38. Carbon sequestration

Background

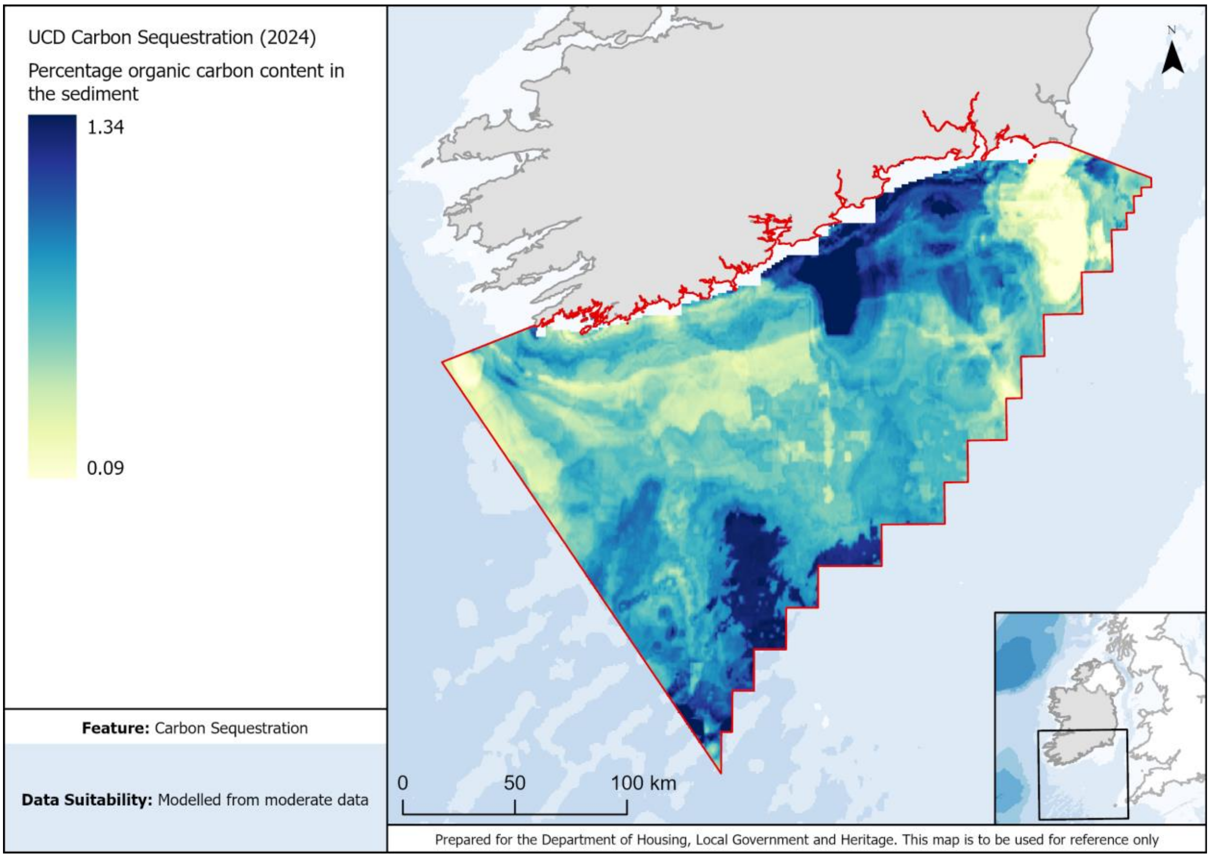
The prevailing science suggests that areas of the seafloor that are dominated by mud-grade sediments can potentially store significant amounts of organic carbon, acting as a carbon sink and forming a key part of the carbon cycle (e.g. Atwood *et al.*, 2020; Smeaton *et al.*, 2021). This carbon stock can be disturbed by anthropogenic activity (e.g. ORE development, benthic trawling, cable and pipeline installation) potentially causing resuspension and remineralisation of carbon that can be released back to the atmosphere, through the water column (Bauer *et al.*, 2013; Legge *et al.*, 2020). Initially, quantifying carbon stock levels and qualifying carbon flow processes in marine sediments (in particular mud) is a first order need in terms of managing their disturbance (Luisetti *et al.*, 2019; Smeaton *et al.*, 2021; Graves *et al.*, 2022).

There is a paucity of direct study of the impact of ORE development on carbon stock. However, work to date suggests that, whilst there is disturbance of the seafloor at different life stages of development (i.e. construction and decommissioning), offshore wind farms can trap more organic carbon than they release through sediment disturbance (Heinatz, Iris and Scheffold, 2023). Further work is required to study the effects in an Irish context. Similarly, the impact of the installation of cable infrastructure requires more nuanced study (Clare *et al.*, 2023). Seabed trawling is known to have a more sustained impact on seafloor sediments (e.g. Puig *et al.*, 2012; Oberle, Storlazzi & Hanebuth, 2016),with varying degrees of impact depending on the gear type used, the sedimentary environment and the frequency of trawling events (e.g. O'Neill and Summerbell, 2011; Black *et al.*, 2022). There is no available information on the effect of benthic trawling on seabed carbon stocks in the Study Area. Whilst it is suggested that trawling represents a significant risk to seabed carbon stocks as a result of the impact it has on seabed sediments (e.g. Luisetti *et al.*, 2019; Paradis *et al.*, 2021; Sala *et al.*, 2021), such results may not be fully applicable to all areas and requires more experimental and modelling studies considering local environmental conditions (Epstein *et al.*, 2022).

