



Mapping the future of *Posidonia oceanica*: conservation challenges and opportunities in the changing Sardinian seas

SARDINIAN REGIONAL WORKSHOP

THE FUTURE OF BEACHES AND COASTAL ECOSYSTEMS IN SARDINIA:
WHAT ACTIONS TO ADDRESS CLIMATE CHALLENGES?

Let's create a shared vision for transformative adaptation together

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SARDIGNA CHIRCAS
SARDEGNA RICERCHE



REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA



**Marine-coastal
environment
sustainability**

Technology Transfer

**Cross-border
cooperation**

**Training and
Dissemination**

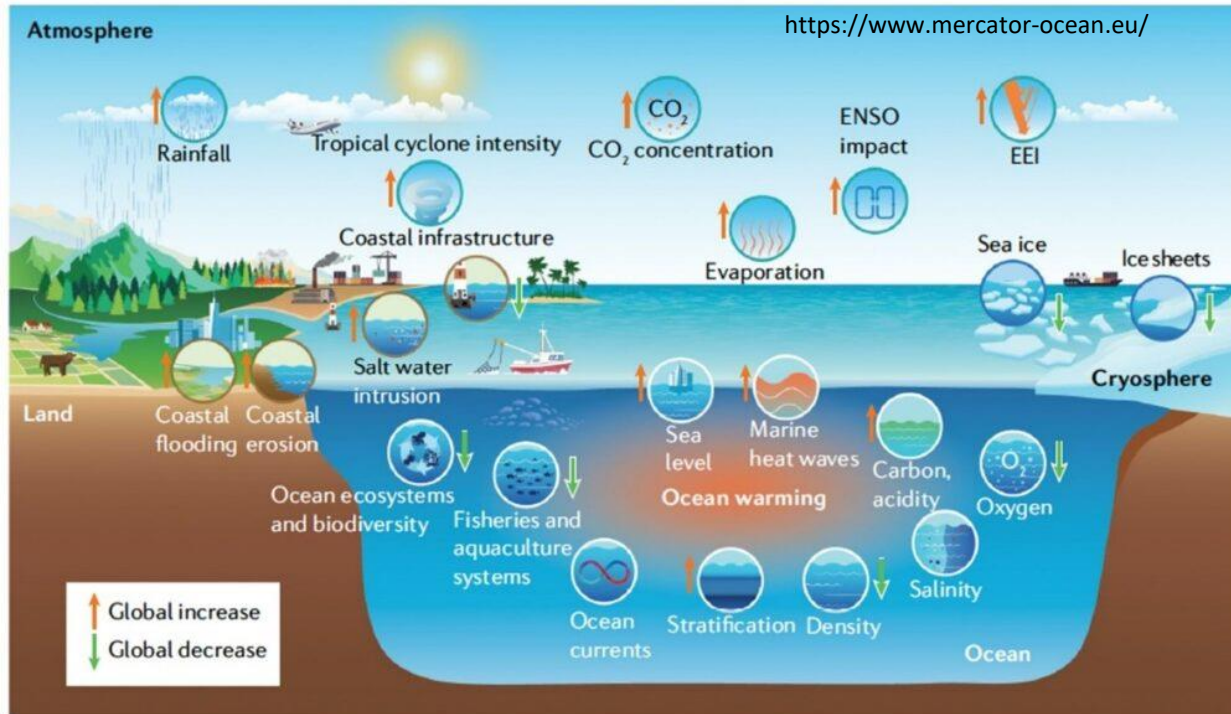
Research areas
Ecology and Planning of
Marine-Coastal Ecosystems
Aquaculture



I cambiamenti climatici nei nostri oceani

Climate change has significant impacts on marine ecosystems, with devastating effects on biodiversity, local economies and the health of the planet.

