

Archaeometrical analyses demonstrates that humans excavated clay from mardels on the Luxembourger Gutland plateau to produce ceramics.

jan vanmourik (1) and Dennis Braekmans ()

(1) Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, the Netherlands. , (2) Faculty of Archeology, University Leiden, the Netherlands

Mardels, small closed depressions, are distinctive landforms on the Luxembourger Gutland plateau. In the present landscape most mardels are shallow fens, filled with colluvial sediments.

Slotboom (1963) investigated 108 mardels in the Luxembourger Gutland and ascribed the mardels in the Luxembourger Keuper marl formations to subsurface solution of gypsum inclusions, followed by collapse and subsidence of the overlying beds. The colluvial deposits in the mardels were palynologically dated as Post Roman. Schmalen (2001) published an actualized inventory of mardels in the Gutland. This inventory includes also mardels on the Lias marls, a formation without gypsum inclusions.

Etienne et al. (2011) considered beside natural processes also anthropogenic factors as explanation for CD's in the Lorraine landscape. The sediments in the majority of the CD's were palynologically dated as Post Roman. Combined with the open character of the local vegetation this suggest that the majority of the mardels are probably abandoned Roman quarries.

Slotboom and van Mourik (2015) showed that the fillings of the mardels on the Lias marls are Post-Roman, just as on the Keuper marls.

To answer the question “are mardels natural subsidence basins or abandoned quarries” we need additional information from the soil archives.

Firstly we must identify the process, responsible for the deposition of clay in the mardels. The majority of the mardels in the Gutland occur in clusters in deciduous forests. Earthworm activity in the forest soils promote lateral clay leaching and soil erosion and mardels function as sediment traps. Due to this process clay with the best properties for the production of ceramics occurred in mardels. This process was active during the whole Holocene. It is striking that we did not find Pre-Roman but only Post-Roman mardel fillings.

Secondly we need information about the practice of clay, excavated from mardels. If mardels are really abandoned quarries, the excavated sediments must have been used, most probably for the production of ceramics. If we can find relicts of ceramics in the vicinity of mardels we can compare the composition of these ceramics with mardel clay. We could collect finds of Roman tile-works on the Lias marls (Kalefeld) and of Roman pottery on the Keuper marls (Biischtert) in the vicinity of mardels. Provenance analysis (XRF) demonstrated the similarity of chemical composition of mardel clay and ceramics.

This indicates that the mardels on the Gutland plateau developed initially as natural depressions (sediment traps), on Strassen marls related to soil subsidence, caused by joints in the underlying Luxembourger sandstone, on Keuper marls to subsidence after soil subsurface dissolving of gypsum veins. The colluvial clay was used by the Romans for the production of ceramics. Due to the excavation reached the actual seizes. Colluvial clay accumulation restarted in the abandoned quarries.

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