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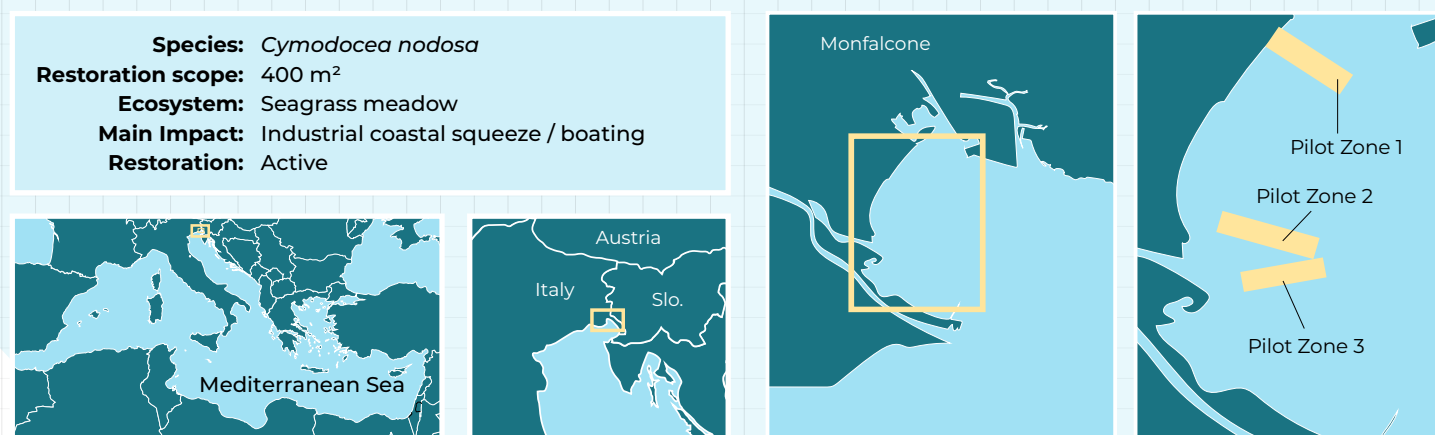


Co-funded by
the European Union

Natural Capital Accounting (NCA)

Site Context & Ecological Baseline

Panzano Bay, Monfalcone, Friuli Venezia Giulia, Italy



The Challenge

Shipping, shipyards, energy developments, and intensive recreational boating slicing up shallow meadows.



Key Biodiversity Indicators

	Impacted		Control
★ Macroinvertebrate Diversity (Shannon H')	3.38	vs.	3.46
★ Macroinvertebrate Species Richness:	20	vs.	21
✓ Benthic Community Health Index (M-AMBI)	0.68	vs.	0.68
♥ Seagrass Canopy Deviation (MediSkew Index):	0.57	vs.	0.31

Project Accounting & Recovery Timeline

Step 1: Year 1 (Active Intervention)

High-intensity physical transplantation across the active pilot plot using localised anchoring. This phase executes the project's primary transplantation capital expenditure of €42.80/m².

Step 2: Years 1–35 (Asset Recovery and Monitoring)

Implementing passive propeller-mitigation measures and eco-mooring infrastructure across the degraded management zone.

Step 3: Years 36–60 (Maximised Asset Capacity)

Continuous tracking up to the 60-year maximised accounting horizon to capture long-term stability in ecosystem service provision.

Condition Analysis & Natural Capital Profile

Ecosystem Condition Account Gap

Condition and Service Radar Chart

- Impacted (degraded)
- Control (healthy reference)

All axes are normalised scores
(% of control zone condition = 100 %)

