicated from the maximum regional average surface PN value in the vicinity of the UD discharges, which was confirmed by significant negative correlation with salinity.