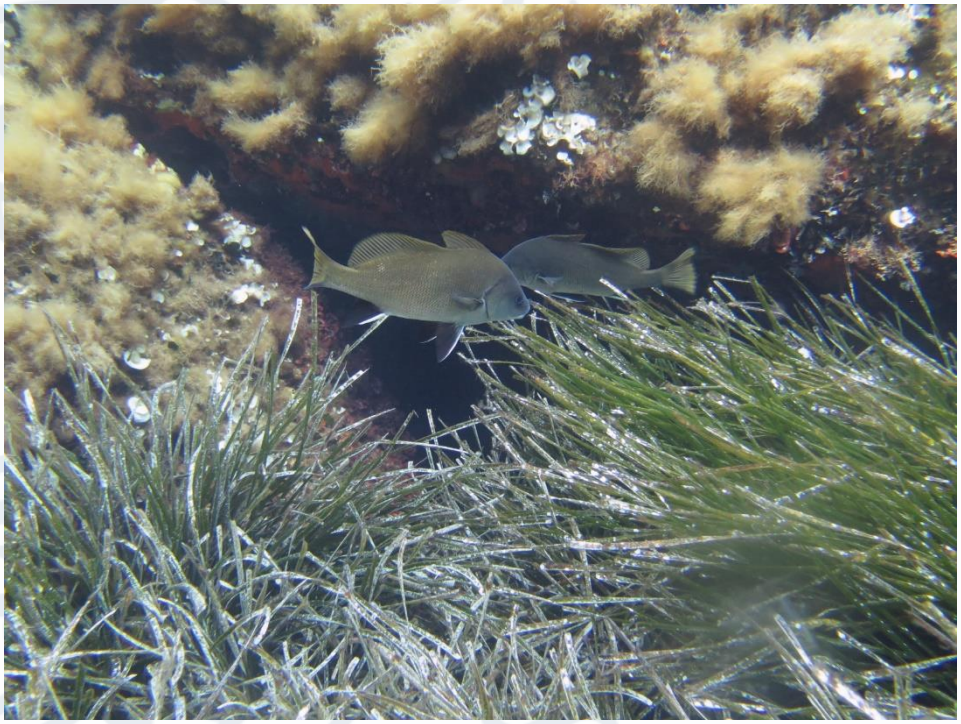
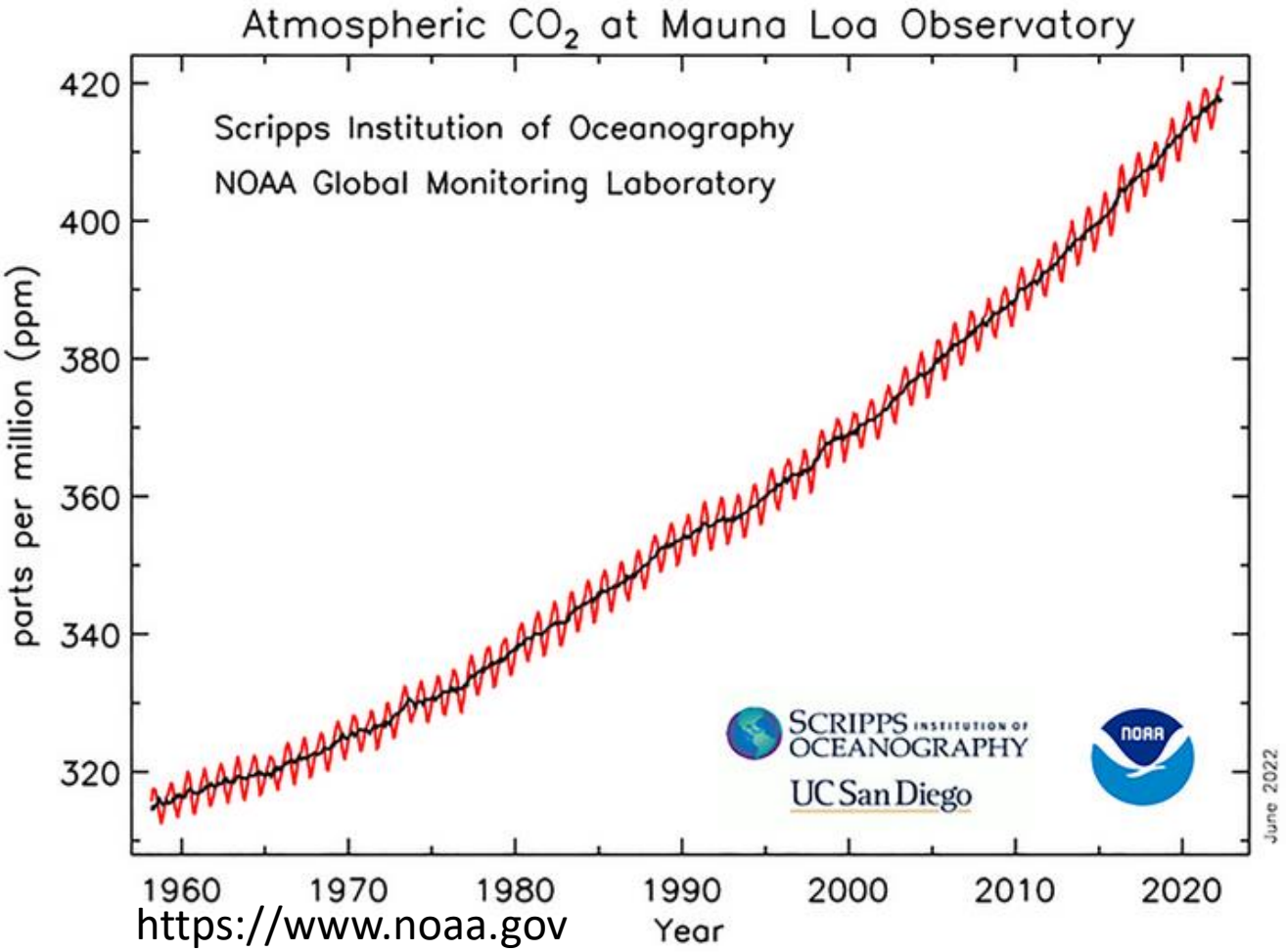
Effetti dei cambiamenti climatici in ambiente marino



Fabio Bulleri (fabio.bulleri@unipi.it)

