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Response of the Hunter River to Quaternary Changes in Sea Level and Sediment Supply

The Holocene Hunter Valley of central NSW, Australia is occupied by a coastal river whose stratigraphic development has been largely controlled by sea level fluctuations. However, recent modifications illustrate the important influence of changes in fluvial sediment supply. Around 20,000 years BP, the Hunter River excavated a valley approximately 50 m deep and 5 km wide. The river channel extended 40 km seaward of the highstand position. However, valley incision only occurred between the highstand shoreface and a bedrock constriction 30 km upstream, with maximum incision near the shoreline. A combination of fluvial and longshore sediment sources supplied a prograding strandplain from -30m down to the lowstand position at -120 m. No significant sediment accumulation occurred at lowstand. As relative sea level rose between 18 and 6.5 kybp, the former river valley flooded and sediment accumulated in estuarine environments behind a wave-dominated barrier. In the highstand estuary, the river no longer supplied sand downstream of the bayhead delta. The majority of the estuarine mud fill was deposited from the river during sea level rise and not after highstand. Upstream from the infilled estuary, the Hunter River transported gravel in a flashy discharge regime through a heavily forested floodplain. After European settlement, the river received a major new sediment flux from deforestation, injecting sand into the former upper estuary. The majority of the sand transport occurred in intense flood events. However, the gradient across the former estuary remains low enough to inhibit sand transport to the present coastline.