flexure, subsidence and compaction, as well as a reduction of resilience that often follows where the natural ecosystems have been transformed for agriculture, aquaculture or urban development.
Subtle geomorphological variations between and within the extensive low-gradient delta plains reflect sedimentation patterns during aggradation and shoreline progradation over the past 6000 years. Substantial impacts result where rivers are dammed and sediment supply is decreased; in some cases, subsidence or compaction exceeds the rate of supply of new sediment, and the longer-term prospect of inundation is increased. The relationship between elevation of the plains surface and flood and storm surge levels is critical for sustainable management of these systems but sediment pathways and the interactions of river, wave and tide processes are rarely understood in sufficient detail.
There are relatively few approaches to assessing the vulnerability of coastlines that are appropriate for application to these multi-stressed sedimentary coasts. Vulnerability in Asian deltas is multi-faceted and assessment needs to address all its dimensions. This paper examines the factors that contribute to vulnerability and reviews the tools that are available to assist the assessment and management of vulnerability.

Cyclonic versus tidal mobilization and sedimentation in the submarine Ganges-Brahmaputra delta, Bangladesh

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The Swatch of No Ground is deeply cut into shelf at the northern Bay of Bengal. The canyon head ends in an amphitheatre-like depression intersecting the prograding foreset beds of the central submarine delta of the Ganges-Brahmaputra. Seismic profiles across the canyon and piston cores from the canyon floor were collected in 1994, 1997, and 2006 using the research vessel SONNE. The canyon floor is covered by several decimeter-thick, parallel-bedded sand-silt-clay sequences draping a slump-derived morphology. Sediments consist of graded, partly laminated fine sand to clay deposited in a mostly anoxic environment. The deep shelf canyon (> 200 m water depth) is therefore a reliable recorder of sediment mobilization and transport at the adjacent shallow (< 20 m water depth) environments of the submarine delta. The high sedimentation rate of up to 50 cm per year allows a correlation of the graded layers with the historic records of tropical cyclones. The repetition of high-resolution seismic profiles and piston coring with a time difference of 12.5 years identifies an additional deposition of 1.75 m in the upper canyon. Detailed analyses of the grain size and the composition of diatom assemblages show that the tropical cyclones are the most effective agent to mobilize, transport, and widely distribute particles from the freshwater/brackish mangrove deposits and from the marine topset beds into the canyon.
In a more general scheme, the results indicate that extreme high-energy events like cyclones exert a much greater influence on the sediment distribution in submarine deltas than daily tidal currents under fair weather conditions.

Megarivers, megadeltas, and the future

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The ability of a river to create a large delta depends in part on the size of the river, particularly its sediment load. But the extent and growth of a delta also depend on the morphology of the river's watershed, the susceptibility of the river to periodic catastrophic events (such as storms or earthquakes), as well as the preference for floodplain vs. offshore storage, which in part is dictated by regional and local subsidence. Although Amazon River discharges approximately 400 times more sediment annually than the Chao Phyra (1200 vs. 30 (pre-dam) Mt/yr), their deltas are approximately the same size; similarly, the Mekong delta is an order of magnitude larger than the Amazon delta even though it discharges an order of magnitude less sediment.
Superimposed on the geologic and fluvial settings are the impacts of human modification and global climate change, sea-level rise being the most discussed in the popular press, although not necessarily the most critical. High-density urban population centers on the Ganges-Brahmaptura (Calcutta and Dhaka), Nile (Alexandria), Yangtze (Shanghai) and the Mississippi (New Orleans)