

## The 1421 St.Elisabeth flooding ‘event’ and the loss of “De Groote Waard”, the Netherlands.

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According to legend, a very severe storm in November 1421 caused catastrophic flooding and overnight loss of the larger part of “De Groote Waard”, a prosperous polder area in medieval The Netherlands. Allegedly, more than 25 villages were lost and thousands of people were killed. But what had really happened?

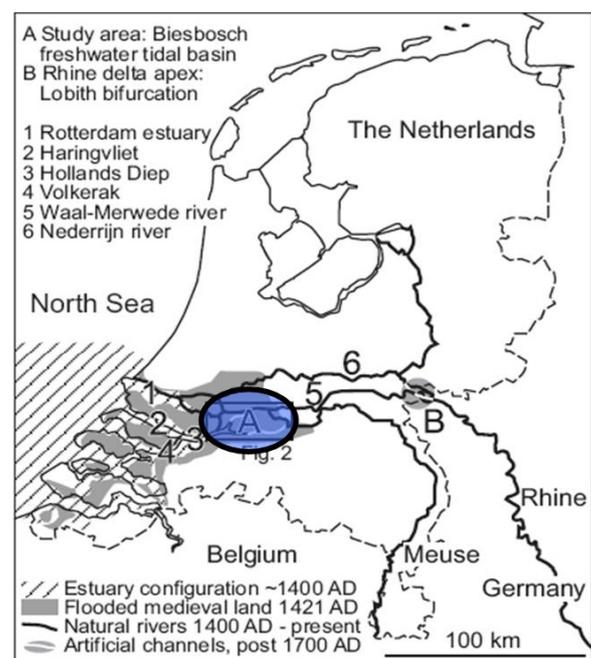
De Groote Waard had become a flood-protected polder area after construction of dikes and damming of smaller rivers was completed in 1283. By 1421, the land surface of most of this area had lowered to below Mean Sea Level, owing to subsidence due to ditch-drainage for agriculture and peat digging for fuel. In November 1421 a severe storm surge struck the area, the St.Elisabeth flood proper. Dikes along the southwestern side of the polder broke and subsided land was flooded. In February 1422, dikes along the tidal river Merwede (lowest river Rhine) along the north of the polder gave way as well, due to flooding and presence of ice jams in the river bed. River discharge routed through the flooded polder had a gradient advantage relative to the old route. Half-hearted attempts to repair the dikes followed, but regional discord severely hampered adequate repair (“Hoeksche en Kabeljauwsche twisten”). In the autumn of 1424, both the dikes in the southwest (storm surge) and in the northeast (Rhine peak discharge) broke again. In 1425, the larger part of the 1421-1424 inundated land was given up. There is evidence for careful dismantling of stone buildings in the now deserted villages.

The area (“Biesbosch”) was a large, shallow, fresh-water mesotidal basin, with river sediment entering through the dike breach channel in the northeast. Palaeogeographical reconstructions from old maps shows the formation of a river delta between 1460 and 1680 (Zonneveld, 1960). Both geological reconstruction and sedimentary modelling results suggest that for some twohundred years, the equivalent of the full Rhine river bed load sand was trapped in the area (550,000 to 900,000 m<sup>3</sup> / year; Kleinhans et al., 2010). Only centuries later, after natural river sedimentation had healed this man+sea+river created scar in the delta, could the Biesbosch lost medieval polder be partially reclaimed for agriculture once again.

So what had really happened? Not so much the severity of a single storm surge, but the combination of land subsidence and socio-economic forces and several flood events were fatal to the prosperous polder. The 1421 – 1424 floods were catastrophic only because of the preceding sinking of the land. Peat digging had been declared illegal, but there was no control on it. Dike maintenance was inadequate, and initial dike repairs failed, probably because of absence / weakness of a central organising power.

Zonneveld, I., 1960. De Brabantse Biesbosch, a Study of Soil and Vegetation of a Freshwater Tidal Delta. Vol. A,B,C. PUDOC Centrum voor Landbouwpublicaties, Wageningen, The Netherlands, published PhD-thesis.

Kleinhans, M.G., Weerts, H.J.T. & Cohen, K.M., 2010. Avulsion in action: Reconstruction and modelling sedimentation pace and upstream flood water levels following a medieval tidal-river diversion catastrophe (Biesbosch, The Netherlands, 1421-1750 AD). *Geomorphology*, 118: 65-79.



Area affected by the 1421 St.Elisabeth flood and location of “De Groote Waard”.