

THE RHINE DELTA: UNRAVELLING ITS 8000-YR HISTORY OF SEDIMENT TRAPPING

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The Holocene Rhine delta in the Netherlands has functioned for more than 8000-year as a sink for fine sediment from the Rhine basin. Over the past decennia, numerous studies have been conducted on the palaeogeographic development of the Rhine delta and overbank deposition on the Rhine floodplains. Integration of these results provides us insight in the amounts and changes of overbank fines trapped in the Rhine delta and their controls at different time scales in the past, present, and future. Sediment trapping throughout the Holocene was quantified using a detailed database of the Holocene delta architecture. Additional historic data allowed the reconstruction of the development of the river's floodplain during the period of direct human modification of the river. With OSL dating and using heavy metals as tracers, overbank deposition rates over the past century were determined. Measurements of overbank deposition and channel bed sediment transport in recent years, together with modelling studies of sediment transport and deposition have provided detailed insight in the present-day sediment deposition on the floodplains, as well as their controls. The results demonstrate that human impact on the amounts of trapped sediments has been large. Land use changes since the early Bronze age increased sediment delivery and deposition between 3000 and 1000 BP; embankment of the river channels between 1000 and 1350 AD dramatically decreased the accommodation space for sedimentation, while since the fixation of the river channels around 1850 AD the modern floodplain has become a very inefficient sediment trap. Yet, future climate change and floodplain restoration interventions might re-activate the trapping function of the lower Rhine floodplains.