



Estimation of carbon stock and assessment of natural carbon sinks in seagrass meadows and coastal wetlands: A case study of the Kerkennah Archipelago, Tunisia

Brussels, Belgium 5th June, 2023

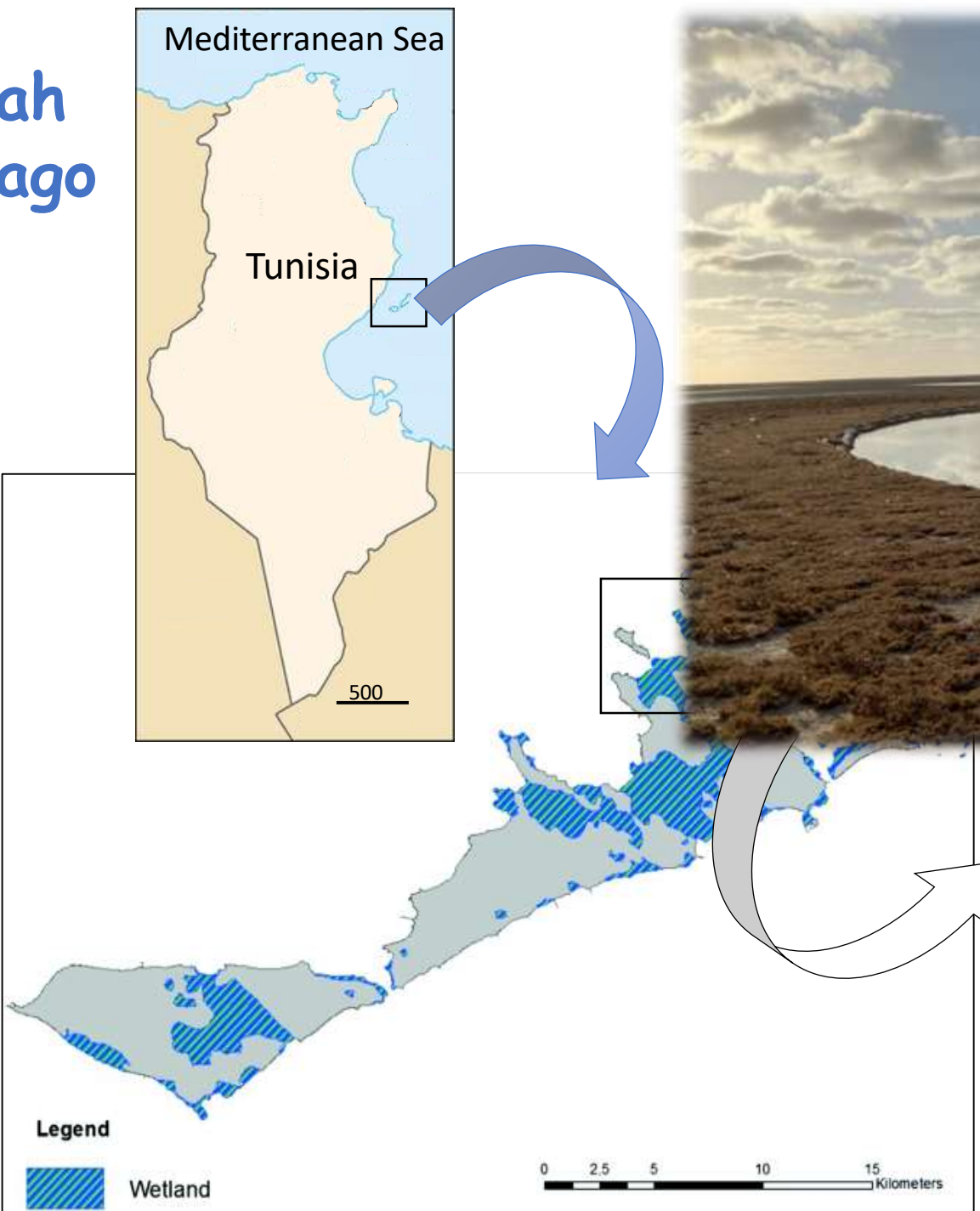
Imen ZRIBI

Faculty of Sciences of Tunis, ATUTAX

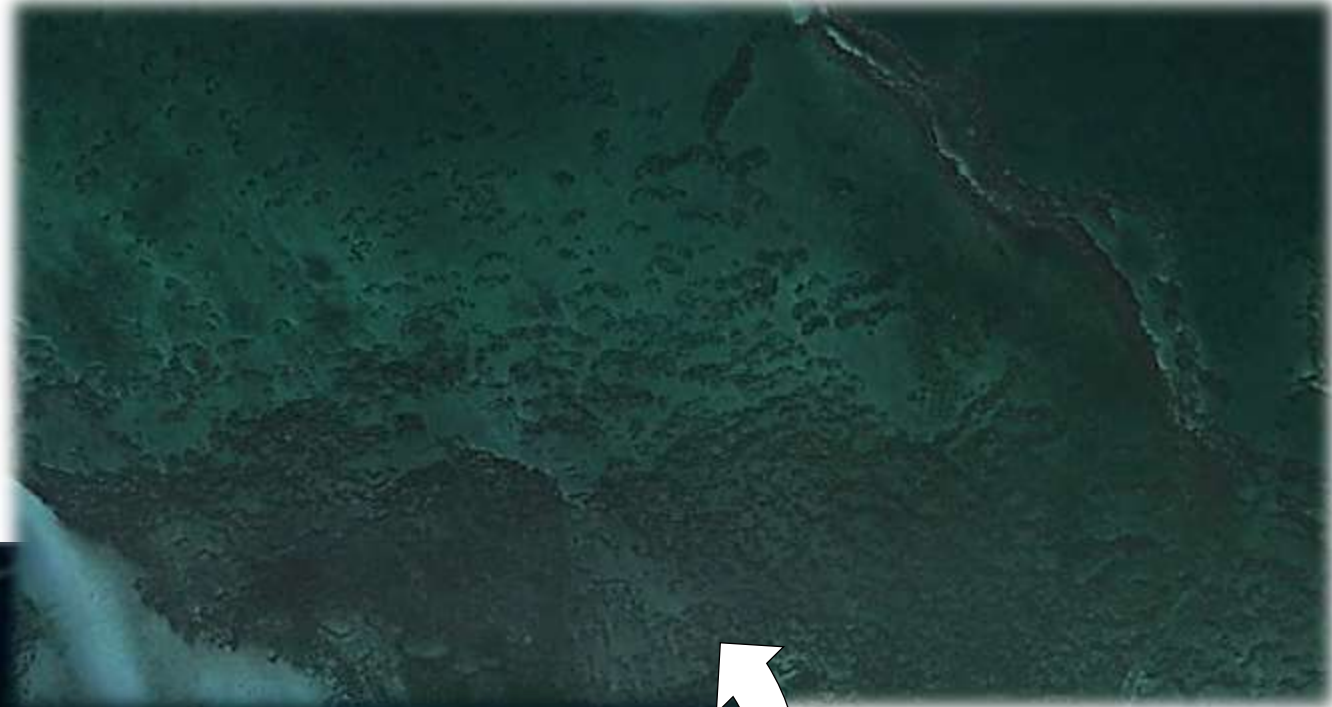
INTERNATIONAL UNION FOR CONSERVATION OF NATURE



Kerkennah archipelago



Kerkennah archipelago



Kerkennah archipelago



