



Anatomy of a macrotidal monsoonal estuary

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The paper describes the surface geomorphology, microfauna and sedimentology of a macrotidal monsoonal estuary that debouches into the Gulf of Cambay, western India. Geomorphological mapping was carried out using Indian Remote Sensing (IRS) LISS 3 data. The satellite data chosen for the geomorphic study is a peak summer 1999 scene due to reduced vegetative cover which facilitated bar macroform study and low stage flow which enabled an insight into channel macroforms owing to the low suspended sediment load in the estuary during the premonsoon month. A geomorphological map was prepared based on the raw imagery using alternate band combinations (3,2,1 & 4,2,1) and decorrelation stretch. Microfaunal studies have revealed that the modern foraminiferal assemblage comprises both benthic and planktic forms belonging to the families Spiroloculinidae, Hauerinidae, Lagenidae, Globigerinidae, Turritinidae, Bagginidae, Bolivinidae, Nonionidae, Rotaludae and Elphidiidae. The benthic foraminiferal assemblage is dominated by species of *Ammonia* and *Quinqueloculina*. There is a surprising rarity of agglutinated forms in the Mahi estuary. One of the most interesting results of the analyses is a significant presence of planktic foraminifera. The preservation of delicate surface ornamentation implies that the foraminifera were transported in suspension and experienced negligible attrition and no saltation related abrasion. In quite a few samples the total numbers exceeded > 50 forms of well preserved *Globigerina* & *Globigerinoides* which negates a chance occurrence in the estuary. Photopanel mapping of terrace stratigraphy show sedimentary structures and facies predominantly related to high stage flows. This conforms with the presence of modern 3D gravel dune fields in the Mahi estuary. Alternating clay and sand facies reflect the punctuated sedimentation in the estuary with slack (non-monsoon) periods of sedimentation marked by suspended load fallout. The tight coupling between extreme discharge behaviour and tidal range make monsoonal macrotidal estuaries a

special depositional setting. Similar studies need to be replicated in other macrotidal monsoonal estuaries within the Gulf of Cambay such as the Narmada, Tapi and Shetrunji. These sites also stand further chance to provide areas of high resolution climate records covering the late Holocene.