

A vast medieval dam-lake cascade in northern central Europe: review and new data on late Holocene water-level dynamics of the Havel River, Berlin-Brandenburg area (Germany)

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An interdisciplinary study was carried out in order to trace the human transformation of the medium-scale Havel River in northeastern central Europe during the last c. 2000 years. This research was driven by the hypothesis that the present-day riverscape is widely a legacy of medieval and modern human transformation of the drainage system initiated essentially by damming for the operation of water mills. Recent opportunities to investigate the extent of this human impact arose during the course of archaeological rescue excavations and palaeoecologic studies, which significantly enhanced the amount of respective high-quality data. Along the middle course of the Havel, sedimentary sequences were analysed in order to explore the potential for reconstructing regional water-level dynamics. The river, draining the Berlin metropolitan area, forms a chain of dammed lakes and meandering river sections which were strongly modified by hydraulic engineering in the past. We have not only recorded new sections but also re-evaluated older ones, forming a total of sixteen sedimentary sequences along the river. Chronological control is provided by a multitude of palynological, dendrochronological, archaeological, and radiocarbon data. The sections upriver from the Brandenburg/H. and Spandau weirs, representing sites with historic water mills, reveal substantial water-level changes during the late Holocene. Generally, lower water levels before and higher levels parallel to the medieval German colonisation of that area (c. 1180/1250 AD) can be inferred. This water-level increase, which is attributed to be caused by medieval mill stowage, took place rapidly and amounted to a relative height of c. 1.5 m. It has caused the widening of river sections and the enlargement of existing lakes or its secondary formation when already aggraded, and thus a flooding of large portions of land. The rising water level has even influenced the settlement topography to a large degree. Several medieval rural settlements were abandoned due to a drowning environment. The c. 150 km-long dammed lake cascade of the lower and middle Havel between Rathenow and Oranienburg is, despite its small-scale dam heights and lengths, one of the largest anthropogenic dam-lake structures in historic times globally. This applies to both water area and volume. Thereof the c. 70 km-long middle river course between Brandenburg/H. and Spandau is the largest medieval single dam lake in central Europe known thus far.