



Mapping the unseen: geoarchaeological prospection to the Stone Age heritage in the early Holocene delta deposits of the Rotterdam harbor area (the Netherlands)

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The Port of Rotterdam (PoR) is expanding the Rotterdam harbor area into the sea. A new channel, the Yangtze harbor, will be dug out to a depth of 20 m below sea level in order to connect the existing Maasvlakte harbor area with the new harbor area under construction. The upper part of the sediment, which was dredged out in order to create the new channel, consisted mainly of marine offshore sands. In the lower part, at a depth of about 17–22 m below the Dutch Ordnance Datum (NAP), Late Weichselian fluvial and aeolian sands and Early Holocene deltaic deposits of the Rhine – Meuse were present. From earlier dredging activities in the Maasvlakte area it was known that the Late Weichselian / Early Holocene deposits contain Late Paleolithic and Early Mesolithic artefacts. The deepening of the Yangtze harbor would affect the Late-Weichselian / Early Holocene deposits and destroy the archaeologically valuable objects in these layers.

The aim of the archaeological Yangtze harbor project was to predict those locations where archaeological heritage from the Stone Age could be found. A geological-geogenetic approach was applied in order to determine the optimal palaeo-environmental locations for man to settle. A 3D palaeolandscape model was constructed of the harbor area; an area which was about 0.5 km wide and 3 km long. Given this palaeolandscape model, the potential archaeological sites were selected. The multidisciplinary prospection research was carried out in several steps. After each research step the strategy of the following research phase was determined. The first step was to make a tentative 3D lithological model of the harbor area based on the existing data of soundings and bore hole information; data which was generated for the construction of the harbor. The next step was a seismic field survey (side scan sonar, Xstar-chrip) in the harbor area which was already dredged to a depth of 17 m –NAP. Based on the seismic data, locations where selected for vibrocore drillings and soundings in order to verify the interpretations of the seismic measurements. After this step two promising archaeological areas (river dunes) were selected for further detailed seismic and drilling research. In the sediments of the bore holes from these sub areas small artefacts and bones were found which proved that the selected areas were Mesolithic sites. In November 2011 an underwater excavation was carried out using an accurate dredging crane on a pontoon, which was normally used to remove polluted underwater soils. The soil samples taken from the crane were administrated carefully (position and stratigraphy), put in big bags and then sieved for further archaeological investigation.

The Yangtze harbor project was a unique project in that here for the first time a 3D palaeolandscape research was carried out aimed at finding prehistoric heritage in the Early Holocene delta deposits at a depth of 17–22 m below NAP. The outcome of archaeological investigations could be integrated well with the engineering plans and implementation of the harbor work.