

Radioactivity Assessment of Sediments in Negombo Lagoon Sri Lanka

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Abstract : The distributions of naturally occurring and anthropogenic radioactive materials were determined in surface sediments taken at 27 different locations along the bank of Negombo Lagoon in Sri Lanka. Hydrographic parameters of lagoon water and the grain size analyses of the sediment samples were also carried out for this study. The conductivity of the adjacent water was varied from 13.6 mS/cm to 55.4 mS/cm near to the southern end and the northern end of the lagoon, respectively, and equally salinity levels varied from 7.2 psu to 32.1 psu. The average pH in the water was 7.6 and average water temperature was 28.7 °C. The grain size analysis emphasized the mass fractions of the samples as sand (60.9%), fine sand (30.6%) and fine silt+clay (1.3%) in the sampling locations. The surface sediment samples of wet weight, 1 kg each from upper 5-10 cm layer, were oven dried at 105 °C for 24 hours to get a constant weight, homogenized and sieved through a 2 mm sieve (IAEA technical series no. 295). The radioactivity concentrations were determined using gamma spectrometry technique. Ultra Low Background Broad Energy High Purity Ge Detector, BEGe (Model BE5030, Canberra) was used for radioactivity measurement with Canberra Industries's Laboratory Source-less Calibration Software (LabSOCS) mathematical efficiency calibration approach and Geometry composer software. The mean activity concentration was found to be 24 ± 4, 67 ± 9, 181 ± 10, 59 ± 8, 3.5 ± 0.4 and 0.47 ± 0.08 Bq/kg for ²³⁸U, ²³²Th, ⁴⁰K, ²¹⁰Pb, ²³⁵U and ¹³⁷Cs respectively. The mean absorbed dose rate in air, radium equivalent activity, external hazard index, annual gonadal dose equivalent and annual effective dose equivalent were 60.8 nGy/h, 137.3 Bq/kg, 0.4, 425.3 mSv/year and 74.6 mSv/year, respectively. The results of this study will provide baseline information on the natural and artificial radioactive isotopes and environmental pollution associated with information on radiological risk.

Keywords : gamma spectrometry, lagoon, radioactivity, sediments

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