- Sea warming
- Ocean acidification
- Coastal flooding and erosion
- Extreme events



- Oceanic currents modification
- Marine ecosystem modification
- Biodiversity loss
- Impact on fishing activities

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The case study of *Posidonia oceanica* in Sardinia

Impacts of climate change on marine-coastal ecosystems

OBJECTIVES

Current and future distribution of *Posidonia oceanica*

Ecosystem Services provided by *Posidonia* and impacts related to CC

Use of ecological corridors as NbS to mitigate CC impacts on *Posidonia*

Climate change and *Posidonia oceanica*



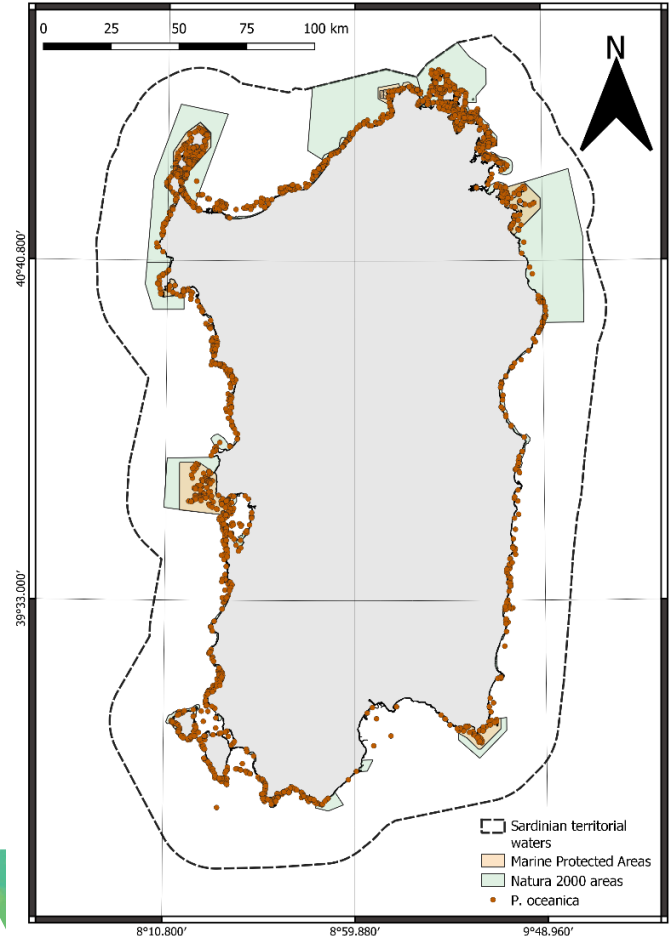
- Seagrass essential for the Mediterranean Sea health
- Absorbs CO₂
- Improves water quality
- Crucial role in coastal protection
- Marine biodiversity hotspot

Impacts

- Thermal stress
- Photosynthesis damage
- Bleaching
- Habitat loss
- Biodiversity loss
- Eutrophication

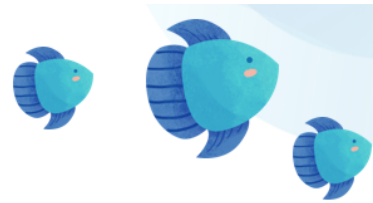
Sardinia includes a large part of the Italian meadows of *P. oceanica* but also the less vulnerable and therefore more valuable ones

Catucci et al., 2023





Ecological Connectivity between Protected Areas with Ecological Corridor Modeling and Mapping



- Presence/Absence data
- Environmental variables
- Marine Protected Areas (n=6)
- Natura 2000 areas (n=77)

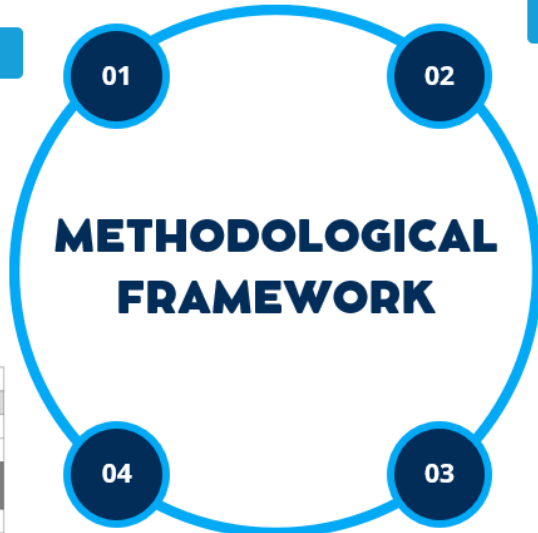
01-DATASET



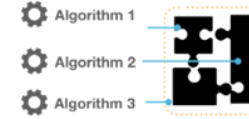
	0.7	0.3	1	0.8	0.9	0.5	0.4
	0.2	0.4	0.8	0.7	0.6	0.3	0.2
Core 1		0.5		0.4	0.3	0.7	0.5
	0.2	0.6	0.7		0.1	0.5	0.4
	0.5	0.9	1	0.2			
Core 2	0.1	0.7	0.8	0.4	0.6	0.1	0.4