Dipartimento di Biologia, Università di Pisa, 56126, Pisa

CO_2 atmosferica ed effetto serra



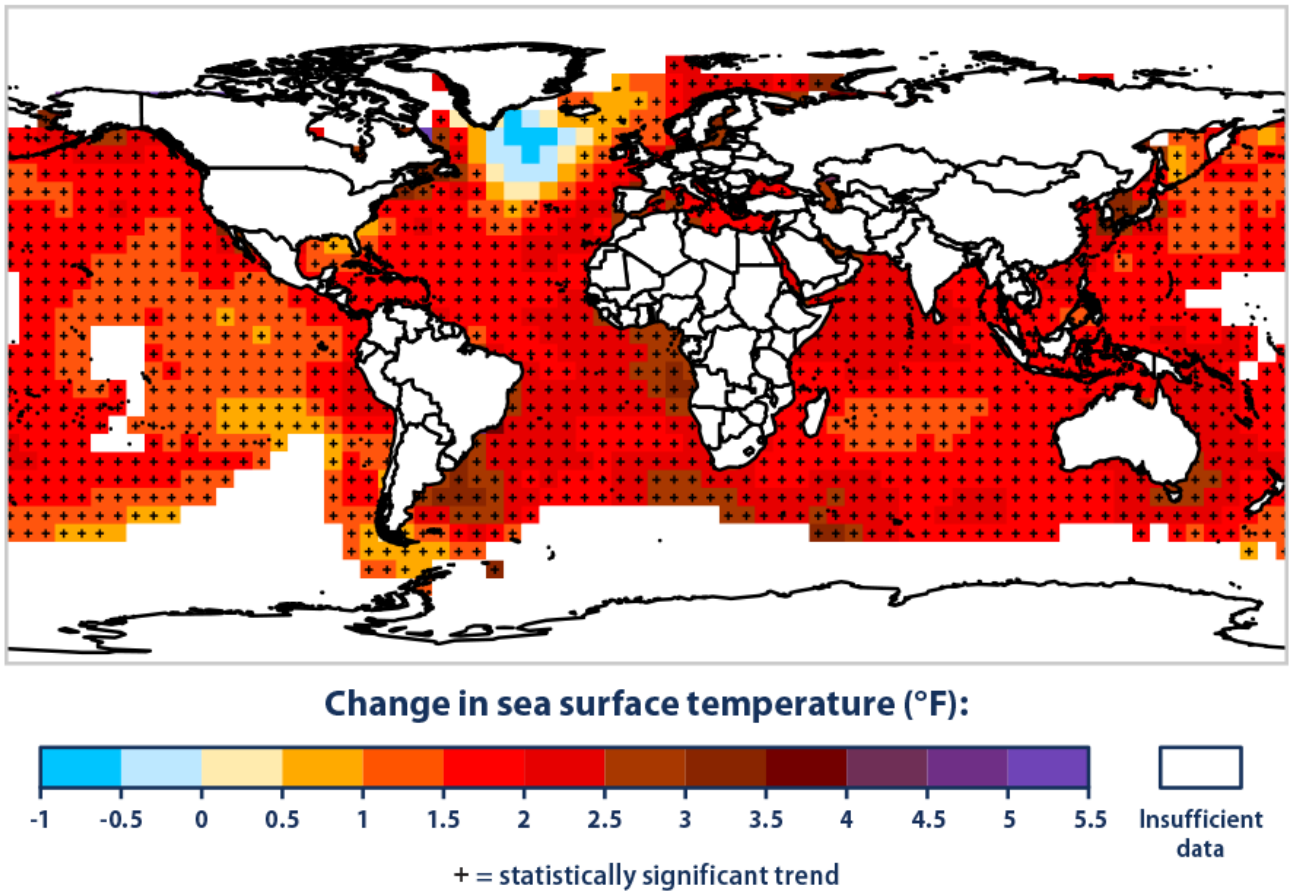
https://www.noaa.gov

Riscaldamento globale degli oceani

Future MARES — Climate Change and Future Marine Ecosystem Services and Biodiversity

Dipartimento di Biologia

Cambiamento in SST tra il 1901 ed il 2020

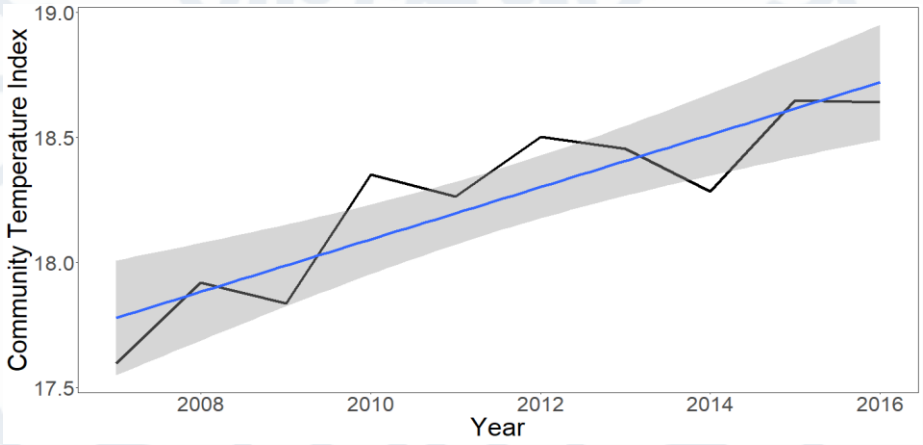


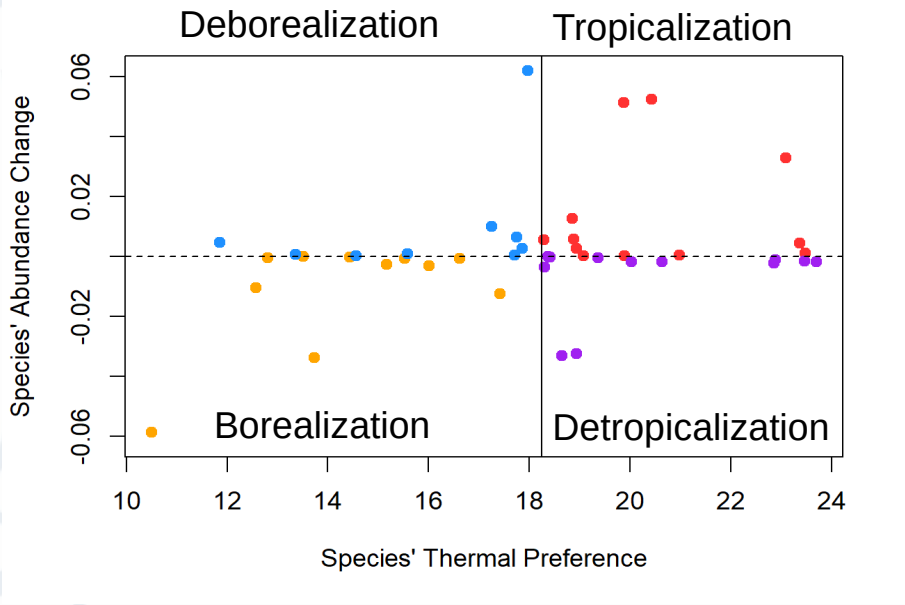
https://www.epa.gov/climate-indicators/climate-change-indicators-sea-surface-temperature

Future MARES — Climate Change and Future Marine Ecosystem Services and Biodiversity

