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Saltmarsh carbon storage: capturing the ecosystem service change under restoration activities

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The role of intertidal vegetated systems in providing climate change mitigation services through enhanced carbon sequestration and storage services is well established. This benefit is derived from the long-term accretion of sediment creating deep organic-rich deposits. The extent to which these areas provide such services differs between and within ecosystem type. Further to this issue is understanding the way in which these systems (such as saltmarshes) behave, from a carbon sequestration perspective, when undergoing restoration. It is important to better our understanding of this process to facilitate an improved appreciation of potential service delivery (and therefore value) of conservation initiatives.

Research was carried out on the Eden Estuary, Scotland to quantify the current carbon storage value of different ecotypes, comparing 'natural' with restored areas to assess their additionality. Restoration activities have taken place at the site since the early 2000s through the transplantation of Bolboschoenus maritimus onto bare upper mudflat.

The carbon storage in this system was investigated through the retrieval of sediment cores taken from natural saltmarsh, restored saltmarsh and adjacent mudflat. Five cores were randomly distributed within each of the areas with sampling conducted down to refusal. The cores were sectioned every 2 cm down to 10 cm deep, every 5 cm to 20 cm deep, every 10 cm to 50 cm deep and at 75 cm; resulting in up to 14 sections. These sections provide data on bulk density, organic matter content, organic carbon content and particle size composition. These data provide total storage information and depth profiles, which highlight how storage has been affected by past. Initial data suggest that established restored areas are functionally similar to natural marshes, storing far more carbon in their sediments than that of the mudflats they once were.

The resulting improved understanding will feed into other benefit values of such areas, for example their role in coastal protection, contributing toward a total ecosystem valuation. This appreciation of the societal benefits and values of saltmarshes may facilitate a shift in perception of such ecosystems and improve their conservation status.