Developing the First National Blue Carbon Inventory for the Isle of Man

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BLUE CARBON: A CLIMATE SOLUTION

Seagrass meadows, saltmarshes and shelf-sea muddy sediments can be long-term sinks for organic carbon (OC).[1] These "blue carbon" habitats could be managed to help offset *unavoidable* greenhouse gas emissions and contribute to nations' Net Zero ambitions.

IMPACT

The Isle of Man Government is developing a comprehensive blue carbon management plan to protect and maximise natural carbon accumulation, which could help mitigate the effects of climate change.

AIMS

To inform the blue carbon management plan, our study quantifies:
1. the distribution and extent of seagrass meadows, saltmarshes and shelf-sea sediments around the Isle of Man;
2. the carbon stored and accumulated by these habitats.

METHODS

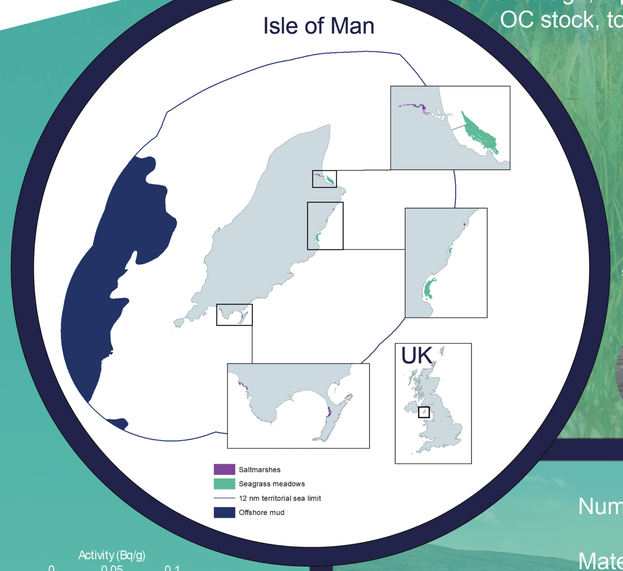
Fieldwork took place around the Isle of Man from April to September 2022 and August 2023. Sediment cores were collected from seagrass meadows, saltmarshes, and shelf-sea sediments to assess stored organic carbon. Remote sensing was used to assess seagrass meadow extent.

OFFSHORE MUD

Location: 6–12 nm offshore (west)
Water depth: 60–120 meters

Materials and methods:
Gravity corer (ø90 mm) x20 cores
EA-IRMS, γ-/α-spectrometry, particle size analysis

Results:
Sediment type: mud (<63 µm = >85%)
Total area: 49212.3 ha
OC storage, top 10 cm: 10.05 MgC/ha
OC stock, top 10 cm: 494609.47 MgC
OC accumulation: 20.40–49.88 gC/m^2/yr



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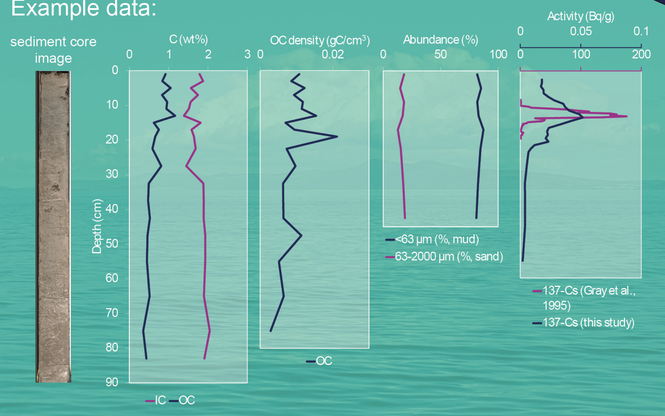


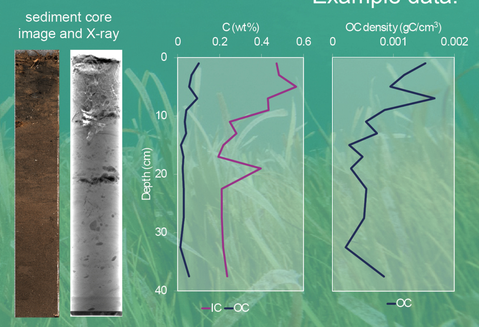
SEAGRASS MEADOWS

Number of sites: 4; Species: *Zostera marina;*
Water depth: 5–12 meters

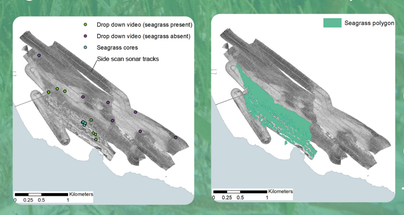
Materials and methods: PVC push corer (ø90 mm) x5 cores; EA-IRMS, X-ray

Results:
Total area: 110.88 ha
OC storage, top 10 cm: 1.13 MgC/ha
OC stock, top 10 cm: 125.77 MgC

Example data:



Seagrass mapping methods: side scan sonar, drop-down video



Seagrass polygon drawn using expert judgement

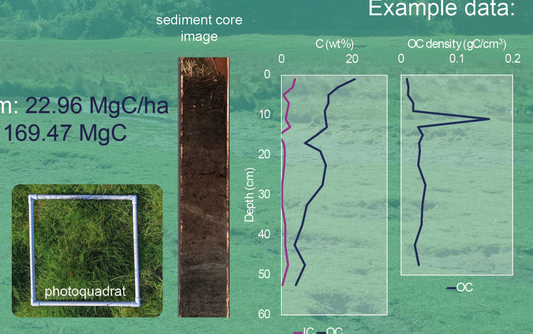
SALTMARSHES

Number of sites: 4

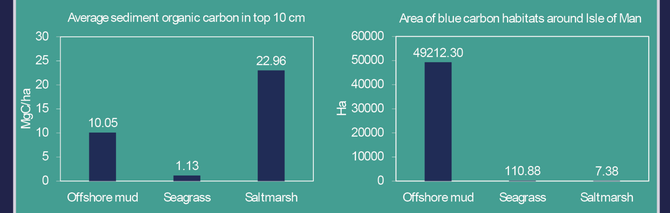
Materials and methods:
PVC push corer (ø110 mm) x5 cores
EA-IRMS, X-ray

Results:
Total area: 7.38 ha
OC storage, top 10 cm: 22.96 MgC/ha
OC stock, top 10 cm: 169.47 MgC

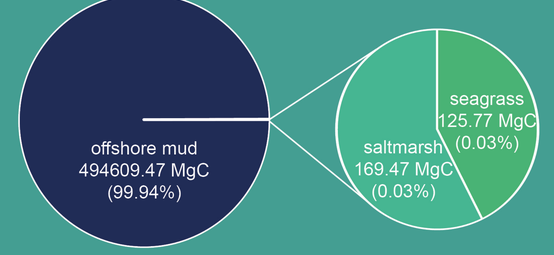
Example data:



WHERE IS THE BLUE CARBON?



OC stocks:



CONCLUSIONS

- The most significant blue carbon stock is in offshore muddy sediments, due to the vast area covered.
- The densest blue carbon stock is in saltmarsh sediments, in agreement with literature.[3]
- The lowest blue carbon storage capacity and stock is in seagrass meadows, which agrees with low carbon found in other temperate seagrass meadows.[4]
- These data can be used to prioritise areas for blue carbon management.

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