DIPARTIMENTO di BIOLOGIA

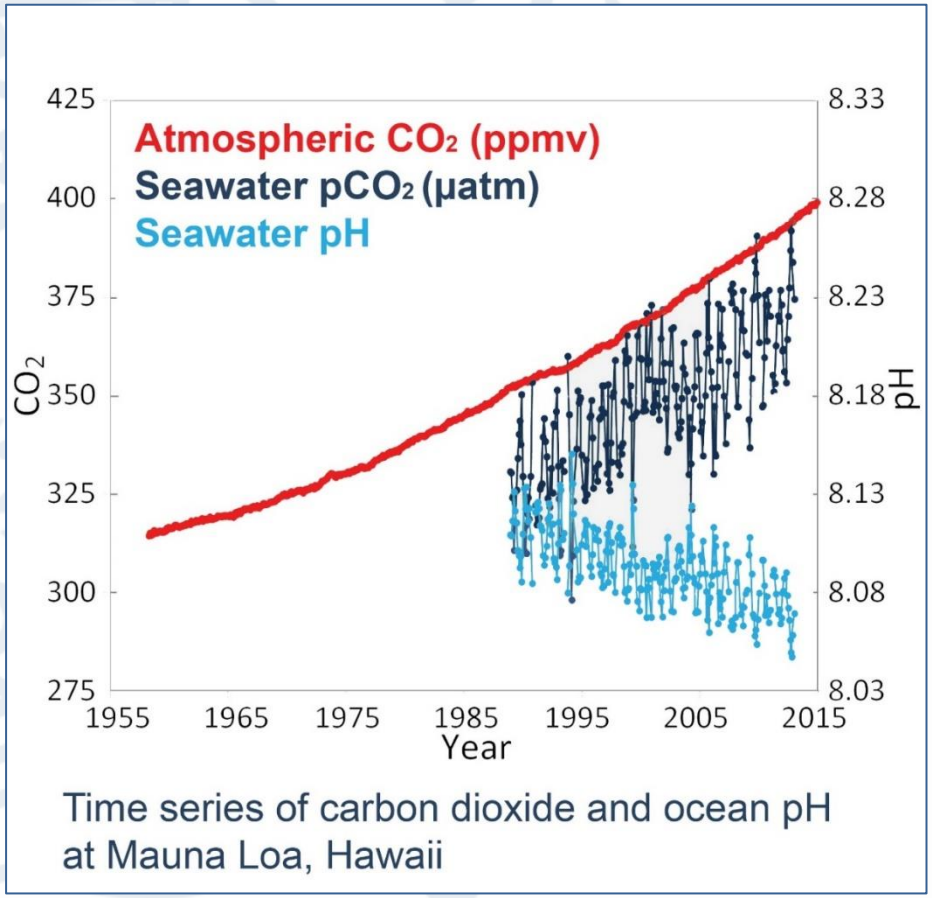
Cambiamenti nella composizione di popolamenti bentonici in seguito a CC





Progressivo aumento dell'abbondanza di specie con affinità per acque calde

Acidificazione degli oceani

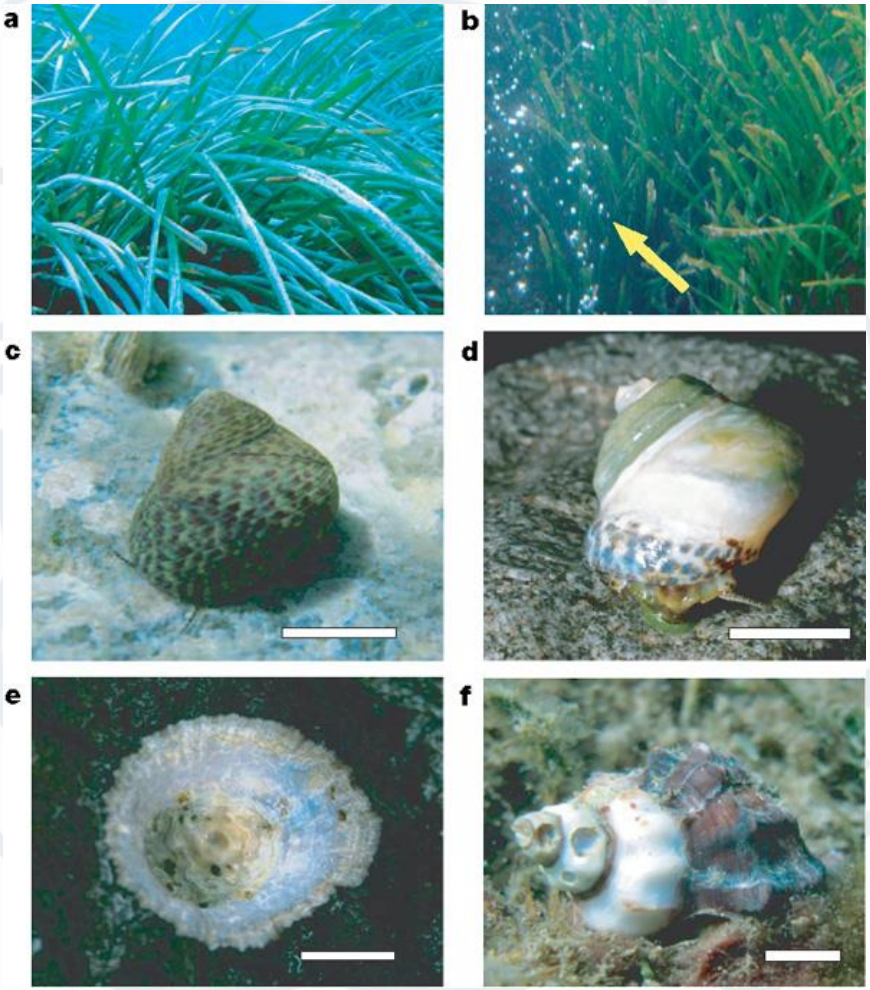


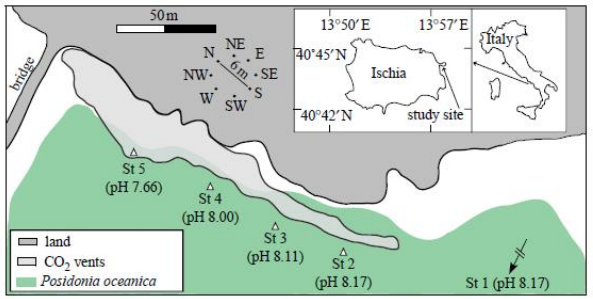
Time series of carbon dioxide and ocean pH at Mauna Loa, Hawaii

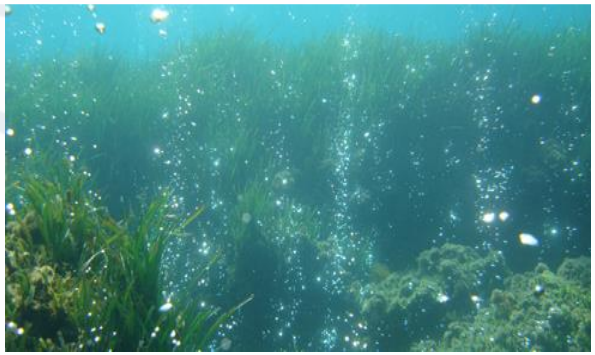
https://oceanacidification.noaa.gov/OurChangingOcean.aspx

Effetti dell'acidificazione degli oceani

DIPARTIMENTO di BIOLOGIA







Quali strumenti per far fronte ai cambiamenti climatici?