SUSTAINABLE DEVELOPMENT GOALS

SDG 1: No Poverty (30)

SDG 2: Zero Hunger (105)

SDG 4: Quality Education (387)

SDG 7: Affordable and Clean Energy (14)

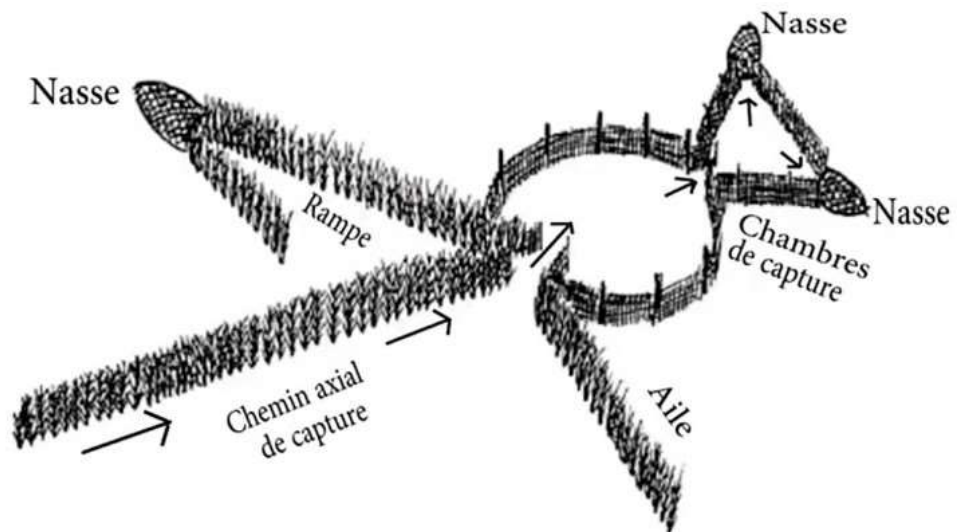
SDG 11: Sustainable Cities and Communities (136)

SDG 12: Responsible Consumption and Production (156)

SDG 14: Life below water (19)

UNESCO > Culture > Intangible Heritage >

Charfia fishing in the Kerkennah Islands



Kerkennah archipelago (RAMSAR, IBA)



