



Biogenic structure enhances landscape retention on intertidal flats at extensive spatial scales

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Ecosystem engineering species can structure their environment at multiple spatial scales, locally where the organisms are found, but this can also extend to significant distance. Such structural change of the landscape can have important consequences for ecosystem functioning, increasing retention of valuable resources in the system, such as water or nutrients. Yet, the relative effect of structure added by ecosystem engineers as opposed to the physical landscape structure on retention remains poorly understood. Using remote sensing techniques, we reveal that on intertidal flats, water retention is greatly enhanced by the reef structure created by shellfish, where the effects exceed significantly beyond the physical borders of the reef system. Furthermore, real and simulated landscapes show that changes in retention capacity brought about by ecosystem engineering depends on the underlying landscape configuration. Strikingly, shellfish reefs enhance retention even at low densities, and this effect is largest and most extensive in space on relatively flat landscapes. Our results provide valuable new insights into the importance and context dependence of biogenic structure to landscapes.