

The impact of pre-restoration land-use and disturbance on sediment structure, hydrology and the sediment geochemical environment in restored saltmarshes

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Saltmarshes are being lost or degraded as a result of human activity resulting in potential loss of critical ecosystem services including the provision of wild species diversity and water quality regulation. To compensate for this saltmarshes are being restored or recreated, usually driven by legislative requirements for increased habitat diversity, flood regulation and sustainable coastal defence. Yet, there is increasing evidence that restoration may not deliver the ecosystem services anticipated and this is frequently attributed to poor drainage and sediment anoxia. However, physical sediment characteristics, hydrology and the sediment geochemical environment are rarely examined in restoration schemes, despite such abiotic factors being critical for plant succession.

This study combines a broad-scale investigation of physical sediment characteristics in nine de-embanked saltmarshes across SE England, with an intensive study at one site examining water levels, sediment structure and the sediment geochemical environment. Three-dimensional sediment structure and porosity was quantified using the novel application of X-ray microtomography. The aim was to examine the impact of pre-restoration disturbance on physical sediment characteristics, specifically 1) to measure physical sediment characteristics and sediment structure, 2) to examine sub-surface water levels and connectivity between the sub-surface environment and tidal floodwaters and 3) to examine the potential influence of pre-restoration land-use and disturbance on sediment and pore water geochemistry.