LIST OF ILLUSTRATIONS

Fig. 01 Transport mechanisms of metals in the geo-environment 3

Fig. 02A Movement of trace metals in the hydrological cycle 4

Fig. 02B Major processes and interactions between the dissolved and solid metal species in the surface water 4

Fig. 03 Annual fluvial sediment flux from large drainage basin areas to the oceans 9

Fig. 04A Bengal basin in reference with the G-B-M river basin 20

Fig. 04B Extent of the Bengal basin 21

Fig. 05 Landform of the Bengal basin 24

Fig. 06A The Ganges-Brahmaputra-Meghna river system 26

Fig. 06B River system in the Bengal basin 27

Fig. 07A Soils of Bangladesh 30

Fig. 07B Soils of West Bengal 31

Fig. 08A Regional tectonic setting of the Bengal basin 34

Fig. 08B Major tectonic elements of the Bengal basin 34

Fig. 09A Geological map of the Ganges-Brahmaputra-Meghna river drainage basin 35

Fig. 09B Geological map of the Bengal basin 36

Fig. 10 Geological cross-section across the Bengal basin 38

Fig. 11 sedimentary environment and landform in the Bengal basin 38
Fig. 12  Paleo-geographic maps of the Bengal basin showing the history of the Bengal basin since 18,000 yr BP 40

Fig. 13  Sampling location in the Bengal basin 42

Fig. 14  Relative percentage of clay minerals in the < 4 μm fraction of bed sediments of the G-B-M system, Bengal basin 58

Fig. 15  Source of heavy minerals and their relative stability in the Bengal basin 62

Fig. 16  Dominant factors responsible for the ion-chemistry 72

Fig. 17  Ternary diagram relating silica, alkalinity and sulphate plus chloride 74

Fig. 18  Alkalinity plotted against (Ca+Mg) for the G-B-M system, Bengal basin 75

Fig. 19  Relation between saturation indices of calcite and dolomite 77

Fig. 20  Plot showing position of water samples with respect to Na-Feldspar plus muscovite to kaolinite zone and quartz dissolution lone of Brantley et al. (1986) 78

Fig. 21A-D  Stability diagram for the silicate system 80-81

Fig. 22  Average monthly discharge of the Ganges-Brahmaputra-Meghna river system in the Bengal basin 82

Fig. 23  C/N ratio in the bed sediments of the G-B-M system, Bengal basin 93

Fig. 24  P content in different size categories of bed sediments, and in suspended sediments of the G-B-M system, Bengal basin 95

Fig. 25  P content in different grain size fractions of bed sediment in the G-B-M system, Bengal basin 96

Fig. 26  TC/TN ratio in the < 63 μm fraction of bed sediments in the G-B-M river system, Bengal basin 98

Fig. 27  relationship between clay content (%) and the concentration of dissolved P (DP) and particulate P (SP) 100
Fig. 28  Plot of total TN vs TOC in the bed sediments of the G-B-M system, Bengal basin 102

Fig. 29  TP and PAP in the bed sediments of the G-B-M system, Bengal basin 104

Fig. 30  Plot of PAP vs C/N in the bed sediments of the G-B-M system, Bengal basin 105

Fig. 31  Plot of PAP vs TOC in the bed sediments of the G-B-M system, Bengal basin 106

Fig. 32  Concentration of major elements in the bed sediments of the G-B-M system, Bengal basin 111

Fig. 33  Distribution of E/Al ratio in the bed sediments of the G-B-M system, Bengal basin 113

Fig. 34  Absolute major elemental composition of < 63 µm fraction of bed sediments in the G-B-M system, Bengal basin 122

Fig. 35  E/Al ratio in the < 63 µm fraction of the bed sediments in the G-B-M system, Bengal basin 123

Fig. 36  Elemental concentration in the < 4 µm fraction of the bed sediments in the G-B-M system, Bengal basin 126

Fig. 37A  Major element distribution in different grain sizes in the bed sediments of the Ganges, Bengal basin 127

Fig. 37B  Trace element distribution in different grain sizes in the bed sediments of the Ganges, Bengal basin 128

Fig. 38A  Major element distribution in different grain sizes in the bed sediments of the Brahmaputra, Bengal basin 129

Fig. 38B  Trace element distribution in different grain sizes in the bed sediments of the Brahmaputra, Bengal basin 130

Fig. 39A  Major element distribution in different grain sizes in the bed sediments of the Meghna, Bengal basin 131
Fig. 39B Trace element distribution in different grain sizes in the bed sediments of the Meghna, Bengal basin 132

Fig. 40 Variation of P in suspended sediments at different stations 136

Fig. 41 Variation of Metal/Al ratio in suspended sediments at different stations 137

Fig. 42 Distribution of major and trace elements in the bed sediments of the G-B-M system, Bengal basin 142

Fig. 43 Distribution of E/Al ratio in the bed sediments of the G-B-M system, Bengal basin 146

Fig. 44 Average trace element concentration in the < 63 μm fraction of bed sediments in the G-B-M system, Bengal basin 149

Fig. 45A-H Vertical distribution of heavy metals at different stations 161-164

Fig. 46 Distribution pattern of NDF of heavy metals in the G-B-M system, Bengal basin 169

Fig. 47A-B NDF of heavy metals in the bed sediments of the G-B-M system, Bengal basin 170

Fig. 48A-F DF and NDF of different heavy metals in the G-B-M system, Bengal basin 174-176

Fig. I Particle size distribution in bed- and suspended sediments in comparison with the regional physiography 184

Fig. II Stability of heavy minerals and population distribution 185

Fig. 49 Igeo values for different elements in the bed sediments at different stations in the G-B-M system, Bengal basin (Set I) 191

Fig. 50A-B Igeo values for different elements in the < 63 μm fraction of the bed sediments in the G-B-M system, Bengal basin (Set I) 192-193

Fig. 50C Igeo values for Hg at different stations in the G-B-M system, Bengal basin (Set I) 194
Fig. 51  $I_{geo}$ values for different elements in the bed sediments at different stations in the G-B-M system, Bengal basin (Set II) 197

Fig. 52A-B  $I_{geo}$ values for different elements in the <63 μm fraction of the bed sediments in the G-B-M system, Bengal basin (Set II) 198-199

Fig. 52C  $I_{geo}$ values for Hg at different stations in the G-B-M system, Bengal basin (Set II) 200