Anthropogenic impact on alluvial sedimentation rates during the last millennia in the Ardennes (Belgium)

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Alluvial deposits of numerous rivers in the Ardennes have been dated by using iron slag content and 14C. On the basis of these analyses, several periods of increased sediment deposition have been identified. Before the first deforestations, rivers in this region developed multiple channels in alluvial forests (anabranching rivers), which are still distinguishable in the topography of many floodplains by means of LIDAR survey. Moreover, during this period, floodplains were not well-developed and probably very humid, which explains the presence of peat layers within the alluvial sequences. In the Amblève catchment, the first increased sedimentary deposition of the Holocene occurred during the Bronze Age, probably in relation to deforestation and first cropland agriculture in the area. Archaeological data indicate Roman occupation in parts of the catchment, and Roman Period colluvium has been found at one site. Several peat layers have been dated in the Lienne catchment to around 1000 BP and probably indicate very low anthropogenic pressure. From the 11th Century onwards, there was an increase in sedimentation, coinciding with a higher concentration of charcoal in alluvial deposits. In many catchments there is an important increase in the sedimentation at the end of the 14th century, which can be related to the development of numerous iron-working sites. Analyses of slag concentration produced in these sites allow us to reconstruct the evolution of the floodplain topography in relation to the periods of blast furnaces activity. Total sedimentation in the smaller valleys since the initiation of iron industries amounts 0.5 to 1.0 m, which is in most cases about 40% of the total sediment present in the floodplains and corresponds to a mean sedimentation rate ranging between 10 and 20 cm/century. Such values are explained by former agricultural practices and woodland clearance associated with the huge demand for charcoal by the iron industry. For instance,

about 20 ha of forest were cleared for the yearly consumption of a refining forge or a blast furnace and more than three hundred iron factories existed in the Ardenne Massif between the 14th and the 19th century.