

# Determination of $^{226}\text{Ra}$ , $^{232}\text{Th}$ and $^{40}\text{K}$ in Ponnai River sand, Tamil Nadu, India using HPGe detector based Gamma-ray spectrometry

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The sand samples are collected at 25 different locations, and activity concentrations of  $^{226}\text{Ra}$ ,  $^{232}\text{Th}$  and  $^{40}\text{K}$  have been measured to ascertain the natural radioactivity in Ponnai River, Tamil Nadu using high purity germanium (HPGe) based gamma-ray spectrometry. It is observed from the results that, the mean value of  $^{226}\text{Ra}$  ( $31.07 \text{ Bq Kg}^{-1}$ ) is lower, whereas  $^{232}\text{Th}$  ( $83.61 \text{ Bq Kg}^{-1}$ ) and  $^{40}\text{K}$  ( $416.36 \text{ Bq Kg}^{-1}$ ) in sand samples are slightly greater than the world average values ( $35, 30$  and  $400 \text{ Bq Kg}^{-1}$  for  $^{226}\text{Ra}$ ,  $^{232}\text{Th}$  and  $^{40}\text{K}$ ) given by UNSCEAR, 2000. Also, various radiological parameters were calculated and compared with the recommended limits. The spatial distribution of radionuclides studied for river sands by Kriging method. Using, multivariate statistical techniques like Pearson correlation, principal component analysis and cluster analysis were performed among radioactive variables to know the existing relation. Our findings are important to both human health and future environmental monitoring in Ponnai River, Tamil Nadu.

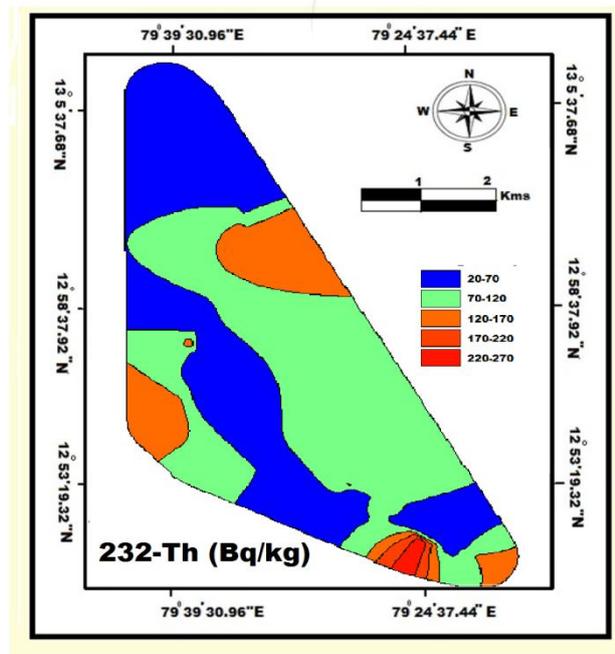


Fig. 1. Spatial distribution of  $^{232}\text{Th}$  in river sand.