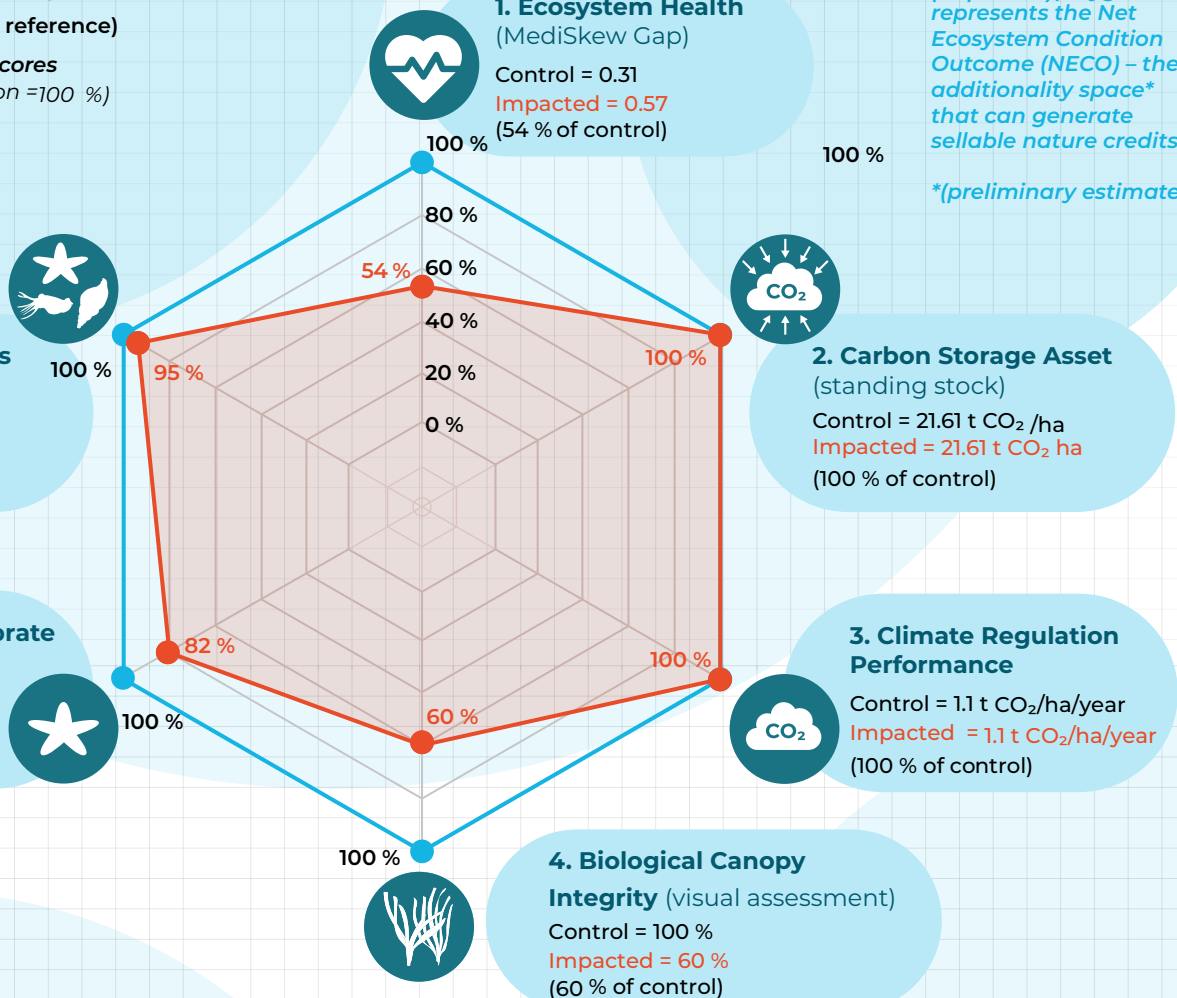
Scoring Guide:

100 % = Good (healthy)
60-80 % = Moderate
< 60 % = Poor (degraded)



The area between the blue (Control) and red (Impacted) polygons represents the Net Ecosystem Condition Outcome (NECO) – the additionality space* that can generate sellable nature credits.

*(preliminary estimate)



Uncertainty Note: Biodiversity metrics reflect indicative directional trends rather than precise financial estimates due to ecological variability and sampling limitations.

Monfalcone evaluates a transitional *Cymodocea nodosa* system using estuarine canopy (MediSkew) and benthic macroinvertebrate (M-AMBI) indicators rather than open-sea fish metrics. Carbon values reflect a uniform baseline distribution across both sampling stations.

Three Pillars of Natural Capital

1 Ecosystem Extent (The Footprint)



400 m² of immediate, high intervention active restoration nested directly adjacent to a broader passive management and anchoring mitigation zone pool.

2 Ecosystem Condition (The Health)



Tracking the canopy degradation gap via the MediSkew index (0.57 impact vs. 0.31 control), demonstrating localized structural fragmentation driven by light limitation and mooring scour within the industrial bay setting.

3 Ecosystem Services (The Benefits)



Net annual atmospheric carbon drawdown of 1.1 t CO₂/ha/year (carbon sequestration), supplemented by critical biodiversity preservation benefits via macroinvertebrate self-maintenance capacity, valued through municipal defensive conservation expenditures.

Economic & Credit Relevance

Natural Capital Metrics



79.9 Mg CO₂/ha
Stored carbon stock



1.1 Mg CO₂/ha/year
Annual sequestration



€42.80/m²
Transplantation
investment



0.57 → 0.30*
Ecosystem
condition gap

*(MediSkew Index)

Restoration Investment

€42.80/m²
Upfront active
transplantation cost

€178.60/m²/year
Annual maintenance
costs

Cost Breakdown:

Scientific monitoring (€28.60) + Use and operations management /
visitor reception (€150)
General restoration (€42.80/m² upfront capital)

Value Generated



ECOSYSTEM SERVICES

Climate regulation > Carbon accumulation

Biodiversity preservation > Habitat maintenance



MONETARY VALUATION

Pathway to Nature Credits



RESTORATION
(transplantation)



FIELD MONITORING
(ecological data)



NCA ASSESSMENT
(carbon + biodiversity)



MONETARY VALUE
(€)



NATURE CREDITS
(financing restoration)

The Natural Capital Balance Sheet

Restoration scenario and price basis	35-year asset value	60-year asset value	Financial takeaway
Active restoration (EU ETS carbon price: €70/tCO ₂)	€3 619 /m ²	€4 575 /m ²	Conservative floorprice baseline
Active restoration (Social cost of carbon: €198/tCO ₂)	€3 621/m ²	€4 576 /m ²	Reflects true societal welfare impact
Passive restoration (Buffer management zone)	Site-scale indicator	Site-scale indicator	Establishes viability for multi-species nature creditstructures

The 35-year and 60-year asset values presented above have been structured to explicitly reflect not only blue carbon, but also biodiversity preservation values. The passive restoration framework remains applied across the broader management zone as an indicative estimation of site-scale financial scalability.