ABSTRACT

Mahanadi delta with an aerial extension of about 9000 sq.km. was formed by the deposition of sediments during the Holocene period by Mahanadi and its distributaries in a fault controlled basin with depressions and ridges along the eastern continental margin of India. It has the classical shape of an arcuate delta and lithogeomorphic content similar to Nile delta of Egypt or Godavari delta of Andhra Pradesh in India. Deposition of sediments occurred under a variety of environmental conditions e.g. fluvial (channel, levee, floodplain), marine marginal (beach, tidal, lacustrine), marine (littoral, river mouth, delta front, prodelta etc.) and aeolian. The textural characteristics of sediments from different typical geomorphological features reflect these environmental conditions.

The sedimentation has resulted in a progressively accreting deltaic land with many large and small-scale geomorphic features. Large-scale features include extensive flat alluvial plains of fluvial and marine origin intersected by numerous distributary systems, radiating from the mother channel, Mahanadi which debouch into the sea at different points. Within the broad extensive features, low-order geomorphic features such as levees, channel bars, channel islands, point bars, floodplains, floodplain swamps, beaches, beach ridges, tidal flats, tidal creeks, mangrove swamps, spits, offshore bars, aeolian dunes and lakes can be seen.

These above geomorphic features can be included into several morphostratigraphic surfaces of different periods. Landward the deltaic sediments are bordered by rocks of diverse ages and origin: the Archean Crystallines, mostly Easternghat group, the Gondwana sedimentaries (Athgarh Formation) and the Pleistocene laterites. These rocks also underlie the sediments forming the floor
of the basin and at times solitary hills of Archean crystallines appear within the deltaic sediments. The complete absence of Pre-Holocene marine sediments within the Mahanadi delta may be indicative of deposition in a Holocene transgressive sea.

The spatial and temporal distribution of geomorphic features indicate evolution of the delta by progressive shifting of river courses and shore line during the short span of Holocene time. As many as four possible stages in deltaic evolution has been visualised both in subaerial fluviatile and submarine domains. The maximum inland limit of the sea has been fixed along Indupur-Jagatsinghpur-Delang line from which it has progressively shifted to the present coast. Some of the important distributary systems during this period are: Sukhabhadra-Burdha (dead), Prachî-Alaka (defunct) and Devî-Kuakhai (active).

The deltaic land is mostly populated for its fertile soil, surface water, ground water and flat terrain condition, but has been a constant source of agony to many for its recurrent floods and cyclones, poor drainage condition, saline soils and contamination of water in the coastal saline tract.

The various aspects of the delta have been discussed in the present thesis.