



Assessment of biodiversity metrics for restoration of macroalgal forests

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What do we mean with macroalgal forests? Why are these ecosystems so important?

Mediterranean Macroalgal Forests

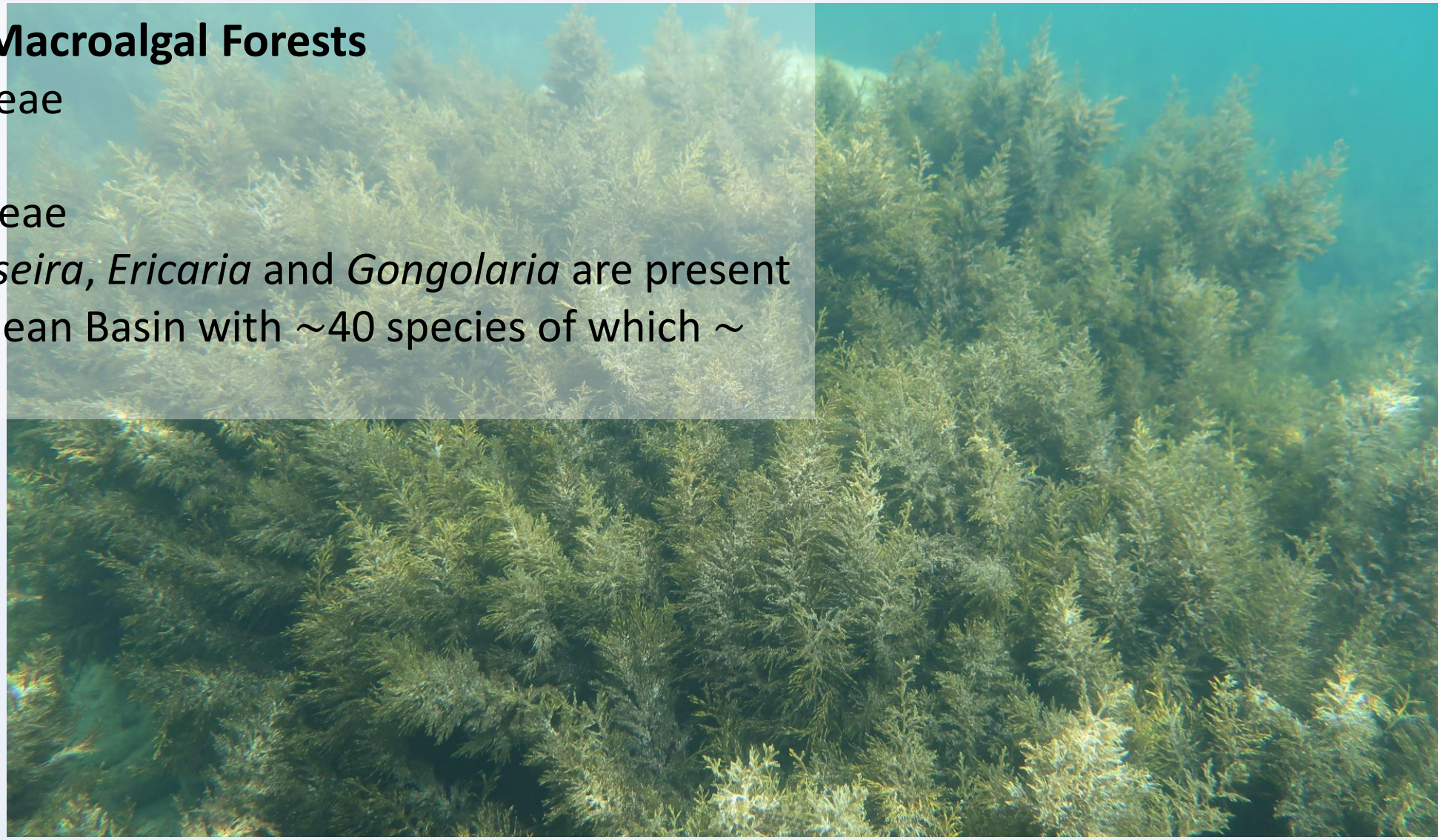
Class: Phaeophyceae

Order: Fucales

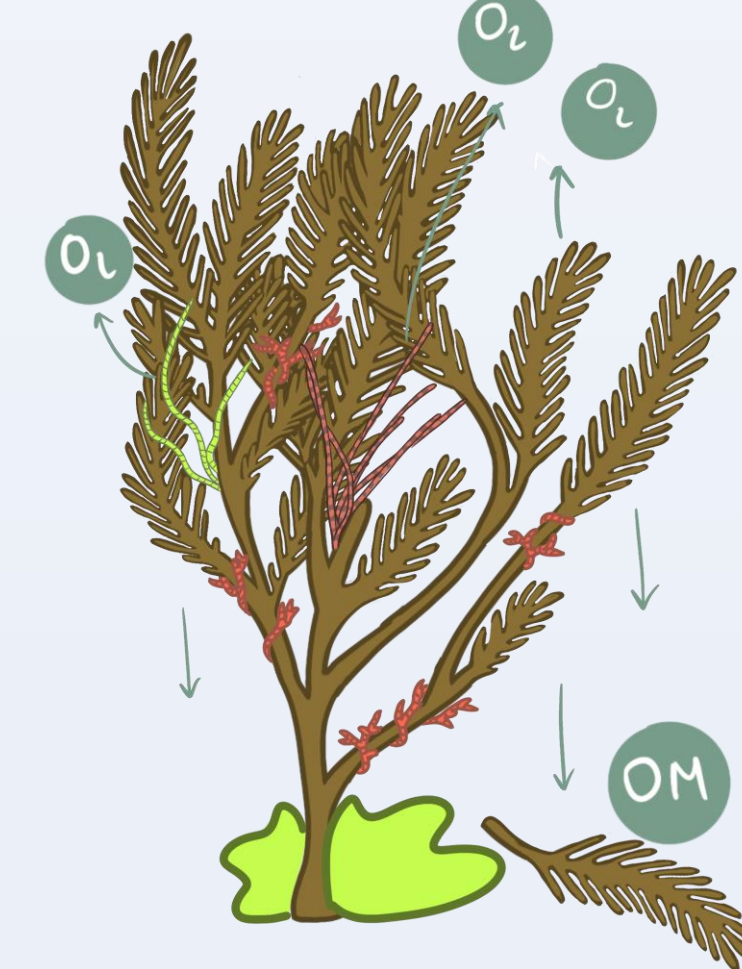
Family: Sargassaceae

The genera *Cystoseira*, *Ericaria* and *Gongolaria* are present in the Mediterranean Basin with ~40 species of which ~20 are endemic.

