Roman and early-medieval occupation of a delta: settlement dynamics in the Rhine-Meuse delta (The Netherlands)

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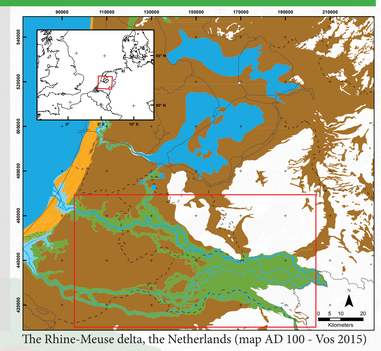
River landscapes are, since they are cultivated and inhabited by humans, among the most densely populated areas in the world. These landscapes provide fertile substrates, natural resources (e.g. food, raw materials), and abundant water routes for long-distance transport. However, these wet and dynamic landscapes often pose challenges to the people. In the past this sometimes even led to the relocation of production areas and settlements to more suitable areas.

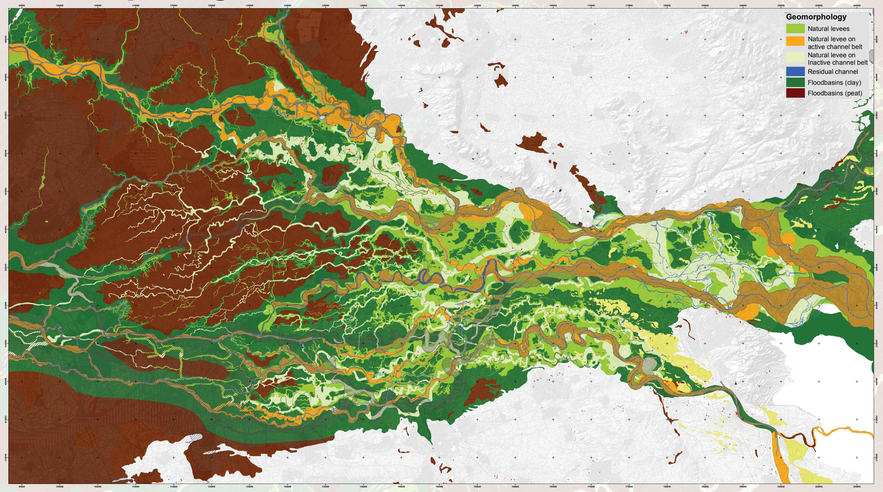
In the fluvial dominated part of the Rhine-Meuse delta, The Netherlands, the late roman and early-medieval periods (AD 270 - 1050) are characterized by both cultural changes (e.g. in demography, settlement location) and environmental changes (river avulsions, changes in flooding frequency). In the delta plain, the relatively high and dry natural levees were most favourable for habitation. The extension and relative elevation of these important landscape units has recently been mapped in high detail, exploring the distribution of settlements on these landscape units and the changing patterns of settlements through time is the next step. To perform this, we need to integrate the geomorphological reconstructions with archaeological datasets.

We have applied a multidisciplinary approach by integrating new high-resolution palaeoenvironmental reconstructions with archaeological datasets. Our aims were to: 1) determine the spatial distribution of settlements on geomorphological landscape units, and 2) explore changes in human-environment interactions from the late Roman period to the Early Middle Ages. In this contribution, we present the first results of these analyses. Integrating these datasets is an important step towards further understanding of the relative contribution of (and the interaction between) environmental and cultural factors in determining settlement distribution in the Rhine-Meuse delta.



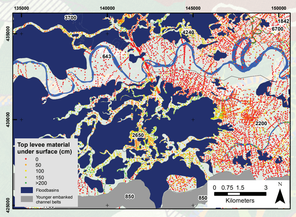
The Rhine-Meuse delta, the Netherlands (map AD 100 - Vos 2015)

Geomorphological reconstructions

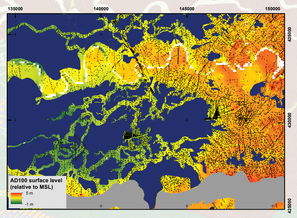


The geomorphological reconstruction maps were compiled using > 100,000 bore hole data points, AHN LIDAR images and existing local reconstructions (Pierik et al. in prep). Channel belt generations were retrieved from Cohen et al. (2012)

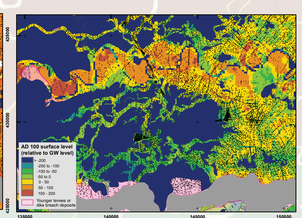
Palaeo elevation reconstruction



For the palaeo-elevation reconstruction we used selections from borehole data for typical natural levee lithology



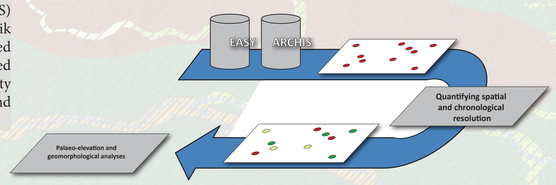
The vertical position of the top of the levees found in the borehole data was interpolated resulting in a DEM of the top of the levees relative to MSL