DIPARTIMENTO di BIOLOGIA

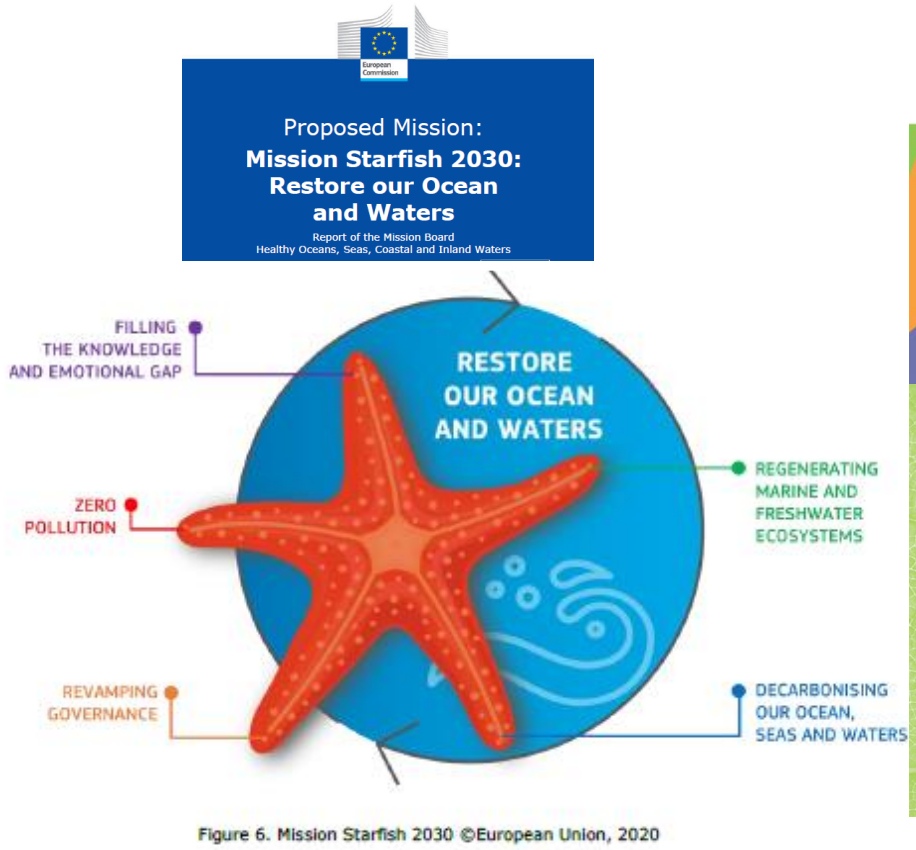


Figure 6. Mission Starfish 2030 ©European Union, 2020

Quali strumenti per far fronte ai cambiamenti climatici?

DIPARTIMENTO di BIOLOGIA

Nature-based Solutions (NBS)

Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions

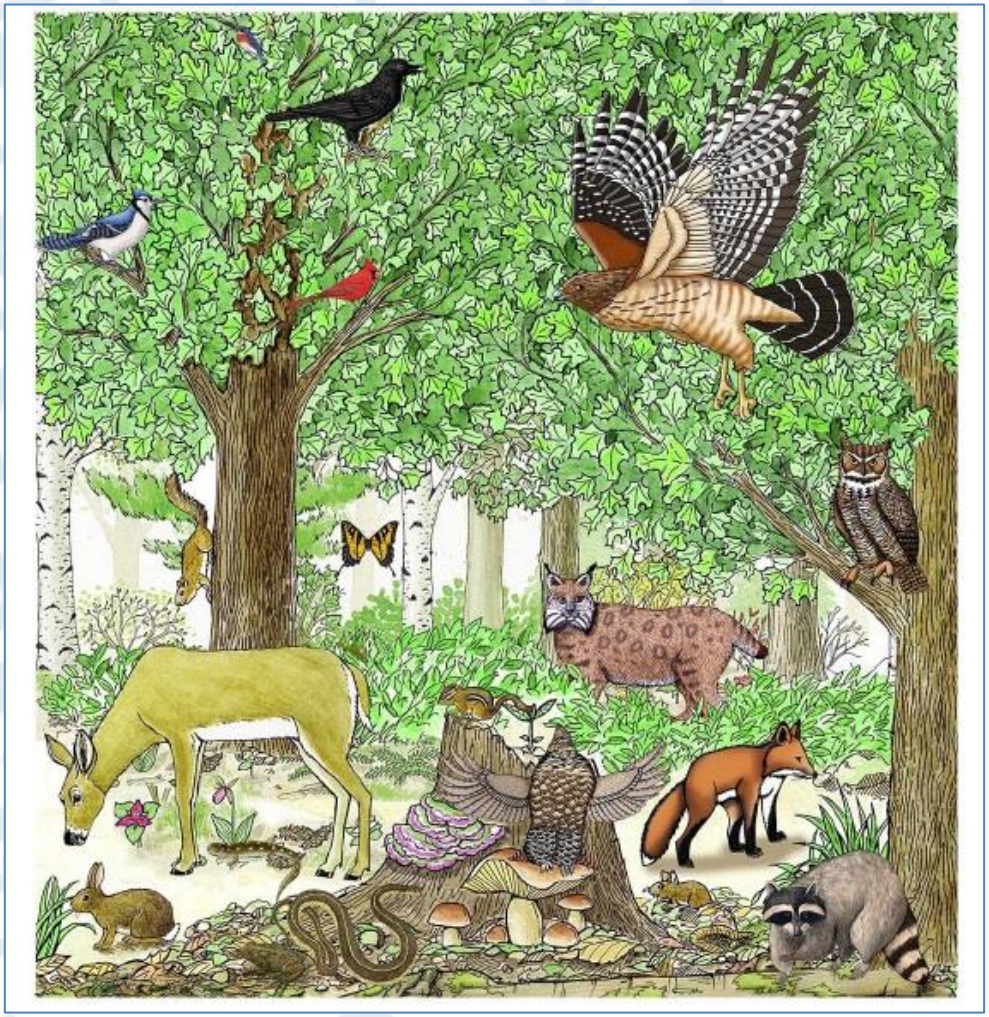
Future MARES | Climate Change and Future Marine Ecosystem Services and Biodiversity

https://www.futuremares.eu/

Future MARES | Climate Change and Future Marine Ecosystem Services and Biodiversity

DIPARTIMENTO di BIOLOGIA

Le foreste : Hotspot di biodiversità



https://www.exploringnature.org

- Condizioni ambientali
- Disponibilità di risorse
- Interazioni tra specie

Future MARES
Climate Change and Future Marine Ecosystem Services and Biodiversity