Gongolaria barbata
(Stackhouse) Kuntze,
Numana (AN),
ph Fabio Rindi



Habitat formers & nursery areas

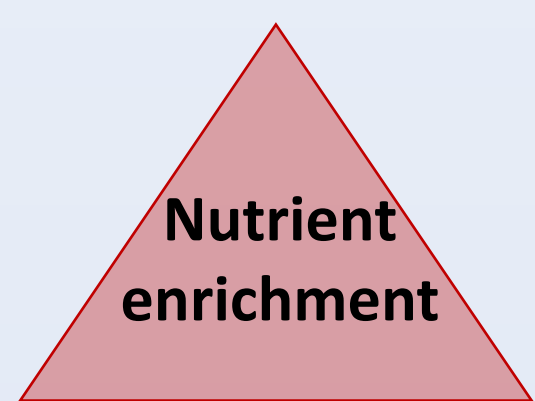


Primary production & OM provision

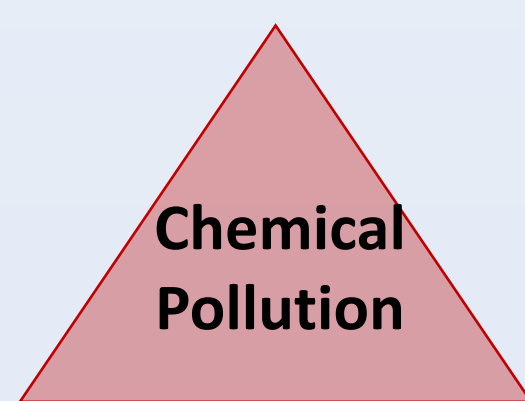


Bioindicators

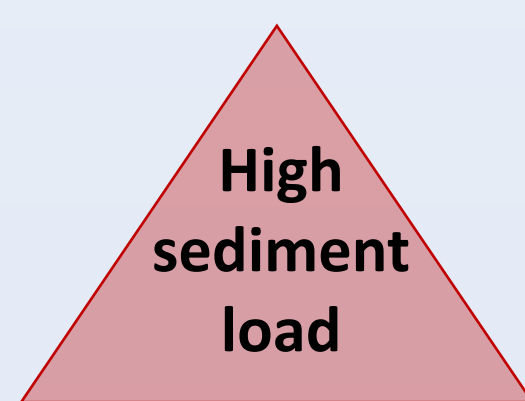
Threats to mediterranean macroalgal forests



Nutrient enrichment



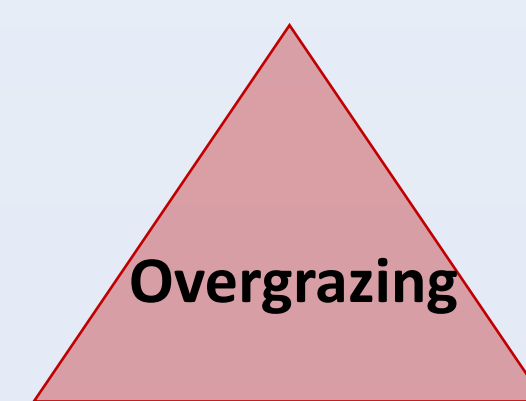
Chemical Pollution



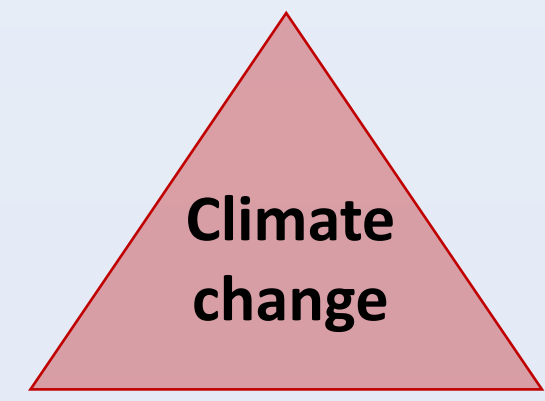
High sediment load



Habitat destruction



Overgrazing



Climate change

Generalized loss of fuclean algae → habitat switch from forests to barrens and turfs

About my PhD project

Assessments of the epiphytic assemblages associated to *Cystoseira s.l.* forest in different conditions of conservation

Identification of **patterns** in species composition and abundances related to the **conservation status** of the forests

