Estuaries are very important even though their area is only a small proportion of the world's surface. Because of their fertile waters, sheltered anchorages and the navigational access they provide to a broad hinterland, estuaries have been the main centres of commerce. Some of the oldest civilizations have flourished in the hinterlands of estuarine environment such as the lower reaches of Indus, Tigris and Euphrates rivers. Estuaries form natural breeding ground for large variety of fishes and shrimps. Of late, some estuaries have been subjected to ruthless rampage, extensive damage and even total destruction as a result of the great pressure of population, industrialisation in the adjacent areas and along the river banks, and urbanisation. Furthermore, man-made changes up-stream, such as the construction of dams, barrages and bunds upset the free flow of water upsetting the ecological balance. Indiscriminate deforestation in the catchment areas, removal of vegetation along the river banks and overgrazing have caused severe soil erosion and heavy siltation of estuaries.

Because of the interaction of so many variables no two estuaries are alike, and difference in the physio-chemical, biological and meteorological conditions that exist in the different regions of our country, makes generalisation somewhat difficult, necessitating detailed studies on each estuary.
This thesis incorporates the results of the studies carried out by the author on some of the dynamical and sedimentological aspects of Azhikode estuary, (South-west coast of India), by conducting synoptic field observations every month for a period of one year on current speed and direction, salinity, tides and suspended sediment concentrations at four cross-sections, between river mouth and 15 Km up-stream. The thesis is presented in 7 chapters.

The first chapter gives, apart from a general introduction, a survey of literature in the relevant fields and a description of the study area in the background of it's geological and climatological setup. The methods of data collection and techniques of data processing have been presented in chapter-2.

Annual distribution of temperature, axial and transverse distribution of salinity and currents are detailed in chapter-3. Variability of residual current and the relation between depth-tide mean salinity with river flow and tidal amplitude are also presented in this chapter.

Chapter-4 deals with the residual fluxes of water and salt and their temporal and spatial variations in the Azhikode estuary at four cross-sections, each comprising of 3 stations. The major physical forcings which influence the transport processes are identified and their relative dominance is discussed. Based on the above results, an attempt has been made to classify the estuary during different months. Flushing time scales and mixing
characteristics of the estuary during each month have been presented in chapter-5.

Temporal and spatial variations of suspended sediment concentration have been discussed in chapter-6. Relation between sediment concentration with current speed and tidal amplitude and river flow have also been analysed. An attempt has been made to quantify the annual input of river borne sediment and to suggest possible remedial measures to prevent or reduce the sandbar formation and siltation at the estuarine mouth which are causing havoc to the safe navigation of fishing boats. The salient features emanating from the foregoing discussions are summarised in chapter-7.