

Holocene river history of the Danube: human-environment interactions on its islands in Hungary

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A change in the frequency and magnitude of floods is the main response of river systems to climatic change. Natural floods are highly sensitive to even modest changes of climate. The discharge and the characteristics of floods basically determine the floodplain evolution and the feasibility of human land use and inhabitation on the islands and floodplains.

The study revealed that those small islands of large rivers which have the surface rising only some meters above the river are particularly suitable research objects of Holocene climate variability as they are exposed to floods, react sensitively to environmental changes and their evolution may be paralleled with human history.

The research area covers the islands of the Danube along the river between Komárom and Paks in Hungary, which is about 250 km, includes more than 50 smaller or formerly existing islands and two extensive islands: the Szentendre Island and Csepel Island. Data gathered from 570 archaeological sites of those islands from Neolithic to Modern Ages were analysed and interpreted in accordance with climate history and floodplain evolution. Nevertheless, the study is not only about river and its environmental history but it demonstrates the role of river and climatic variability in the history of mankind.

The environment of the floodplain, the river hydrology, the sedimentation, the formation of islands and the incision and aggradation of surrounding riverbeds, the frequency of devastating floods have significantly changed through the historical time periods, which is reflected in the number and locations of archaeological sites on the islands. Their occupation history reflects the changes in discharge, climate, geomorphology, floods and human impacts and indicates historical periods with low or high probability of inundation.

The most favourable periods for an island's occupation concerning the flood risk of its surfaces – and consequently of the banks along the river – are the first parts of a stable, warmer and drier period after a humid period, which is usually linked with revolutionary development of cultures and societies. The Middle Neolithic, the Late Copper Age, the Early and Late Bronze Ages, the Late Iron Age and the first part of the Roman Period, the High Middle Age are among the favourable periods, while the periods in between are characterised by frequent floods, higher water level and unfavourable environmental conditions. Archaeological sites known on small islands are found exactly from the above mentioned periods.

The aim of the study was to present the Holocene river history of the Danube, improve a climatic-geomorphological model and reveal the variability of fluvial dynamics and geomorphological processes primarily affected by climate changes.