04-ECOLOGICAL CORRIDORS

Least-cost path analysis

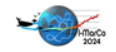


Habitat suitability model

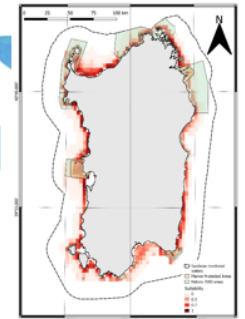


Predictions

02-MODELING

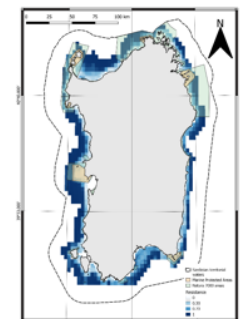


MARINE ECOLOGICAL CORRIDORS
AN INNOVATIVE APPROACH
TO IDENTIFY ECOLOGICAL CONNECTIVITY AMONG PROTECTED AREAS

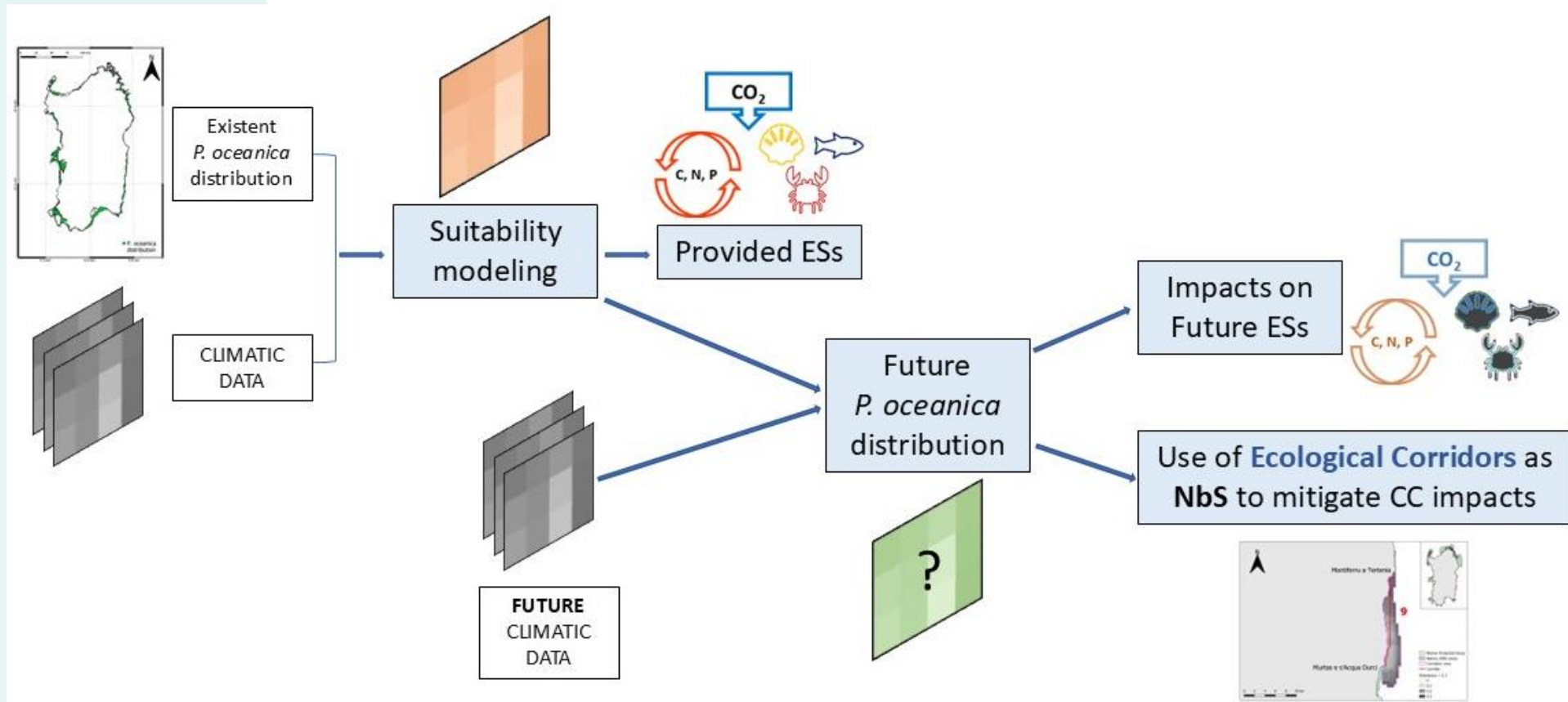


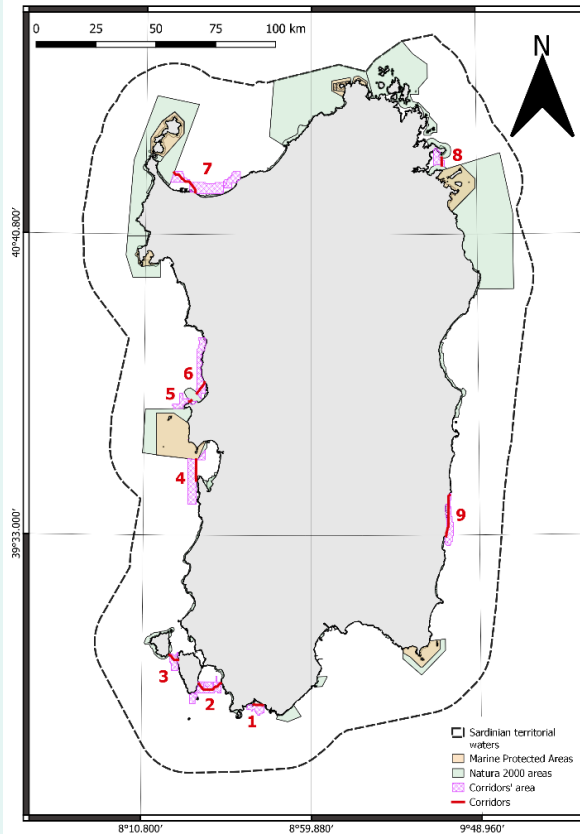
	0.7	0.3	1	0.8	0.9	0.5	0.4
	0.2	0.6	0.8	0.7	0.6	0.3	0.2
	0.3	0.2	0.4	0.3	0.7	0.5	0.8
	0.4	0.5	0.1	0.1	0.6	0.4	0.6