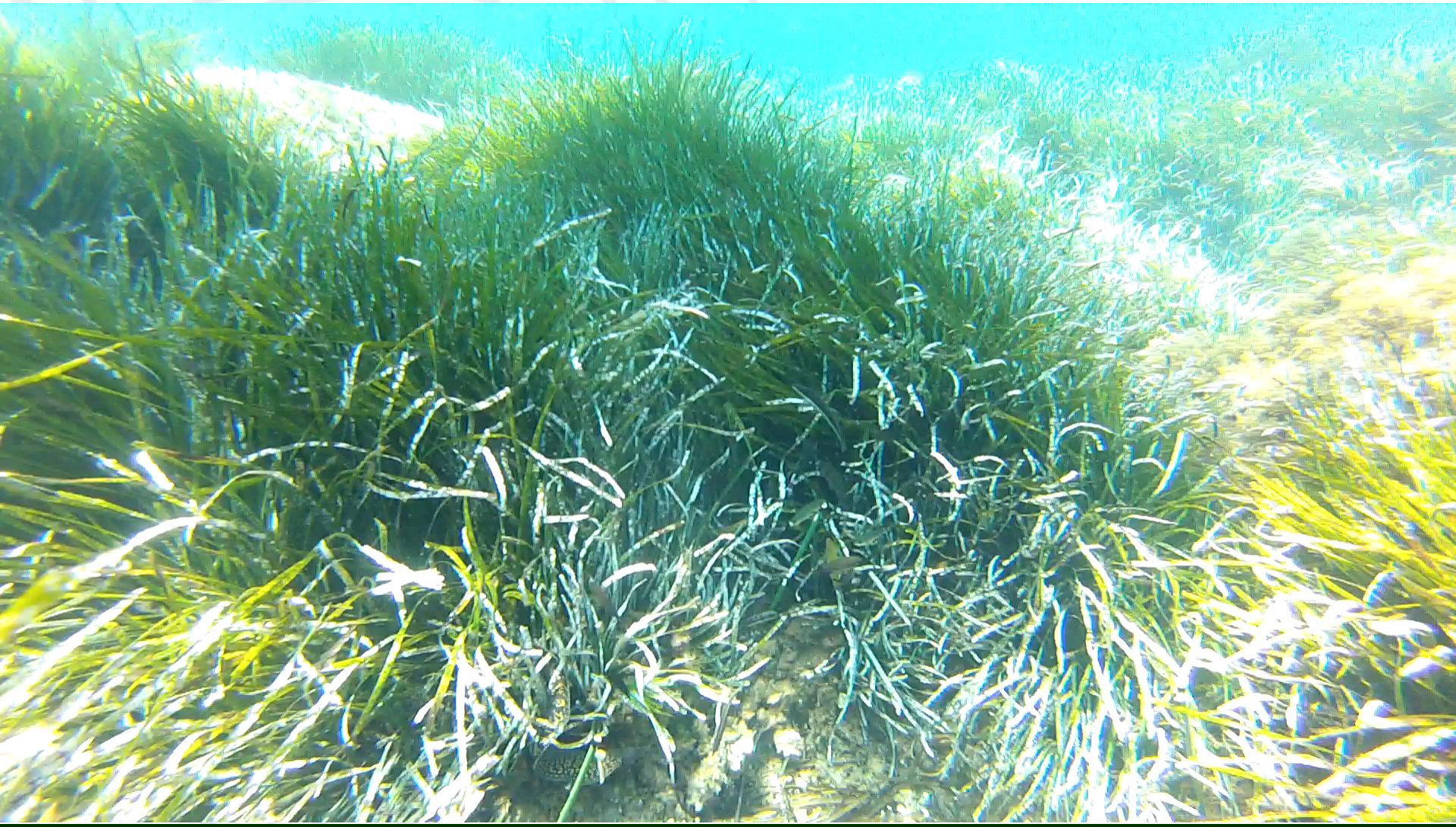
DIPARTIMENTO di BIOLOGIA

Conservazione e ripristino di foreste sommerse

Fucales: *Ericaria* spp. in Mediterraneo

Le foreste marine: perché sono importanti?

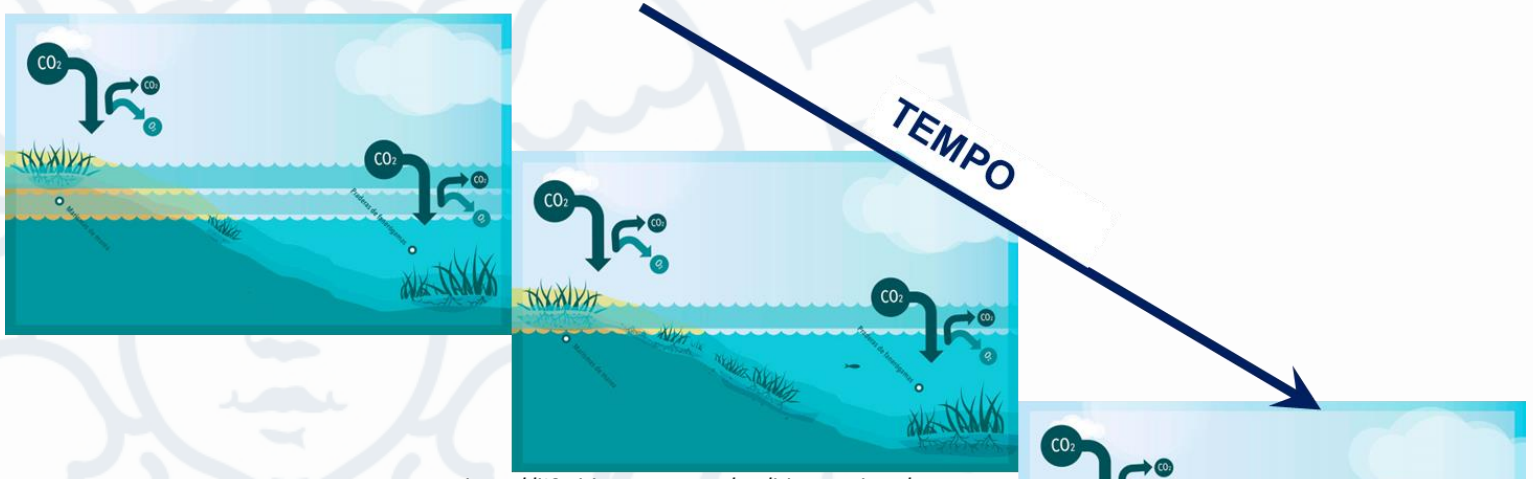
Formazione di habitat: alta biodiversità



Future MARES | Climate Change and Future Marine Ecosystem Services and Biodiversity

DIPARTIMENTO di BIOLOGIA

Le foreste marine come strumento per la riduzione degli impatti dei cambiamenti climatici



http://life-bluenatura.eu/en/blue-carbon/

https://www.thebluecarboninitiative.org/carbon-projects

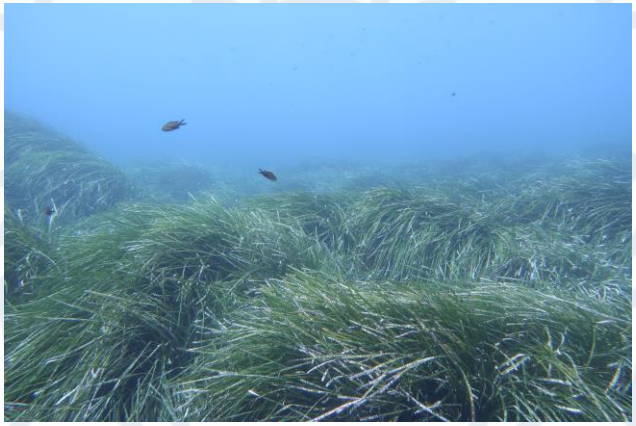
Sequestro del carbonio: blue carbon

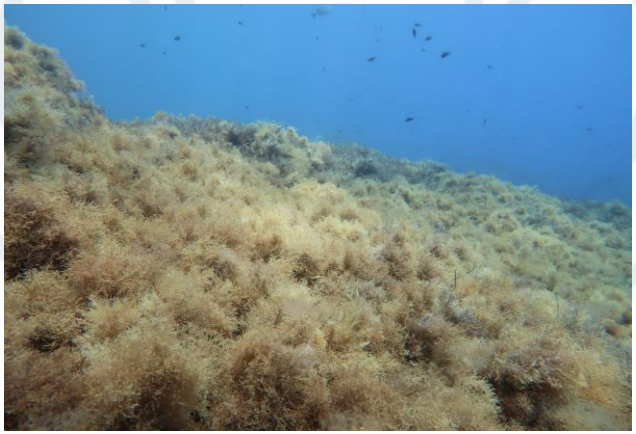
Future MARES
Climate Change and Future Marine Ecosystem Services and Biodiversity