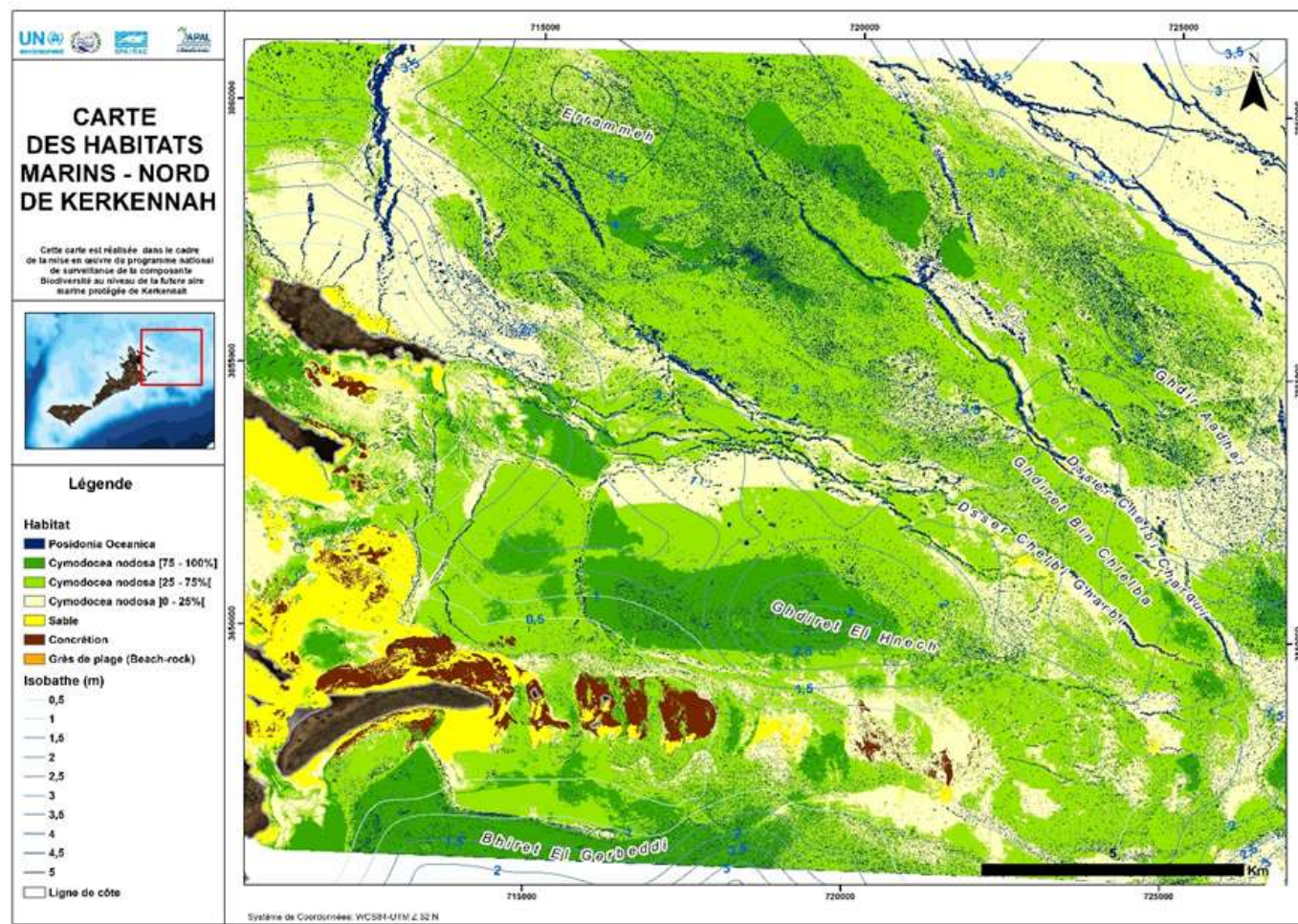
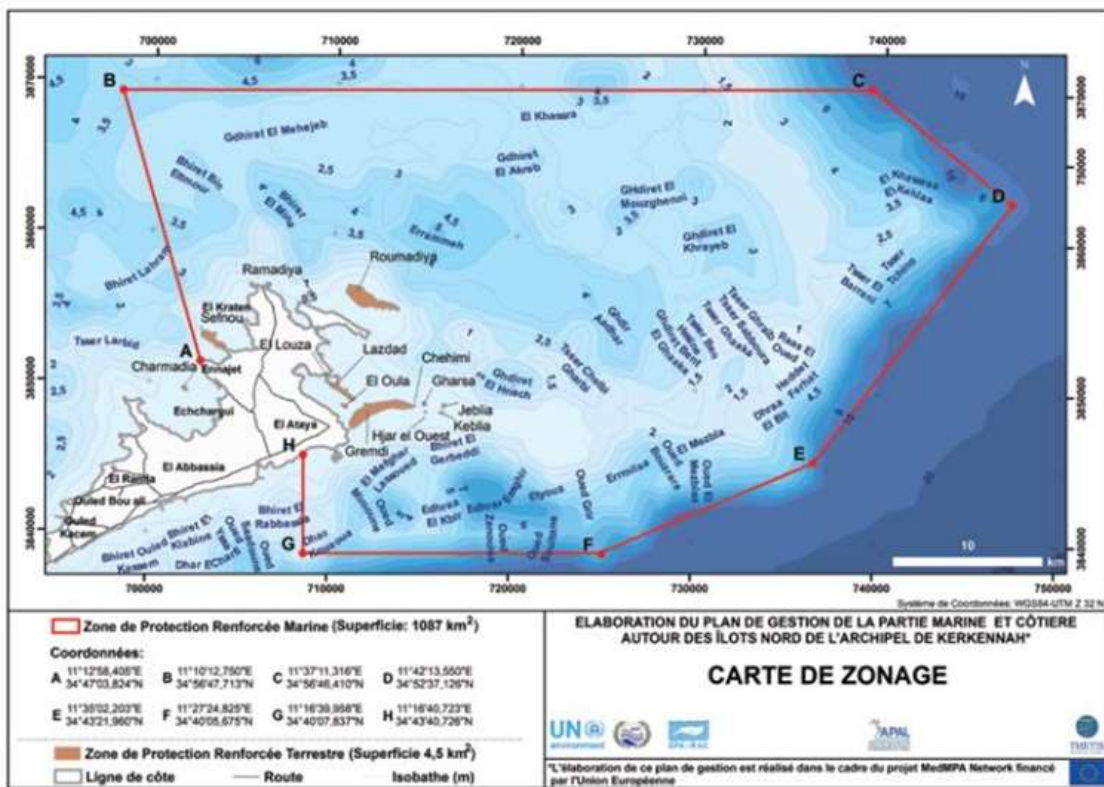


