

Holocene evolution and Anthropocene destruction of the Krishna delta, east coast of India: delta lobe shifts, human impact, and sea-level history

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Holocene evolution of the Krishna delta was inferred using landform characteristics and 11 sediment cores with 59 Accelerator Mass Spectrometry ¹⁴C dates. Landform assemblage in 5880 km² area of the Krishna delta indicated the upper river-built fluvial plain and the lower marine-built beach-ridge delta plain with the maximum landward beach ridge located at ~30 km from the shoreline separating the two plains. Sedimentary facies and their ages showed the Holocene marine sediment overlying the Pleistocene basement and progressively thickened seaward from <10 m to 25 m below the present sea level. The basal mangrove peat layers indicated that the sea level rose from -9 m to -3 m during 8.3–6.3 cal ky BP before stabilizing at the present level around 5 cal ky BP.

Considering the spatiotemporal variations of sediment facies and sediment accumulation rates and the configuration of the palaeo beach ridges (former shorelines), we surmised five major stages in the growth of 3539 km² area of the Krishna delta beach-ridge plain during the last 6 cal ky BP with distinct lateral and seaward migration of delta lobes (depocentre shifts). Delta progradation was accelerated in the last 500 years, forming an out-building lobate delta. However, predominant erosion along the sediment-starved Krishna delta front coast during the past 50 years, due to impoundment of the riverine inputs at the burgeoning upstream dams pushed the Krishna delta into a persistent a destruction phase after ~6,000 years of delta progradation.

Keywords: Beach-ridge plain, Sedimentary facies, Delta lobes, Coastal erosion