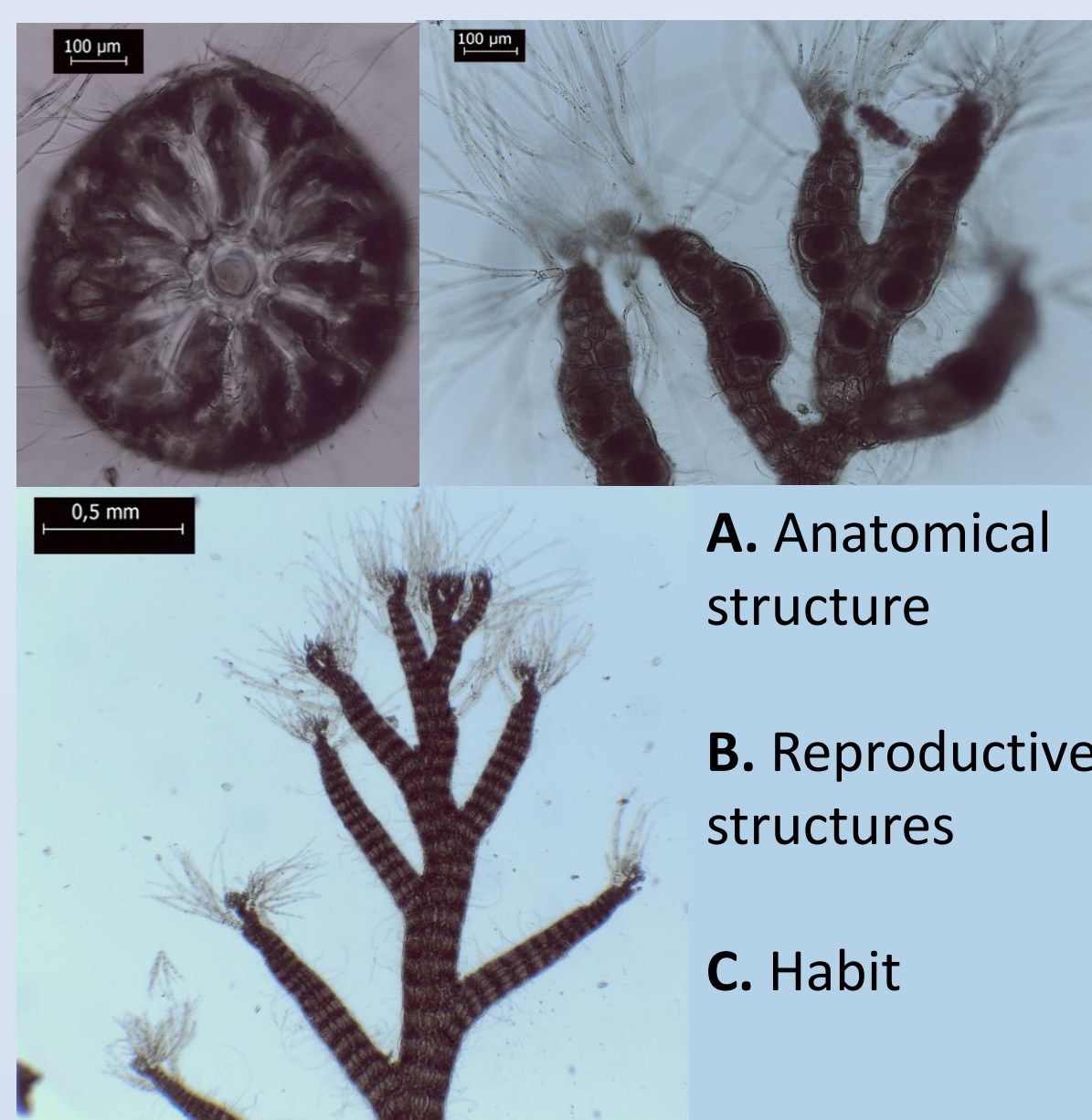
Standardized **indices** to be applied in **conservation** management and **restoration** actions

Nested Sampling: spring-summer 2023 – Conero Riviera (Ancona, Italy)