Marine and coastal protected area of Kerkennah

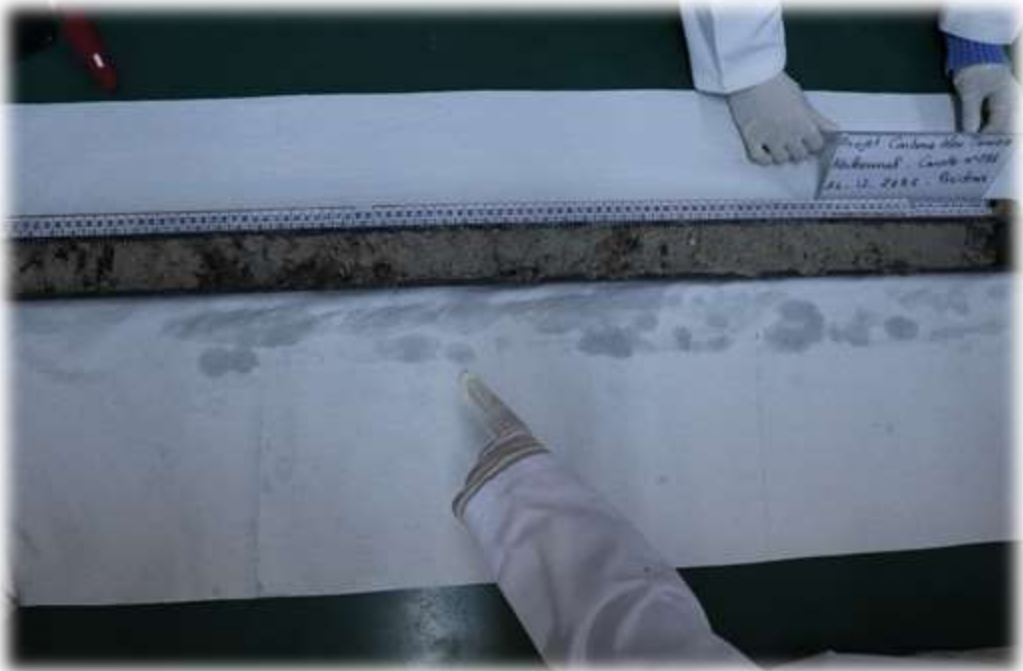
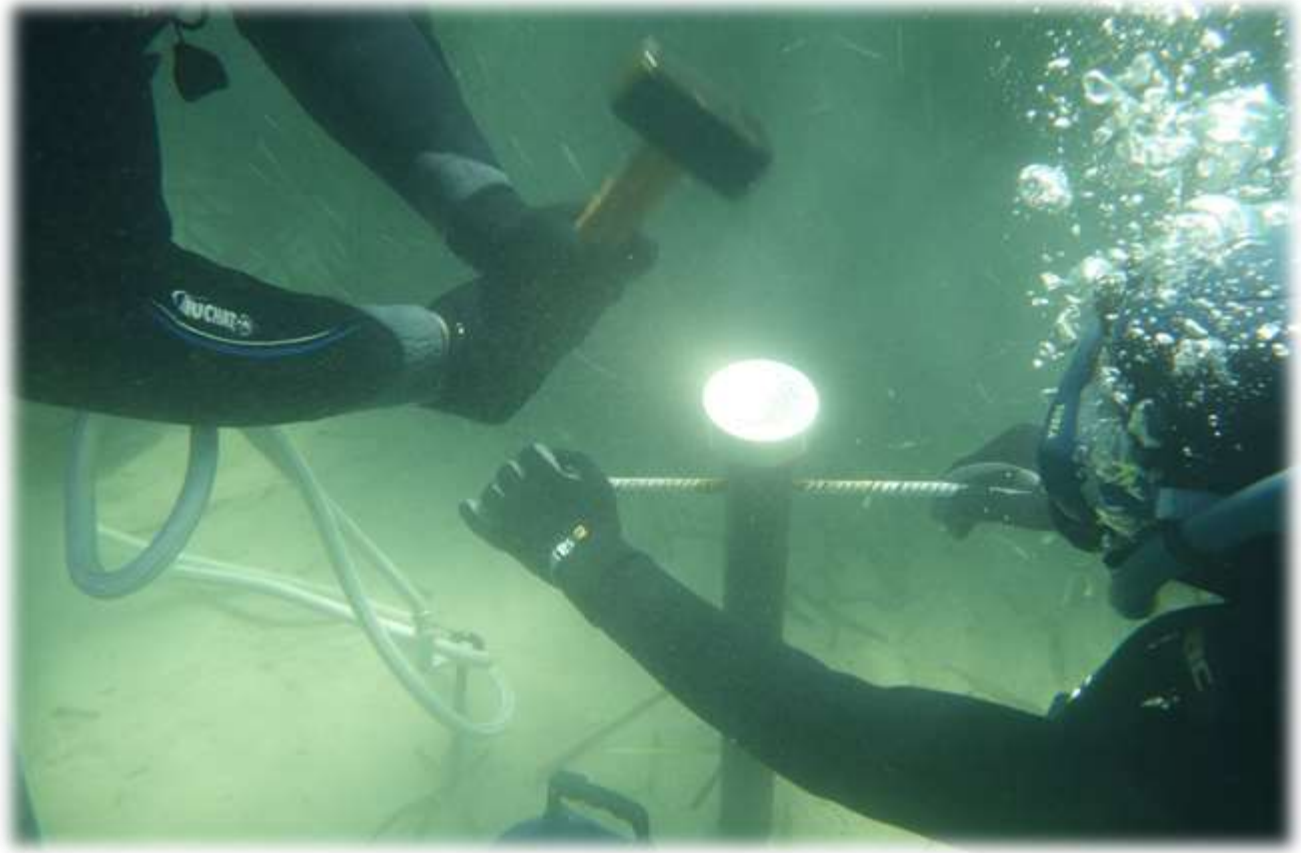
Surface area: 108700 ha

