

The potential impact of human interventions at different scales in offshore wind farms to promote flat oyster



Incorporation of ecology and ecosystem services into marine infrastructural developments has gained interest over the last decades. Growing attention is given to combine the massive roll-out of offshore wind farms in the North Sea with reinstating the once rich but nowadays nearly extinct European flat oyster (*Ostrea edulis*). However, the practical upscaling of these pilots is hindered by the absence of clear management objectives and the lack of quantitative knowledge on the effect of technical interventions that could stimulate oyster reef development. Consequently, it is unclear what scale of intervention would actually be required to achieve overall management objectives. This paper presents a stepwise procedure designed in particular to guide the selection of appropriate measures and their required scale for pro-actively facilitating flat oyster reef development in offshore wind farms, in order to reach a desired state for oyster reef inclusive wind farms. The stepwise procedure addresses the historical and current situation of the physical system and social environment, provides options for intervention that stimulate oyster reef development at a range of scales, from micro-scale (materials used) to mega-scale (connectivity between wind farms), and quantitatively assesses the potential effect of applying these interventions. Assumptions have been made in quantifying the effort required for developing oyster reefs in offshore wind farms, and refinement is obviously needed. However, this is a first attempt to make such estimates. The outcomes provide direction in identifying research needs to fill knowledge gaps, as well as in decision-making during the design process for inducing oyster reef development in offshore wind farms. Herewith, application of the stepwise procedure supports authorities in restoration management for the successful reinstatement of flat oyster reefs in the southern North Sea.

Auteurs du document : Remment ter Hofstede, Gregory Williams, Mark van Koningsveld

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