LIST OF FIGURES

INTRODUCTION

- Figure 1. Generalized physical processes at the estuarine scale with marine and riverine influences
- Figure 2. Examples of (a) a classical macrotidal estuary with a longitudinal salinity gradient and (b, c) estuaries which typically comprise a short and narrow entrance channel, wide central basin and the lower reaches of their tributary river(s). Arrow indicates sand bar

Figure 3. Tidal actions on different moon days

Figure 4. Geometry of Gulf of Khambhat

MATERIALS AND METHODS

- Figure 1. Map of location of study area with reference to Mahi River Basin
- Figure 2. Map showing the toposheet details of the study spread over Mahi River estuary from Fajalpur to Kamboi
- Figure 3. Location of the study area specifically showing region between Sarod and Kamboi, the area where most of the studies were carried out
- Figure 4. Location of 'J' Point or the site of effluent channel opening in the lower estuarine region of Mahi River near Sarod village

RESULTS

- Figure 1. The Lower Estuarine area of Mahi River between Sarod and Kamboi
- Figure 2. Beach profile and slope (cross sectional view) from the upper surf zone (Z1) to the lower intertidal area (Z5) up to 200 m at Kamboi
- Figure 3. Beach profile and slope (cross sectional view) from the upper surf zone (Z1) to the lower intertidal area (Z3) up to 110 m at Sarod
- Figure 4. Different Sediment types of intertidal area at Kamboi.
- (a) Zone 2 (b) Zone 3 (c) Zone 4 and (d) Zone 5
- Figure 5. Water inundation in different zones during low tide

- Figure 6. Acidity, Alkalinity, Total Hardness and Ca Hardness of lower estuarine water sample
- Figure 7. Chloride, Phosphate, Total solids and Salinity of lower estuarine water sample
- Figure 8. Sand & silt-clay % and Soil organic carbon (%) in Z2 and Z3 at Sarod
- Figure 9. Electric conductivity (μ S/cm) and pH in Z2 and Z3 at Sarod
- Figure 10. Water content (%), Porosity, Wet bulk density (g/cm-3) and Dry Bulk density (g/cm-3) in Z2 and Z3 at Sarod
- Figure 11.Sand & silt-clay % and Soil organic carbon (%) in Z2 to Z5 at Kamboi
- Figure 12. Electric conductivity and pH in Z2 to Z5 at Kamboi
- Figure 13. Water content and Porosity in Z2 to Z5 at Kamboi
- Figure 14. Wet bulk density and dry bulk density in Z2 to Z5 at Kamboi
- Figure 15. Cluster analysis of study sites on the basis of Physico-Chemical conditions
- Figure 16. Linear regression between silt-clay % and water content %
- Figure 17. Linear regression between water content % and Dry bulk density

- Figure 1. (a). Dorsal view of *Euricarcinus orientalis* and, (b). Ventral view of *Euricarcinus orientalis*
- Figure 2. (a). Dorsal view of Uca Annulipes and (b). Ventral view of Uca annulipes
- Figure 3. (a). Dorsal view of *Ilyoplax sayajiroai* and (b). Ventral view of *Ilyoplax sayajiraoi*
- Figure 4. (a). Dorsal view of *Metopograpsus messor* and (b). Ventral view of *Metopograpsus messor*
- Figure 5. (a). Dorsal view of *Macrophthalmus sulcatus* and (b).Ventral view of *Macrophthalmus sulcatus*
- Figure 6. (a). Dorsal view of Scylla serrata and (b). Ventral view of Scylla serrata
- Figure 7. (a). Dorsal view of *Ashtoret lunaris* and (b). Ventral view of *Ashtoret lunaris*