Material and Methods

Traditional approach

Molecular approach



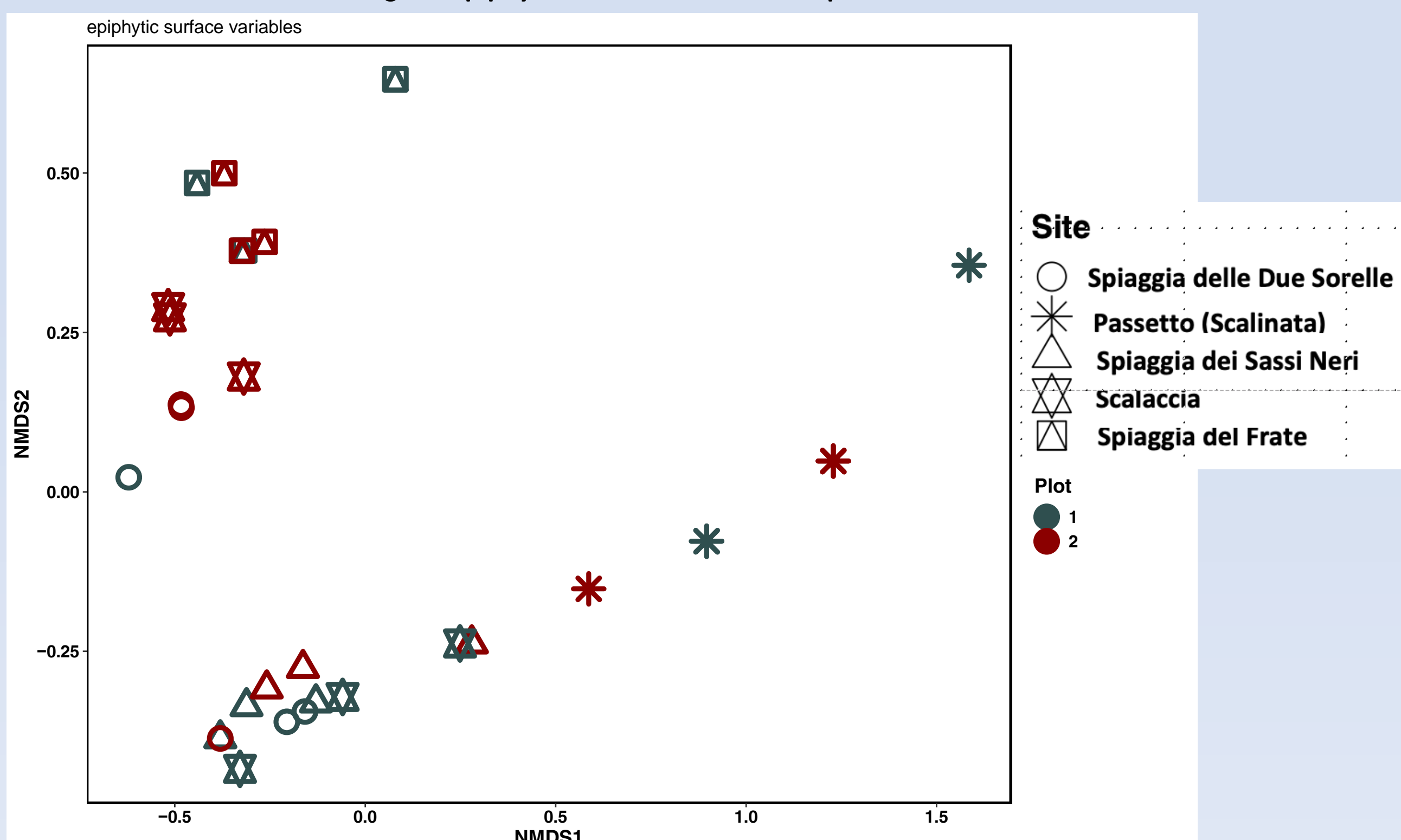
Barcoding analysis from macroalgal tissues with specific primers:

- *tufA* (plastid elongation factor)
- *rbcL* (rubisco large subunit)
- ITS (internal transcribe spacer)
- COX (cytochrome oxidase I)
- *psbA* (photosystem II protein D1)

Metabarcoding analysis from filtered seawater with universal primer 23S (flank Domain V of the 23S plastid rRNA gene).

First Results

NMDS considering the epiphytic abundances and the species richness.



21 species of macroalgal epiphytes on *Gongolaria barbata*

One site (**Scalinata del Passetto**; wave exposed, urbanized, hosting a highly fragmented *G. barbata* population with a different phenology) clearly **separated** from the other sites.

No major **differences** in the epiphytic vegetation among sites that can be **clearly related** to the conservation status of the macroalgal forests.

Extended investigations on populations of *Gongolaria barbata* from **other Mediterranean sites** are ongoing and will clarify if this pattern is consistent in time and space.

DNA barcoding analysis so far **confirming** the presence of species identified with **traditional methods** and **unraveling** the presence of **cryptic species**: *Ulva lacinulata* & *Ulva rigida*, *Vertebrata fruticulosa* & *Vertebrata martensiana*, *Corallina berteroi*.