Posidonia oceanica : 2420.3481 ha

Cymodocea nodosa : 20816.485 ha



Manual for the Creation of Blue Carbon Projects in Europe and the Mediterranean

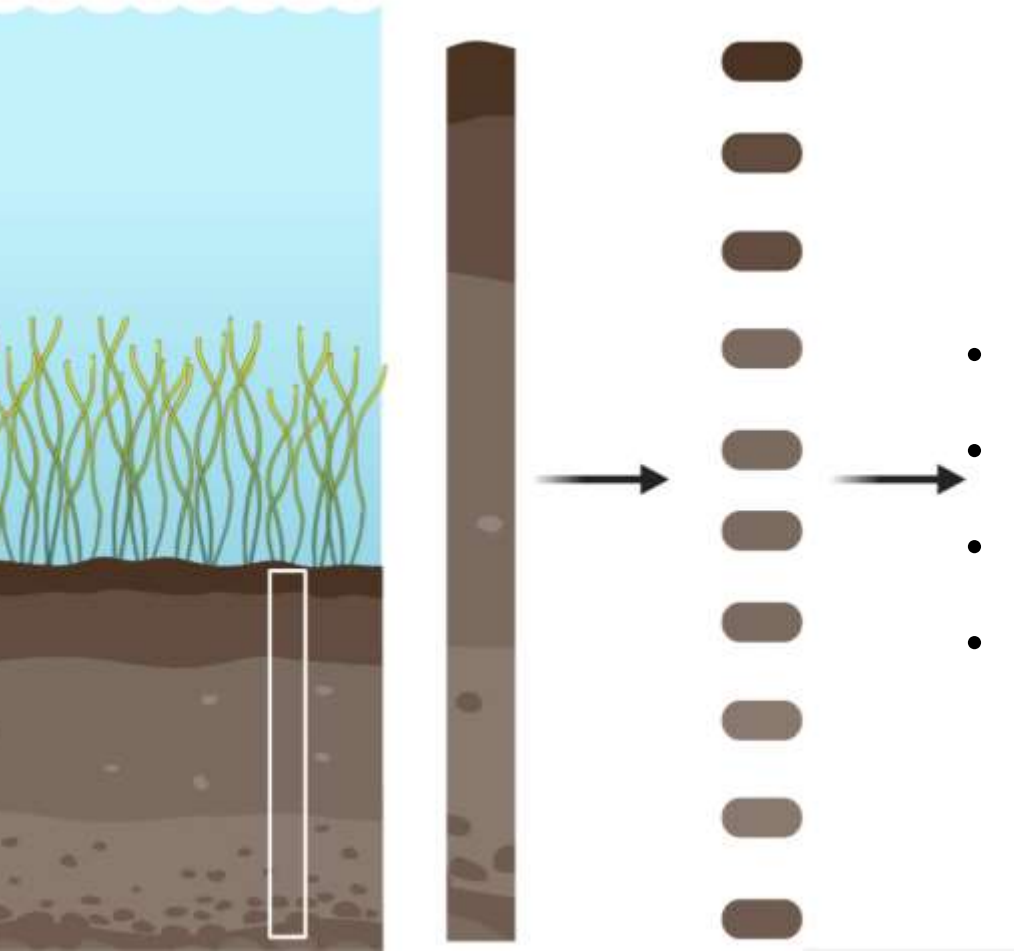


Manual for the Creation of Blue Carbon Projects in Europe and the Mediterranean



Sediment pool

- *Vegetated and bare sediment*
- *Depth corrected for compaction*
 - *3 replicates*



- Dry bulk density
- Organic carbon
- Inorganic carbon
- ^{14}C dating

Biomass pool



Sarcocornia fruticosa

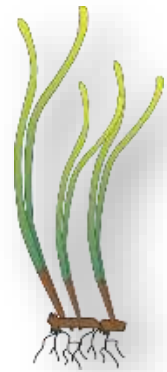
Posidonia oceanica

(n = 5) per site

Corg determined according to
(Duarte 1990; Howard *et al.*, 2014)