	0.2	0.6	0.7	0.3	0.5	0.4	0.2
	0.5	0.9	1	0.2	0.1	0.1	0.5
	0.1	0.7	0.8	0.4	0.6	0.1	0.4

03-RESISTANCE SURFACE



Question: Can Ecological Corridors be considered a NbS to mitigate the impacts of climate change on Posidonia?



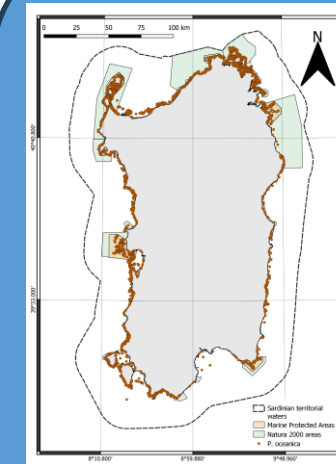


Different scenarios

RCP 4.5 – medium impact
RCP 8.5 – high impact

Past
2005-2023

Future
2024-2050
2024-2075
2024-2088



P. oceanica presence

Temperature
Salinity
Sea currents

Depth



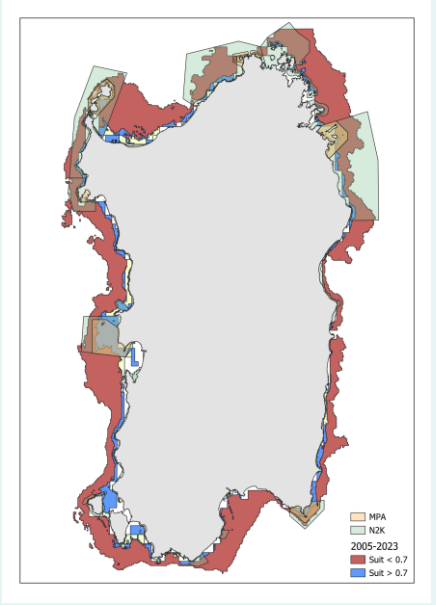


RCP4.5 Scenario Analysis

(medium impact)

