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Review Paper

The necromass of the *Posidonia oceanica* seagrass meadow: fate, role, ecosystem services and vulnerability

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Abstract *Posidonia oceanica* is a seagrass endemic to the Mediterranean Sea. Most of the primary production of the *P. oceanica* meadow is not directly consumed by herbivores and plays a role as dead rhizomes and roots, dead leaves and drift epibionts (hereafter necromass). The fate of this necromass is (i) sequestration within the *matte*, (ii) consumption by detritus-feeders within the meadow, (iii) export towards other marine ecosystems, where it constitutes a source for food webs, (iv) export towards beaches, where it constitutes *banquettes*, reduces the impact of waves and contributes to the beach ecosystem, and (v) export towards the terrestrial dune ecosystem. These five stocks can exchange necromass. The ecosystem services of the *P. oceanica* necromass are pivotal. For example, the role of *P. oceanica banquettes* is fundamental in protecting beaches from erosion, and the carbon sequestration within the *matte* contributes to the mitigation of emissions of CO_2. Human impact on each of these stocks can affect the other stocks and their ecosystem services. The removal of *banquettes* from beaches can have a dramatic negative impact on *P. oceanica* ecosystem services, including the sustaining of beaches. The erosion of *matte* due to trawling and anchoring can remobilize the sequestrated carbon stock.

Keywords *Posidonia oceanica* · Seagrass · Necromass · Detritus-feeders · Beaches · Ecosystem services

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