

Rethinking the Mississippi River diversion for effective capture of riverine sediments

Y. JUN XU

Louisiana State University and LSU Agricultural Center, School of Renewable Natural Resources, Baton Rouge, USA
yjxu@lsu.edu

Abstract Many river deltas in the world are vibrant economic regions, serving as transportation hubs, population centres, and commercial hotspots. However, today, many of these deltaic areas face a tremendous challenge with land loss due to a number of factors, such as reduced riverine sediment supply, coastal land erosion, subsidence, and sea level rise. The development of the Mississippi River Deltaic Plain (MRDP) in southeast Louisiana, USA, over the past century is a good example. Since 1932, approximately 4877 km² of the coastal land of MRDP has become submerged. The lower Mississippi River main channel entering the Gulf of Mexico has become an isolated waterway with both sides losing land. In contrast, large open water areas in the Mississippi River's tributary basin, the Atchafalaya River basin, have been silted up over the past century, and the river mouth has developed a prograding delta feature at its two outlets to the Gulf of Mexico. The retrospective analysis of this paper makes it clear that the main cause of the land loss in the MRDP is not the decline of riverine sediment, but the disconnection of the sediment sources from the natural flood plains. Future sediment management efforts in the MRDP should focus on restoring the natural connection of riverine sediment supplies with flood plains, rather than solely using channelized river diversion. This could be achieved through controlled overbank flooding (COF) and artificial floods in conjunction with the use of a hydrograph-based sediment availability assessment.

Key words fluvial deltas; riverine sediment; coastal geomorphology; sediment management; river engineering; Mississippi-Atchafalaya River system