DIPARTIMENTO di BIOLOGIA

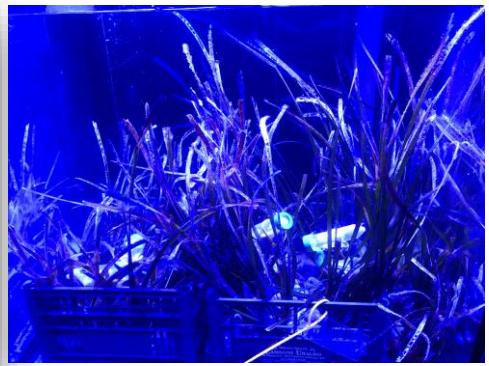
Foreste marine come rifugio da OA

Aumento del pH durante la fotosintesi





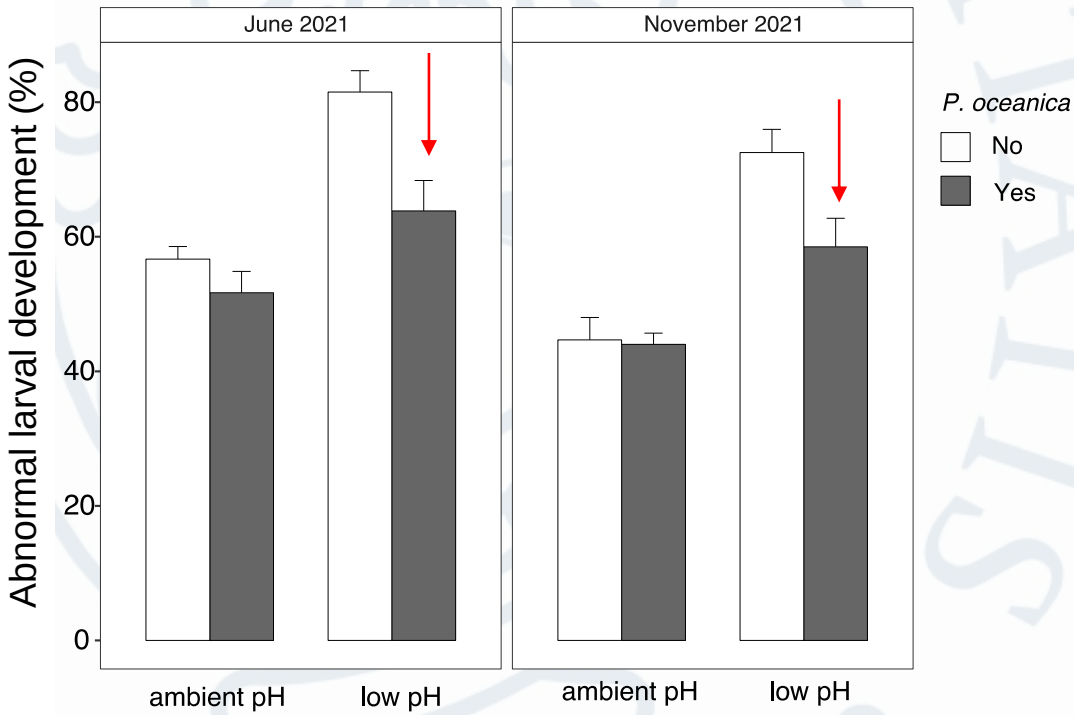
Rilascio di gameti e fertilizzazione



Parco Nazionale Arcipelago Toscano
unesco Biosphere Reserve
Isole di Toscana Riserva della Biosfera
IUCN Green List

Foreste marine come rifugio da OA

Sviluppo larvale dopo 72 h in condizioni sperimentali



Maggior tasso di sviluppo normale delle larve a pH basso in presenza di *P. oceanica*