Ultimately, the effective management of seabed areas in relation to sedimentary carbon disturbance will ultimately depend on the environmental settings as well as the chemical characteristics of the carbon (e.g. reactivity) (Epstein and Roberts, 2022; Smeaton and Austin, 2022). The resuspended carbon in the sediment could possibly make its way into the atmosphere and a lack of direct evidence should not prevent us making recommendations to offset the risk.

Data sources available

Data sources for carbon sequestration in the Celtic Sea AOI that were available to the MPA Advisory Group, and the quality / suitability of those data for conservation prioritization analyses (See Table 3.2.1 Main Report), are shown in Figure A10.38.1. For information on how data were prepared for use in prioritization analyses, and for visualisations of layers used, see Appendix 5e, section 5e.4.



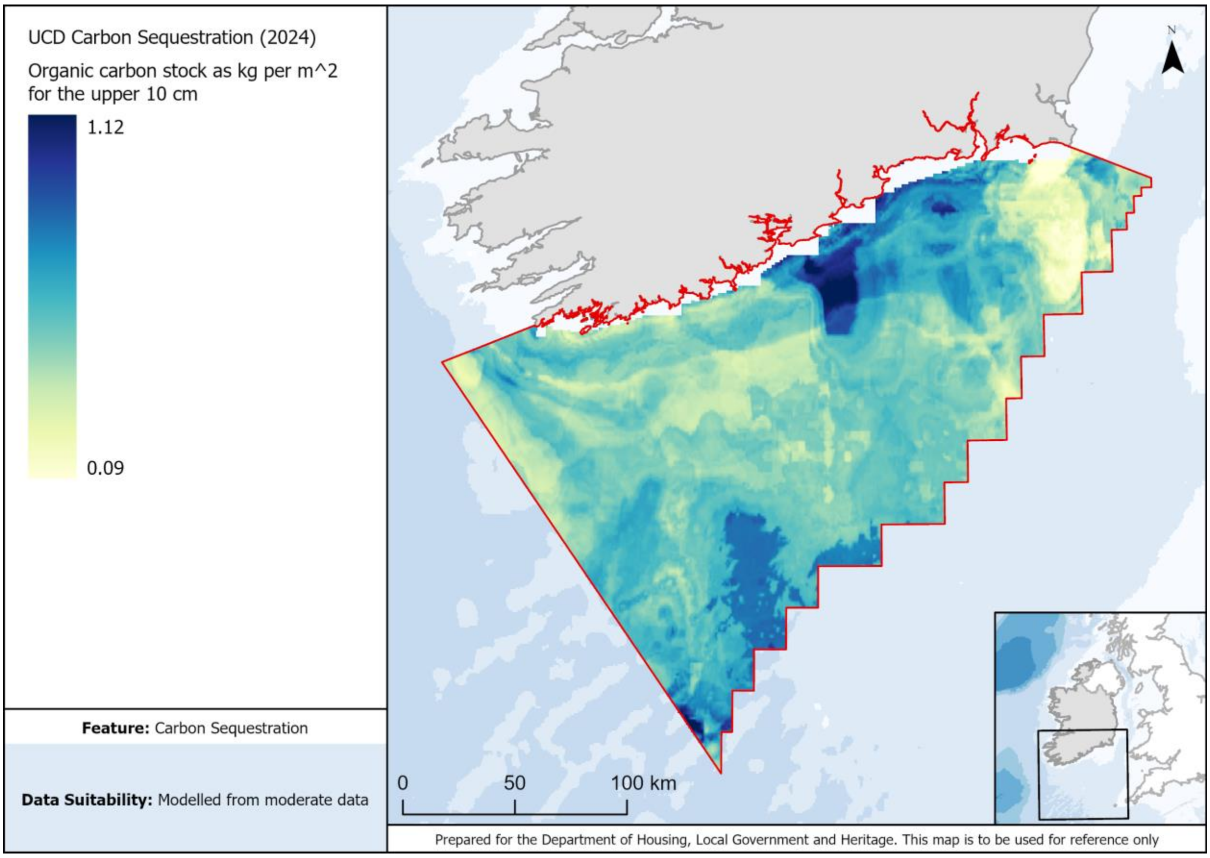


Figure A10.38.1. Modelled carbon sequestration in the Celtic Sea area of interest

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