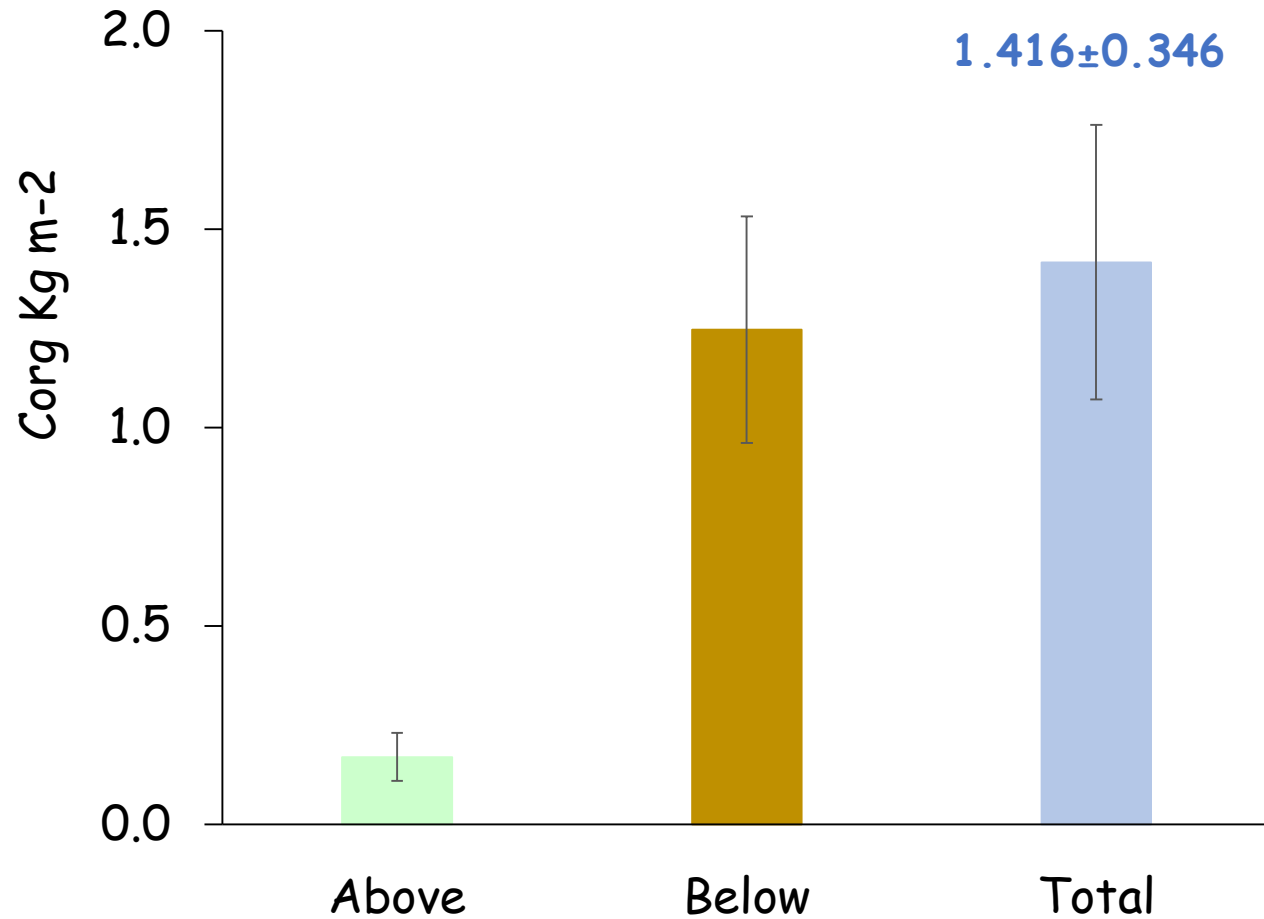
Seagrass Carbon Stock



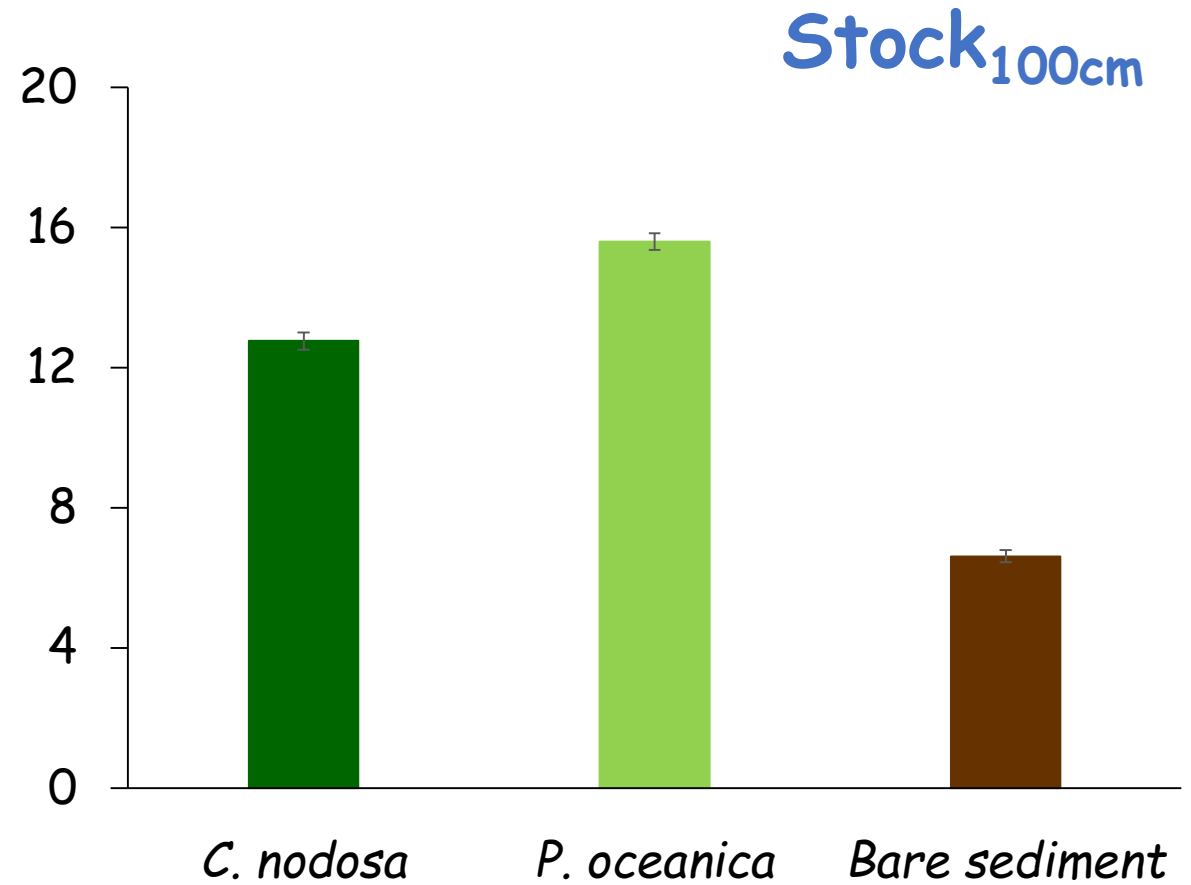


Seagrass Carbon Stock

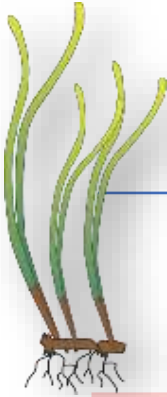
Biomass pool



Sediment pool

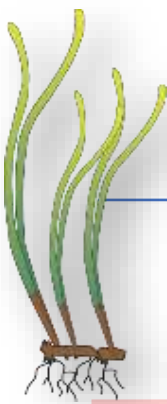


Sediment Carbon Stock



Site	Species	Depth (m)	Stock 1m thick (Kg Corg m ⁻²)	Reference
Kerkennah	<i>Posidonia oceanica</i>	1 - 2.5	13.69	This study
Kerkennah	<i>Cymodocea nodosa</i>	1 - 2.5	12.54	This study
Talmanca cove (Balearic islands, Spain)	<i>Posidonia oceanica</i>	2	75.50	Serrano et al. (2014)
Es Pujols (Balearic islands, Spain)	<i>Posidonia oceanica</i>	2	63.30	Serrano et al. (2014)
Cockburn sound (Western Australia)	<i>Posidonia sinuosa</i>	2	6.60	Serrano et al. (2014)
Mediterranean Sea	<i>Zostera marina</i>	0.5-3	8.79	Rohr et al. (2018)
Almeria Bay, Spain	<i>Cymodocea nodosa</i>	<5	12.24	Life blue natura project
Red Sea	<i>Halophila stipulacea</i>	1	2.66	Serrano et al. (2018)

Accumulation rate: Organic carbon burial



Site	Species	Depth (m)	Accumulation rate (g Corg m ⁻² yr ⁻¹)	Reference
