

Enhancing biodiversity through artificial reef deployment in mussel aquaculture areas: temporal trends of key species in NW Spain.

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The Ría de Vigo (Galicia, NW Spain) is renowned for its nutrient-rich upwellings and high levels of primary production, supporting extensive mussel farming on rafts, establishing it as Europe's leading producer and a global leader. While mussel aquaculture has transformed soft-sedimentary benthic communities, it has also provided multiple ecosystem services, including the creation of new habitats that benefit economically valuable species. This study aims to investigate the effects of increasing the complexity and heterogeneity of benthic habitats by deploying artificial reefs (AR), and to raise species abundance and richness by recycling biodeposits from mussel farms.

Twelve AR were deployed across four locations (~14 m depth): two beneath mussel farms (M-AR) and two distant from mussel influence, on sandy bottoms (S-AR), each location with a corresponding control area (CA). From June 2023 to June 2024, monthly visual censuses of fish and macroinvertebrates revealed clear seasonal patterns, with higher abundance in late summer. The presence of AR compared to CA significantly affects species diversity and abundance in M-AR and S-AR. M-AR had no significant effect on the richness or abundance of fish, cephalopods, or decapods assemblages compared to S-AR. However, echinoderms were significantly more diverse and abundant near M-AR (70.7%) compared to S-AR (29.3%). Remarkably, the commercially valuable echinoderm *Paracentrotus lividus*, is showing a rising abundance in M-AR since November. Therefore, it seems that the installation of artificial reefs in the vicinity of mussel farming facilities can enhance ecosystem services, with the distance being relevant for some groups such as echinoderms.