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Beneficial impacts of historic soil erosion and valley sedimentation on ecosystem processes and society

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Soil erosion and increased sediment fluxes towards river channels following land clearance is mostly being considered as a negative anthropogenic impact on the environmental. Since the introduction of agriculture, humans have greatly modified the rates of erosion and sediment delivery and in many areas this has resulted in wastelands no longer suitable for agriculture. However, millennia-long soil disturbances also have offered beneficial impacts to society and the environment we are living in. Detailed data on historic erosion and sediment fluxes from the central Belgian Loess Belt show that intense agricultural practices over the last few millennia have transformed inhabitable and unproductive floodplains characterized by peat-forming wetlands into a wide floodplain with an appealing meandering river channel. Floodplains nowadays are managed and used for agriculture as well as nature and recreation areas of high value. Furthermore, increased rates of sediment mobilisation and storage do present a net soil carbon sink which reduces the emission of carbon to the atmosphere following land cover change by approx. 40%. Long-term soil erosion has no significant impact on soil productivity, the latter increasing much more through the use of fertilizers. Negative impacts on soil erosion in the Belgian Loess Belt are mostly related to off-site damages during intense rain storm events (i.e. muddy floods and siltation of ponds and canals). Data from Mediterranean environments, that are often considered to be more susceptible to intense erosion, also show that the story is more complicated and often also less negative. Initial land clearances during Bronze and/or Iron Age in e.g. the Taurus mountain range (SW Turkey) did result in widespread erosion and soil exhaustion on hillslopes. However, much of the soil material eroded off the hillslopes was deposited further downstream creating wide and gently sloping valley bottoms. This may have provided a stimulus for further agricultural expansion during the subsequent Hellenistic and Roman Periods: in these periods archaeological and palynological data all point towards an increasing human activity whereas sediment archives do not point towards an increase in erosion rates.