Kerkennah	<i>Posidonia oceanica</i>	1 - 2.5	36	This study
Kerkennah	<i>Cymodocea nodosa</i>	1 - 2.5	12	This study
Talmanca cove (Balearic islands, Spain)	<i>Posidonia oceanica</i>	2	140	Serrano et al. (2014)
Es Pujols (Balearic islands, Spain)	<i>Posidonia oceanica</i>	2	8.5	Serrano et al. (2014)
Cockburn sound (Western Australia)	<i>Posidonia sinuosa</i>	2	6.6	Serrano et al. (2014)
Mediterranean Sea	<i>Zostera marina</i>	0.5-3	—	Rohr et al. (2018)
Almeria Bay, Spain	<i>Cymodocea nodosa</i>	<5	12	Life blue natura project
Red Sea	<i>Halophila stipulacea</i>	1	9.54	Serrano et al. (2018)

Seagrass Carbon Stock



Species	Surface area (ha)	OC stock (Mg ha ⁻¹) 1m thick deposits	OC carbon sequestration rate last 100 years (g m ⁻² yr ⁻¹)	OC carbon Stock (Tg)	OC sequestration (Tg yr ⁻¹)	Total national CO ₂ emission emitted in 2021 (Mton)
<i>Posidonia oceanica</i>	2420.3481	115.933	36	0,377	0.009	31.785 (JRC Science for Policy report)
<i>Cymodocea nodosa</i>	20816.485	125.641	12	2.615	0.025	