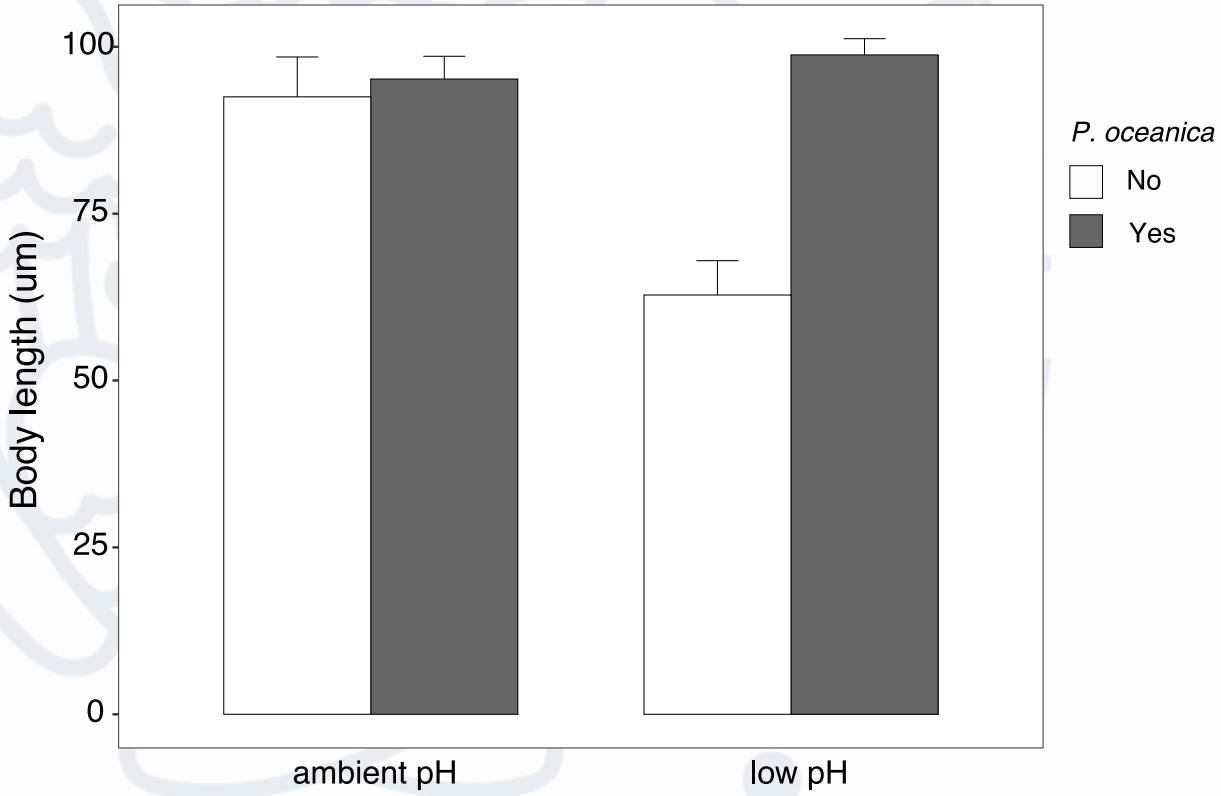
Pluteus larva

Normale

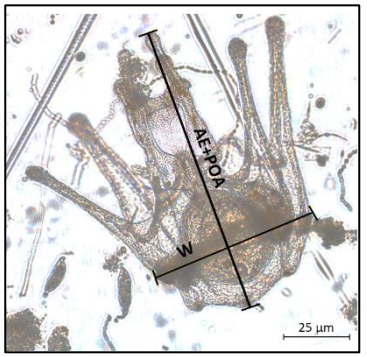
Anormale

Foreste marine come rifugio da OA

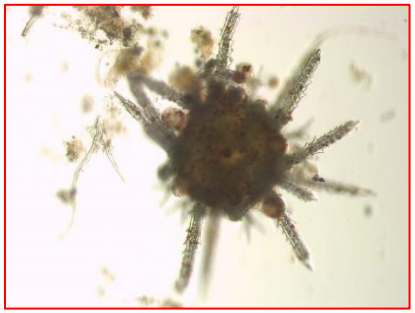
Lunghezza delle larve dopo 30 giorni



Echinopluteus larva



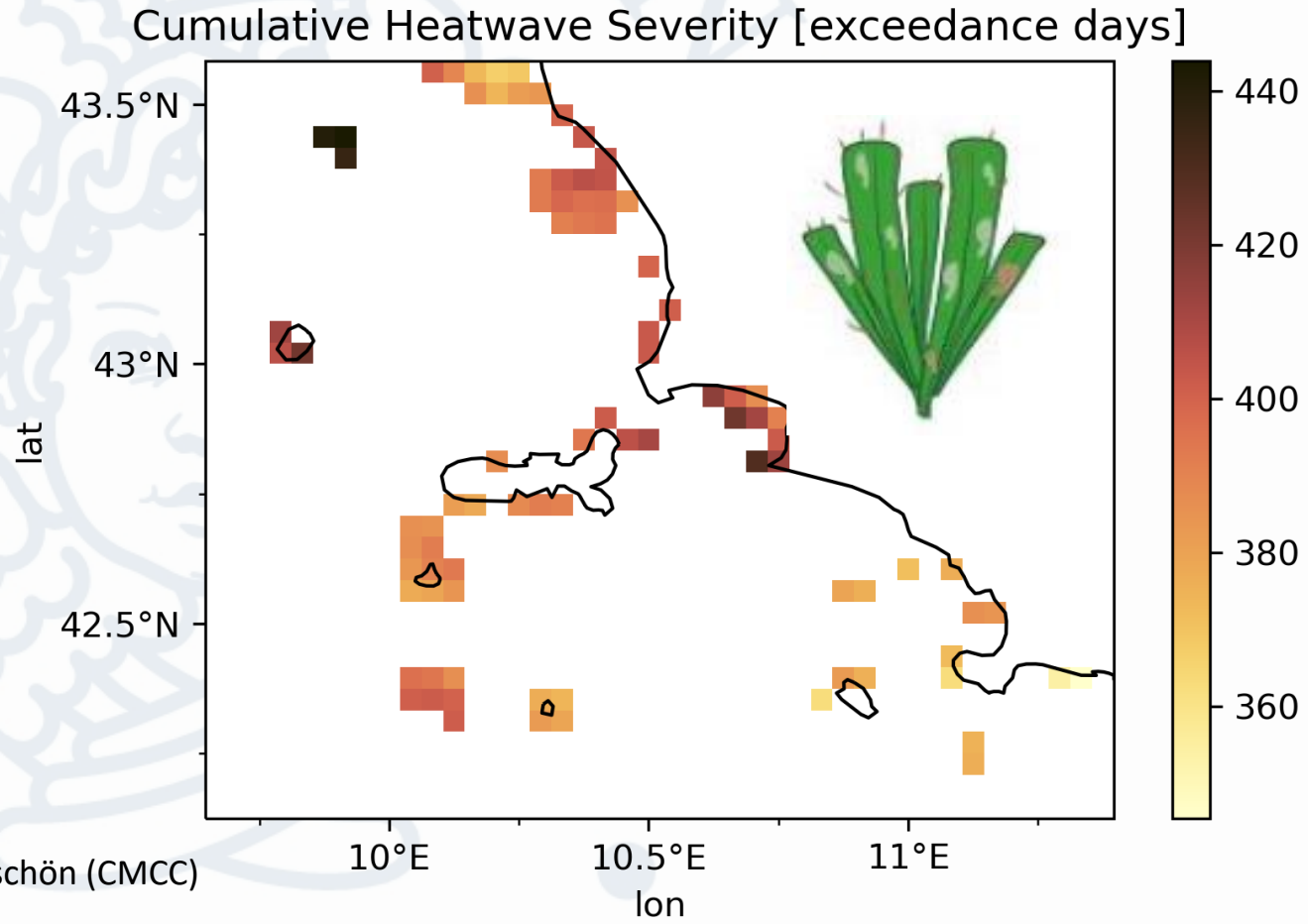
Sea urchin juvenile



Future MARES | Climate Change and Future Marine Ecosystem Services and Biodiversity

DIPARTIMENTO di BIOLOGIA

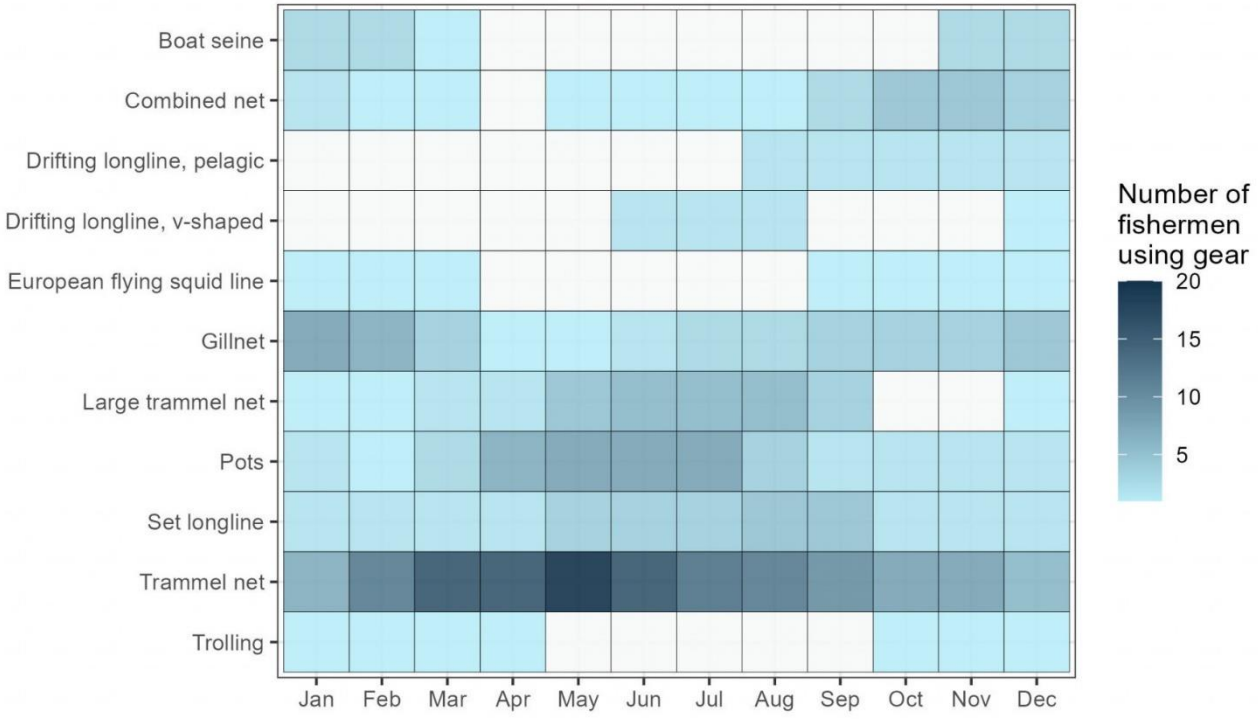
Identificazione di genotipi più resistenti a cambiamenti climatici



