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Characterization and Management of Posidonia oceanica Banquettes as Nature-Based Solutions for Coastal Resilience

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The Interreg AMMIRARE Project aims to improve beach system resilience and enhance adaptive capacity to climate change through the adoption of nature-based solutions (NBS), recognizing living and death *Posidonia oceanica* (L.) Delile, 1813 as key natural assets for coastal protection. By combining ecological restoration, innovative monitoring strategies, and improved governance tools, the project promotes the use of banquettes as natural defenses against erosion and as functional components providing key ecosystem services. The integration of ecological and socio-economic data supports the development of a decision-making support system (DSS) for administrations and policy makers, fostering sustainable coastal management strategies that prioritize NBS over conventional hard-engineering approaches. From an NBS perspective, *P. oceanica* plays a crucial role both within underwater ecosystems and along sandy shorelines, where the accumulation of detached leaves and rhizomes forms distinctive structures known as “banquettes”. This stranded necromass, from a geomorphological perspective, significantly contribute to shoreline stabilization and mitigating erosion processes, by trapping and retaining sandy sediments. Ecologically, *P. oceanica* banquettes sustain a wide number of organisms, providing habitat, shelter, and feeding grounds for several invertebrates and microorganisms, enhancing the biodiversity at the land–sea interface. Despite their ecological and protective values, Italy currently lacks clear legislation for the protection and management of banquettes. They are frequently removed to preserve the aesthetic appeal of recreational beaches, often without considering the associated environmental and economic costs. Here, we present the evolution of a banquette located north of Civitavecchia (Italy) which is being monitored monthly by collecting manual penetrometer measurements at selected sites along transects longitudinal and perpendicular to the shoreline. These results, coupled by granulometric and surface/volumetric analyses, will provide the possibility to assess the degree of compactness of the *P. oceanica* banquette. When the results will be standardized and integrated with measurements from other banquettes with different compactness and formation characteristics, we aim to provide a simple and replicable method for classifying these deposits. These results will also be necessary to the DSS which, through the integration of scientific knowledge into coastal policies, will be able to foster the adoption of adaptive strategies capable of reconciling environmental protection with tourism and local economies.