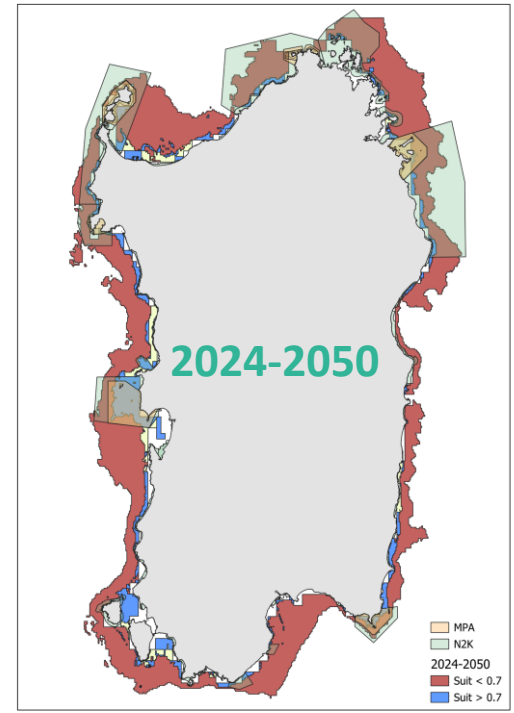


PAST (2005-2023)

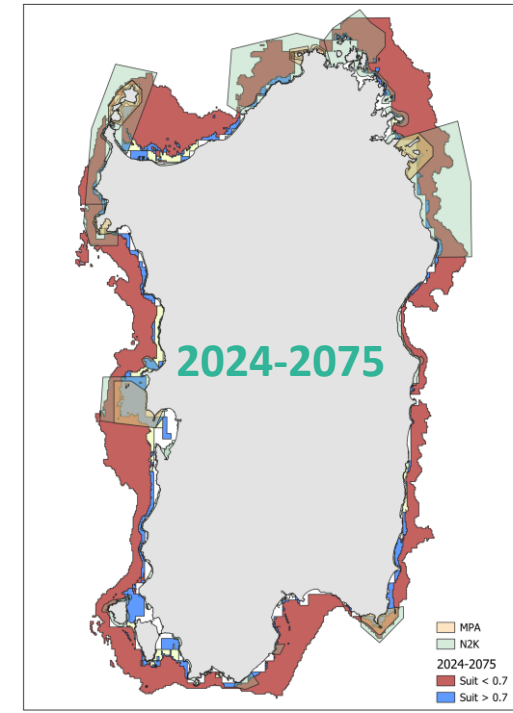


Study area 8.777 km²
Bathymetric range 0-100 m

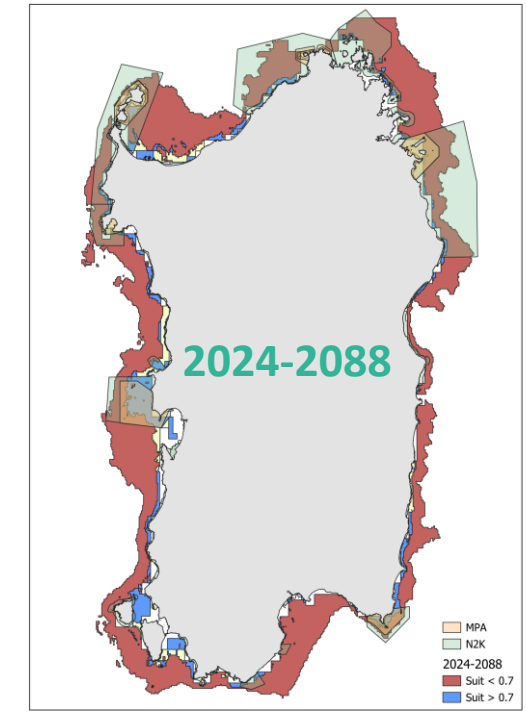
Suitable area
1309 km²
Ca. 15%



-6,26%
1227 km²



-10,01%
1178 km²



-15,51%
1106 km²

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Next step?

01

RCP Scenario 8.5
(High Impact)

02

Corridor mapping on
RCP 4.5 scenario

03

Corridor mapping on
RCP 8.5 scenario

04

Focus on spatial
evolution of corridors

05

Which corridors will persist
over time?

06

CLIMATE REFUGIA???

- **Ecological Corridors are NbS if adequately protected**
- **Close interaction with stakeholders and administration**



Thank you for your attention

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