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The influence of seagrass, Zostera noltii on steady unidirectional flow and sediment transport

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Zostera noltii meadows are recognized to play an important role in protecting and stabilising the coast. They offer coastal protection by reducing the hydrodynamic forces of waves (Paul & Amos, 2011) and create a low energy environment that promotes deposition of particles (Ganthy et al., 2015). The meadows are highly seasonal with high shoot densities in summer and low shoot densities in winter. The influence of above and below-ground biomass on flow-velocity, turbulence and bed load sediment transport was examined in the laboratory. Blocks of meadow from different stages of its seasonal growth were transferred from their natural bed into an annular flume. Instantaneous velocity profiles and ripple migration were analysed before, within and after the Z. noltii canopy. Results show that the shoot density has a major influence on reducing the flow velocity and increasing turbulence within the canopy and substantially decreasing sediment movement. Up to 77% flow attenuation was observed in the area covered by the canopy. The bed remained stabilised even after removing all the above-ground biomass, indicating that while below-ground biomass does not influence the hydrodynamics it reduces bed load transport. In conclusion, despite the reduction of Z. noltii above-ground biomass during winter time, the below-ground portion still provides substantial protection towards bed stability all year round. The effectiveness of flow dissipation and resilience of Z. noltii meadows suggest that this habitat is an important component in coastal protection.

References

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Paul & Amos. (2011). Journal of Geophysical Research, 116(C8), C08019.