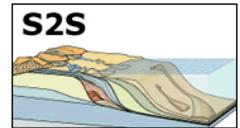


# Modeling sediment delivery and deposition in a simple tide-dominated delta



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This project targets the interface of fluvial and nearshore processes responsible for the transport and accumulation of sediments, specifically for the Fly delta area. Fundamental model experiments have been run with a physics-based numerical sediment transport model, i.e. Delft3D, to identify sedimentation patterns and to assess sediment storage in a simplified tide-dominated delta. Simulation results clearly emphasized that early estimates of the fluvial sediment load of the Fly are improbably high as an input to the delta at the river mouth, which is corroborated by recent studies showing extensive floodplain sedimentation. Estimated water discharge and associated sediment load results in much more rapid sedimentation near mouthbar and tidal islands in our model experiments than is observed in accumulation rates over the last ~50 years. The experiments suggest that a major part of the sediment from the source area is trapped and stored in the lowermost floodplain, and its extensive lake systems as well as in the tidal Fly River, which consist of a stretch in this drainage basin. In addition, we used the modeling framework to run scenarios of human-induced change and extreme climatic events. Mining and deforestation in the upstream drainage area of the Fly River is thought to have 14 times increased the sediment flux (Syvitski et al., 2005)\*. This results in evident progradation and sediment accumulation in the simulation output (Figure 1). The El Niño of March 1997-Jan 1998 caused decrease of cloud cover and extreme drought in Papua New Guinea, the water discharge of the Fly is thought to have been 4 times reduced. Our model shows a rapid decrease of transport capacity under these conditions and increased tidal scouring.

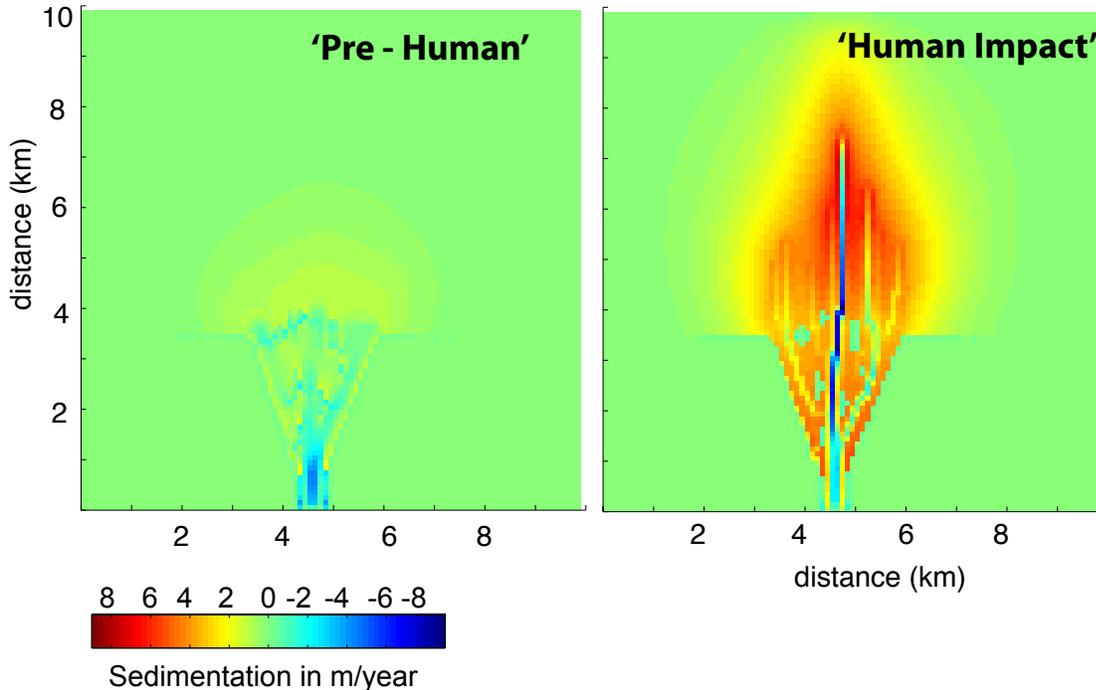


Figure: Model comparison of deposition in a simple tide-dominated delta. Left panel shows modest sedimentation and local erosion at 'pre-human' fluvial sediment influx. Right panel shows greatly exceeded sedimentation rates under high-end conditions human disturbance in Fly River.

Fagherazzi, S., Overeem I., 2007. Models of deltaic and inner continental shelf evolution. Annual Review of Earth and Planetary Science Reviews. Vol 35, 685-715.



\*References listed in appendix A.