

Changing fluvial sediment inputs to the world's deltas

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Abstract The world's deltas currently face many important threats to their longer term stability. Subsidence and sea level rise are key problems and their potential impact is strongly influenced by changes in sediment supply. Fluvial sediment inputs exert a key control on delta evolution and stability, as well as providing an important source of nutrients to delta ecosystems. The sediment loads of the world's rivers are highly sensitive to both human impact and climate change, and the sediment loads of many rivers have changed markedly in recent decades. Some rivers have demonstrated increasing sediment loads, as a result of land clearance and intensification of land use, but in most cases sediment loads are declining. Dam building and associated sediment trapping are the primary causes of reduced sediment loads, but the implementation of large-scale soil conservation and sediment control programmes and the expansion of sand mining are also important. Climate change is increasingly seen as likely to cause further changes in fluvial sediment loads and thus sediment inputs to delta systems in the future. Rivers vary in the sensitivity of their sediment loads to changes in sediment mobilisation and storage in their upstream catchments, and some appear to possess considerable capacity to buffer changes in sediment delivery to their downstream reaches. Changes in the magnitude of sediment loads can also be coupled with changes in grain size and chemistry, which may have important implications for the receiving delta. There is currently widespread evidence of reducing sediment loads for the world's rivers, particularly in Asia. Sediment trapping by dams is the major driver. However, some rivers are characterised by increases. It is suggested that most rivers pass through a phase of increasing loads due to land-use impacts, with this being followed by a reduction due to dam construction. The precise timing of these changes depends on the location of the river basin and its stage of development.

Key words sediment load; sediment inputs; deltas; human impacts; dams; reservoirs