Deltas: Landforms, Ecosystems and Human Activities
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What can we learn from recent development of the Atchafalaya River Delta, USA and the Yellow River Delta, China?

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Abstract Over the past century many river deltas throughout the world have been altered by anthropogenic disturbances, both to the deltas as well as to their drainage basins. Alterations such as dam construction, channel modification, and land cover changes in the drainage basins have led to changes in riverine sediment transport, deposition, distribution, and deltaic subsidence. Two of the most highly engineered rivers in the world are the Mississippi-Atchafalaya River system in the United States and the Yellow River (Huanghe) in China. Both have experienced tremendous hydrologic and land-use changes in the past. The anthropogenic changes have caused the Mississippi River Delta Plain to undergo land loss endangering coastal communities and impacting major economies. Even with land loss, the main distributary of the Mississippi, the Atchafalaya River, has developed a prograding delta feature at the man-made Wax Lake Outlet and main stem south of Morgan City, Louisiana. The Yellow River has also experienced many alterations with dams completed over the past 50 years, and agriculture expansion within the drainage basin. This has led to interrupted river discharge and large decline in sediment delivery to the river mouth. In the recent years, wetland loss has been observed in the Yellow River Delta. An understanding of how these two deltas respond to land and river alterations is integral to continued sustainability of environmental, commercial, and industrial capabilities. This study compares over 20 years (1989–2010) of delta development (growth/erosion) at approximately 5-year intervals in these two largely modified river systems using remotely sensed images, river discharge, and suspended sediment yield data to better understand the long-term effect of river alterations on deltaic development.

Key words fluvial deltas; riverine sediment; river engineering; Mississippi-Atchafalaya River; Yellow River

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Geomorphology and sedimentology of the Mogo Creek fluvial delta, NSW, Australia

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Abstract Mogo Creek is an active sand-bed stream that drains a 213-km^2 basin and flows into a blocked valley lake that functions as a terminal sediment sink. The blocked valley lake, in turn, discharges into the main stream, Macdonald River. A Gilbert-type fluvial delta has formed where Mogo Creek flows into the lake and a reverse delta has formed where the Macdonald River back floods into the blocked valley lake. The development of the fluvial delta since 1848 has been documented from a combination of maps, vertical air photographs and field surveys. The Mogo Creek fluvial delta prograded into the lake as a series of lobate sand bodies that episodically changed direction over time. Over a 13.5-year period 71 700 m^3 of sand (94 600 t) was deposited on the delta plain and in the river channel and 1042 m^3 (1150 t) was deposited on the delta front. Sediment bulk densities were determined so that the total delta depositional mass was computed as 95 790 t or 7095 t/year. Progradation of the delta front has segmented the lake by blocking a former side bay. Topset beds include channel sands and overbank deposits of levee sands, sand splays, chute sands and marsh muds. Foreset beds are delta front sets of planar tabular medium and coarse sands. Bottomset beds are horizontally-laminated prodelta sandy muds grading into massive, low density, lacustrine muds. From our survey of the lake volume, present rates of delta progradation will totally infill the blocked valley lake in 48 years.

Key words blocked valley lake; delta lobes; lake segmentation; Gilbert delta, Australia; sand splays; delta facies model