- Figure 8. (a). Dorsal view of *Parasesarma plicatum* and (b). Ventral view of *Parasesarma plicatum*
- Figure 9. (a). Dorsal view of *Dotilla sp.* and (b). Ventral view of *Dotilla sp.*
- Figure 10. (a). Lateral view of *Boleophthalmus dussumieri* and (b). Ventral view of *Boleophthalmus dussumieri*
- Figure 11. Monthly burrow count / m2 for the dominant four species of macrobenthos at Kamboi
- Figure 12. Monthly distribution of dominant four macrobenthos in Kamboi
- Figure 13. Three meter belt of chimney made by Dotilla blandfordi at zone 3
- Figure 14. Mean burrow count / m2 of *Ilyoplax sayajiraoi* at different time lapse during low tide along the tidal cycle in Monsoon
- Figure 15. Mean burrow count / m2 of *Ilyoplax sayajiraoi* at different time lapse during low tide along the tidal cycle in Winter
- Figure 16. Mean burrow count / m2 of *Ilyoplax sayajiraoi* at different time lapse during low tide along the tidal cycle in Summer
- Figure 17. Mean burrow count / m2 of *Uca annulipes* at different time lapse during low tide along the tidal cycle in Monsoon
- Figure 18. Mean burrow count / m2 of *Uca annulipes* at different time lapse during low tide along the tidal cycle in Winter
- Figure 19. Mean burrow count / m2 of *Uca annulipes* at different time lapse during low tide along the tidal cycle in Summer
- Figure 20. Mean burrow count / m2 of *Dotilla sp.* at different time lapse during low tide along the tidal cycle in Monsoon
- Figure 21. Mean burrow count / m2 of *Dotilla sp.* at different time lapse during low tide along the tidal cycle in winter
- Figure 22. Mean burrow count / m2 of *Dotilla sp.* at different time lapse during low tide along the tidal cycle in Summer

- Figure 1. Intraspecific behaviour of *U. annulipes*, a) Cheliped waving b) Staring c) Fighting d) Hiding
- Figure 2. Intra specific behaviour of *I. sayajiraoi*, a) Cheliped waving b) staring c) Fighting d) Hiding

- Figure 3. Cheliped waving and Staring behaviour in *U* .annulipes during intraspecific interactions
- Figure 4. Hiding and Fighting behaviour in *U. annulipes* during intraspecific interactions
- Figure 5. Cheliped waving and Staring behaviour in *I. sayajiraoi* during intraspecific interactions
- Figure 6. Hiding and Fighting behaviour in *I. sayajiraoi* during intraspecific interaction
- Figure 7. Interspecific behaviour of I. sayajiraoi and *U. annulipes* a) Cheliped waving b) staring c) Fighting d) Hiding at overlapping zone
- Figure 8. Cheliped waving, Staring, Fighting and Hiding behaviour of *U. annulipes* during interspecific interactions
- Figure 9. Cheliped waving, Staring, Fighting and Hiding behaviour of *I.* sayajiraoi during interspecific interactions
- Figure 10. Comparison of Cheliped waving and Staring behavior between intraspecific and interspecific interactions in *U. annulipes*
- Figure 11. Comparison of Hiding and Fighting behavior between intraspecific and interspecific interactions in *U. annulipes*
- Figure 12. Comparison of Cheliped waving and Staring behavior between intraspecific and interspecific interactions in *I. sayajiraoi*
- Figure 13. Comparison of Hiding and Fighting behavior between intraspecific and interspecific interactions in *I. sayajiraoi*
- Figure14. Monthly ratio of adult and juvenile population along the of *U. annulipes* belt
- Figure 15. Monthly ratio of adult & juvenile population in *U. annulipes* belt
- Figure 16. a) Chimney building activity b) Chimney of Dotilla sp.
- Figure 17. Drove formation' in Dotilla sp.
- Figure 18. Quadrate arrangement along the Z5 for Dotilla sp. experiment
- Figure 19. Linear regression between burrow count and water % at Z5
- Figure 20. Mean density of burrow with chimney and without chimney at one hr time lapse

- Figure 1. Concentration of Oil-Grease and Phenol in the downstream of Mahi estuary
- Figure 2. Concentration of Cadmium and Ferrous in the downstream of Mahi estuary
- Figure 3. Concentration of Manganese and Nickel in the downstream of Mahi estuary
- Figure 4. Concentration of Lead and Zink in the downstream of Mahi estuary
- Figure 5. Concentration of Cadmium and Copper in the sediment samples of Sarod
- Figure 6. Concentration of Cobalt and Ferrous in the sediment samples of Sarod
- Figure 7. Concentration of Manganese and Nickel in the sediment samples of Sarod
- Figure 8. Concentration of Lead and Zink in the sediment samples of Sarod
- Figure 9. Concentration of Cadmium and Copper in the sediment samples of Kamboi
- Figure 10. Concentration of Cobalt and Ferrous in the sediment samples of Kamboi
- Figure 11. Concentration of Manganese and Nickel in the sediment samples of Kamboi
- Figure 12. Concentration of Lead and Zink in the sediment samples of Kamboi
- Figure 13. Concentration of heavy metals in crab and vegetation tissue collected from Sarod
- Figure 14. A simplified overview of the interacting physical, chemical and biological processes that affect the fate and bioavailability of metals