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CM 391: Are oil and gas platform foundations affecting marine demersal ecosystems? The Atlantic cod might provide an answer

Bruno Ibanez-Erquiaga, Henrik Baktoft, Jens K. Petersen, Jon C. Svendsen

Offshore oil and gas platforms are present on the continental shelves of 53 countries. Current regulation mostly call for complete structure removal of ageing oil and gas platforms through decommissioning. Just in the North Sea, more than € 90 billion will have to be allocated for decommissioning in the next 30-40 years. At the same time, oil and gas platform foundations could be acting as underwater oases for biological communities. Growing evidence indicate that these infrastructures may shape community structure by providing refuge, settlement area, food sources, which could enhance local productivity, possibly diversifying the ecological functioning in the area. Moreover, there is often a fishing ban 500m around the platforms making them de facto marine protected areas with limited or no ongoing bottom trawling, enhancing seafloor stability and biogenic reef growth. The three-dimensional nature of platform foundations may have positive effects on epifaunal biomass, influencing the presence of species from multiple trophic levels. For example, the Atlantic cod (*Gadus morhua*), a valuable target for North Sea fisheries, which populations are considered below sustainable thresholds, has been observed in association with offshore structures. However, a poor understanding of the mechanisms underpinning platforms' effects remains, and assessments of the ecological outcomes in relation to fish ecology and fisheries are scarce. This makes it difficult to predict possible ecological scenarios associated with different decommissioning and abandonment options. Here, we aim to provide an understanding of the role that platforms are playing for marine ecosystems in the Danish North Sea using cod as a case study. Therefore, we ask the research question: are oil and gas platform foundations influencing cod population in the North Sea? To address this question, we explore how fish community varies along a distance gradient from oil platforms by comparing in situ angling catch per unit effort data. Results from the pilot angling survey carried on June 2021 suggest increasing catch-per-unit effort (CPUE), abundance, and size composition of cod towards oil platforms. From further sampling planned for 2023, we expect to revisit the pilot survey results to shed more light on our research question. This knowledge will contribute to informed decision-making related to platform decommissioning strategies in the North Sea by building on artificial reef ecology knowledge. The legal framework of offshore platform decommissioning calls for a complete removal, potentially neglecting the consequent impact on seafloor and pelagic ecosystems. On the other hand, alternative decommission strategies call for societal changes from a mindset of denouncing ocean dumping and towards endorsing reefing.

Keywords: Offshore platform, decommissioning, oil and gas structures, Atlantic cod, *Gadus morhua*

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