% of total national CO₂ emission emitted in 2021 captured by *Posidonia oceanica* and *Cymodocea nodosa* from the future MPA of kerkennah = **0.39%**

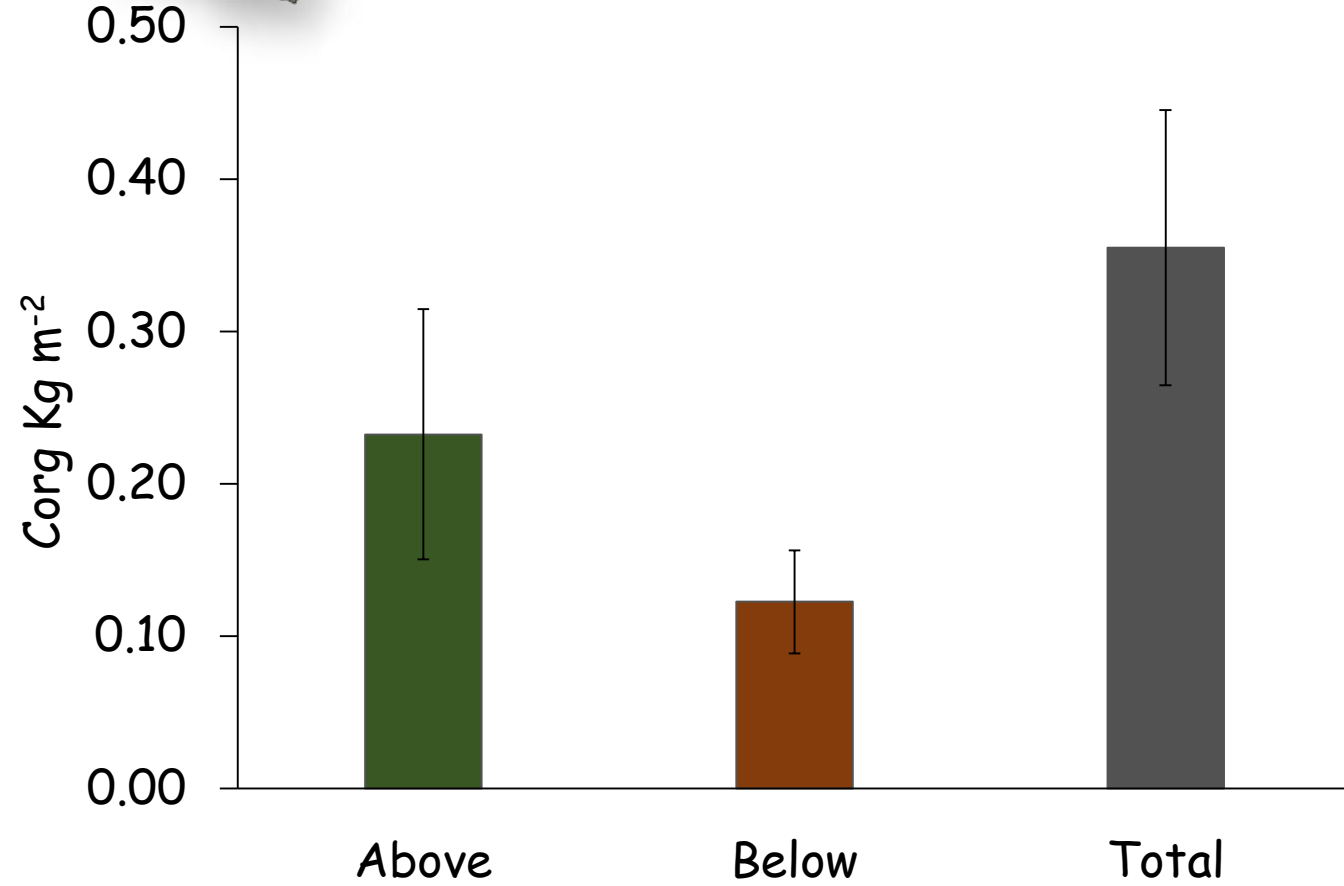
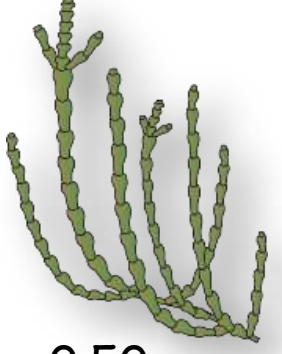
% of total national CO₂ emission emitted in 2021 captured by *Posidonia oceanica* along the Tunisian coast = **26.5 to 55%**

Saltmarsh Carbon Stock



Saltmarsh Carbon Stock

Preliminary data



Biomass pool

Total carbon content in the living biomass
from the studied area

$$483.425 \pm 149.685 \text{ Mg ha}^{-1}$$

Main takeaway

- **Posidonia oceanica habitat:** Covers 1,332,815 ha of the Tunisian Seafloor a significant portion of the Mediterranean Sea's estimated 2,216,116 ha.
- **Conservation significance:** Approximately 60% of the Posidonia habitat is located within the Tunisian coast, making it a critical area for conservation efforts
- **Mapping imperative:** The dire necessity for comprehensive cartographic data.
- **Leveraging Financial Incentives:** To protect seagrass meadows in Kerkennah

