CONCLUSION

The Ganga estuary from Chuchura to Gangasagar and its associated beach sediments were studied for the distribution and fractionation of the heavy metals, Hg, Cd, Cu, Pb, Zn and related elements. The salient features of the findings are discussed below.

The estuarine sediments are mostly silty clays and are poorly sorted. They are fine skewed and get coarser towards the sea. Mineralogically, the sediments are dominated by quartz and regardless of the grain size. Feldspars are more dominant among the finer fractions. Among the clay minerals Illite by far dominates; Kaolinite and Chlorite are also present in significant amounts. There is an inverse relationship between Chlorite and Kaolinite in the <2 μm fractions. Smectite is notable by its absence in the sediments.

The heavy metal distribution show a decreasing trend towards the higher chlorinities, though there are significant exceptions explained by input from tributeries draining from the coal belt. The influence of industrial centres like Haldia port complex are visible. Organic matter is high in the finer grain sizes as well as near tributery confluences. It does not seem to have much influence on the heavy metal concentrations. Zn, Cu and Cd show good positive relationship with the major rock forming elements, Al, Fe and Ti. Pb and Hg on the other hand have very poor correlation with other metals. The suspended sediments show a more regular distribution along the estuary. The Sundarban creeks show a high concentrations of Cu Zn and Cd, probably because of tidal influence and finer sediments being locked up in the creeks. Hg is found to be highly enriched in both the suspended and bed sediments in Ganga estuary. Overall the metal distribution are conservative in the estuary.
The fractionation studies revealed that all the metals are dominantly associated with the residual fraction. Among the non-lithogenic fractions the Fe-Mn oxide fraction is dominant for all the metals studied except Cd. The organic fraction which is known to be scavenger of heavy metals have been found to be less significant in the Ganga estuary. Cu shows a significant association with exchangeable and carbonate fractions in the bed sediments.

In brief, the Ganga estuary is polluted with respect to Hg and Cd to a great extent. Tidal influence show a diluting effect with the all the heavy metals. The Mangrove swamps of Sunderbans are found to be a sink to some of the heavy metals.