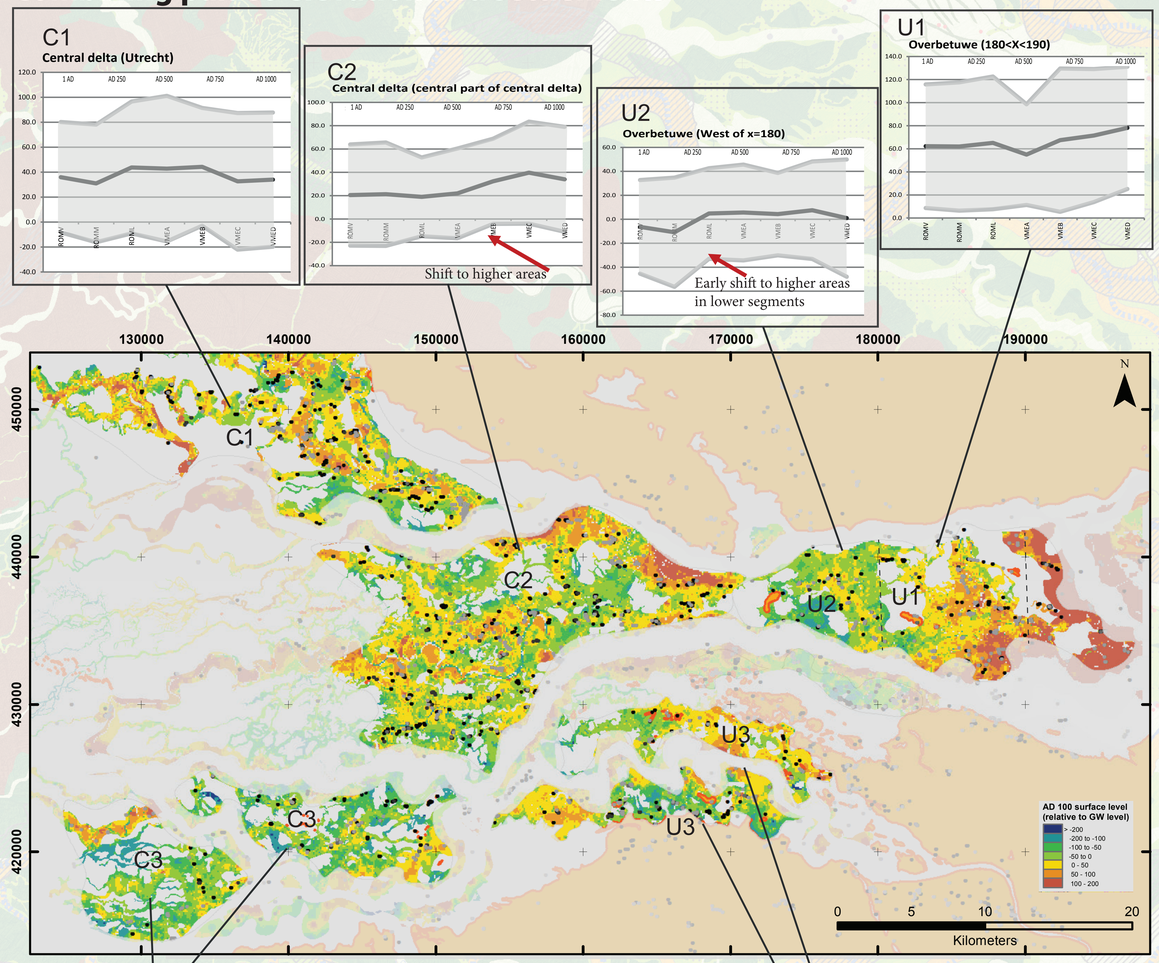
Top levees were corrected for younger sedimentation and for delta plain gradient reconstructed groundwater level (Cohen 2005; Koster et al. in prep)

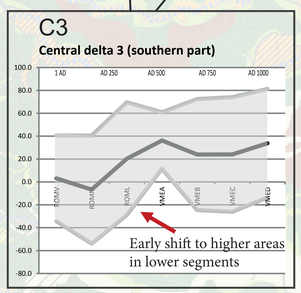
Archaeological data

Settlement data were collected using the Archaeological Information System of the Netherlands (ARCHIS) and Electronic Archiving System (EASY) (Pierik & van Lanen, in prep.). These data were compared and improved with results from recent published research. For each individual settlement data quality was quantified based on the recorded spatial and chronological resolution.

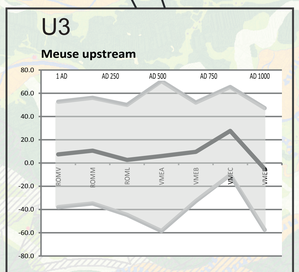


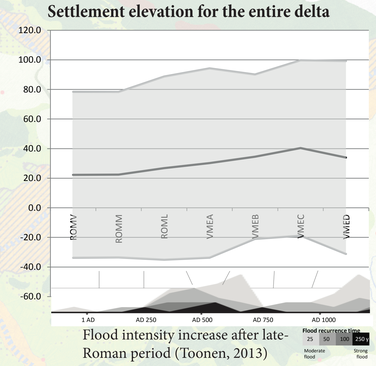
Combining palaeo elevation and settlements





Settlement elevation per delta segment
Settlement elevation relative to reconstructed groundwater level was analysed for different delta segments. Between AD 250 and AD 750 settlements shift to higher parts of the delta, coinciding with observed increased flooding frequencies





Conclusions

In this contribution we match the settlement data with geomorphological reconstructions. Habitation occurred on the higher natural levees in the delta. Between AD 250 and 750 habitation shifted to higher areas in the delta landscape, coinciding with increased flooding frequencies. This tendency is strongest in relatively low elevated delta segments.

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