Momme Butenschön (CMCC)

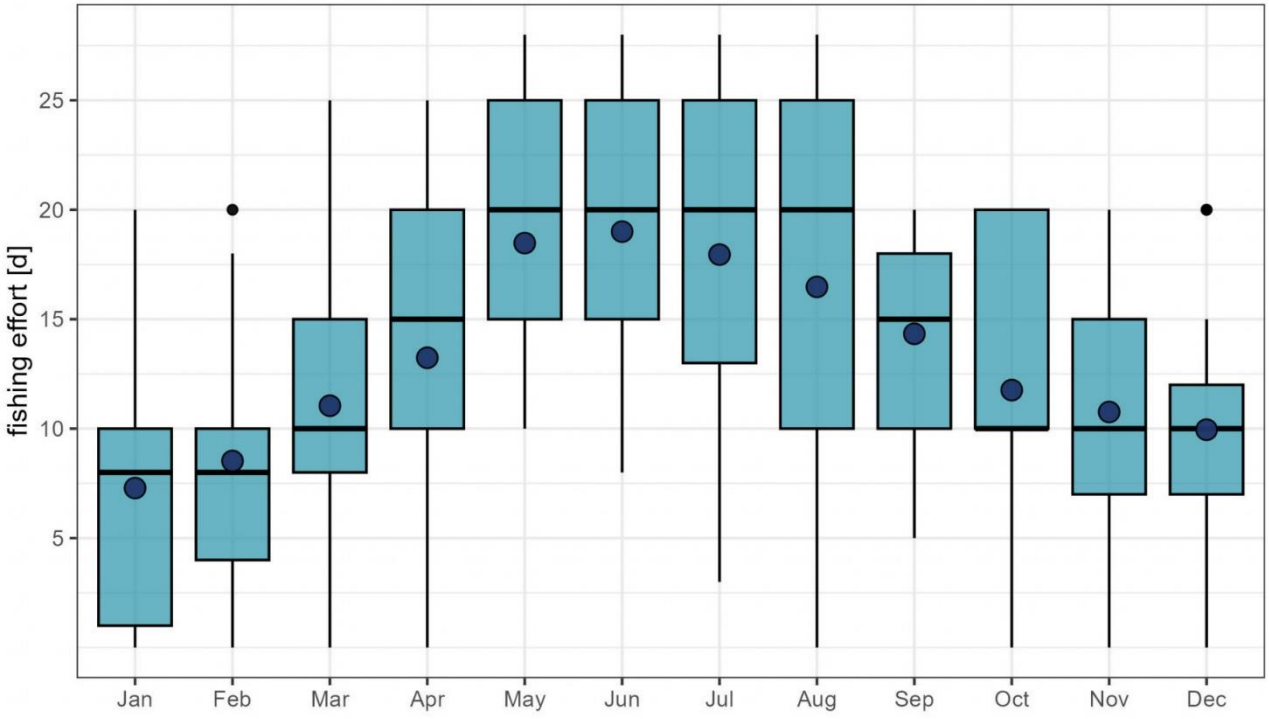
Intensità e frequenza di eventi estremi (Marine Heatwaves) nel periodo 1985-2021

Aspetti socio-economici



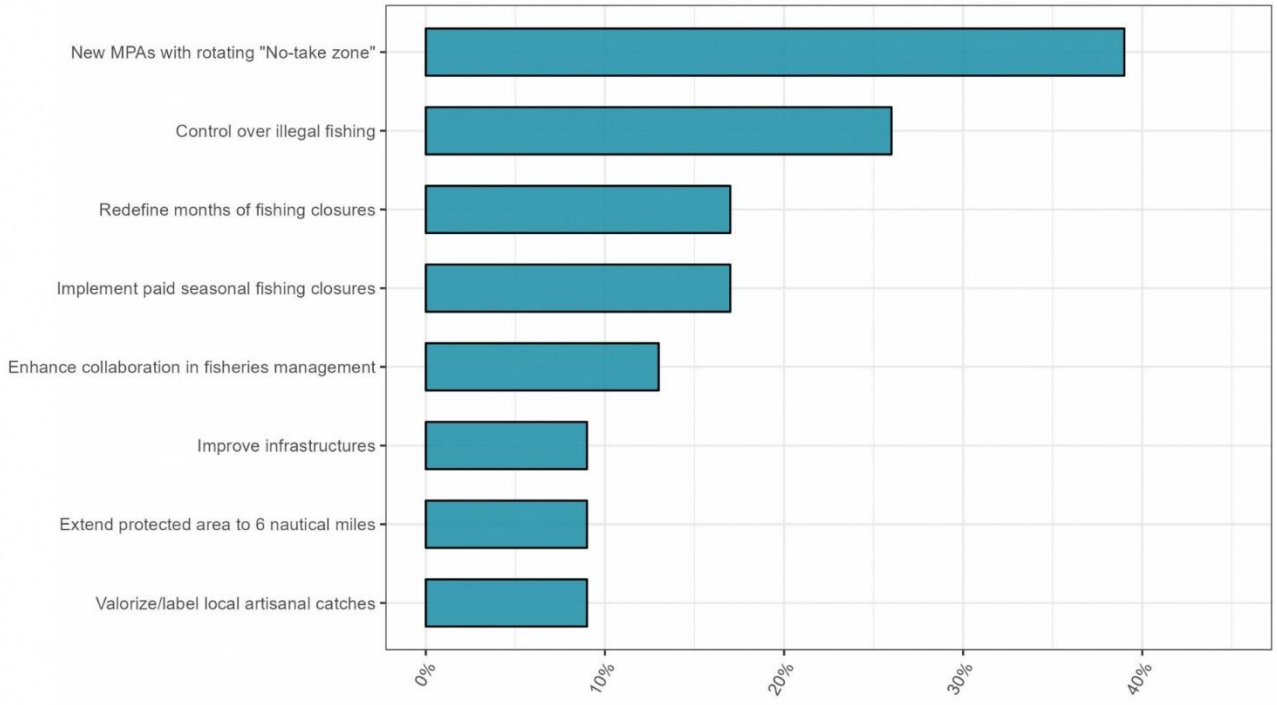
Variazione mensile nei mestieri utilizzati da pescatori artigianali nell'Arcipelago Toscano

Aspetti socio-economici



Numero di giorni di pesca pro capite in vari mesi dell'anno

Aspetti socio-economici



Supporto a proposte per il miglioramento della gestione della piccola pesca da parte dei pescatori nell'Arcipelago Toscano

Opportunità per didattica e formazione

DIPARTIMENTO DI BIOLOGIA -UNIPI

https://www.biologia.unipi.it/pls2018.html

CIRSEC-UNIPI https://cirsec.unipi.it/

Attività 2022/2023

- **Ricercatori in classe**
- **Formazione dei docenti**
- **Progettazione di un giardino scolastico**

Attività 2023/2024 in definizione

Ringraziamenti

DIPARTIMENTO di BIOLOGIA

FutureMARES project https://www.futuremares.eu/ has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869300.