

Ecological status of the macrozoobenthic community in the Marano and Grado Lagoon (northern Adriatic Sea): past and present

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Macrozoobenthos monitoring

Macrozoobenthos is considered as a biological element to assess the ecological quality status in transitional ecosystems



Since 2008 a monitoring program was established for the macrozoobenthic community in the Marano and Grado Lagoon as Biological Quality Element, according to the Water Framework Directive (WFD 2000/60/CE)

The first extensive study on macrozoobenthos in Lagoon was conducted from 1993 to 1995



Considering the same sampling and analysis methodologies applied in both studies
The goal is to compare EcoQS *sensu* WFD between past and present periods

Marano and Grado Lagoon

It belongs to the lagoon-delta system of northern Adriatic Sea and is located between the Isonzo and Tagliamento Rivers (East and West, respectively)

Total surface - 160 km²

Total length - 32 km

Mean width - 5 km

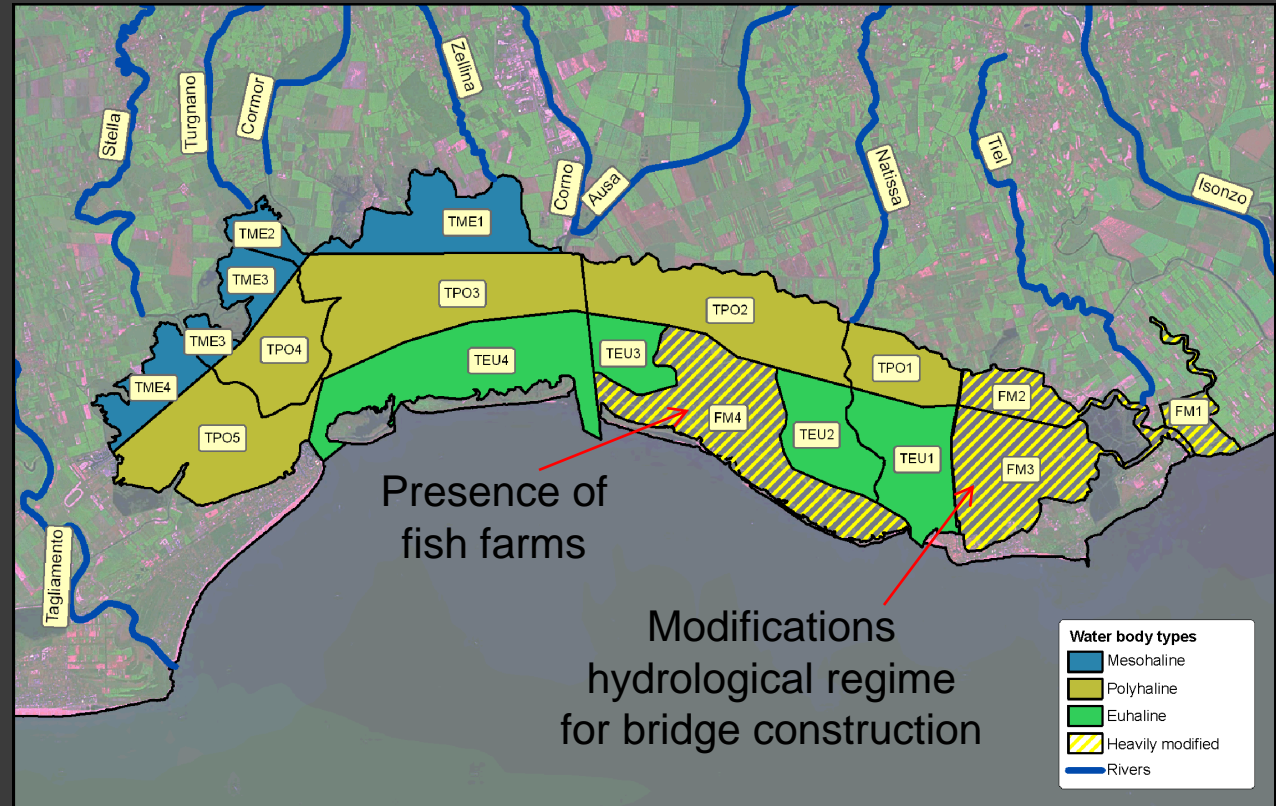
17 water bodies

~~Six lagoon inlets:~~
4 heavily modified

Lignano, S. Andrea, Buso, Morgo, Grado and Primero

Several spring rivers

flow especially in the Marano Lagoon

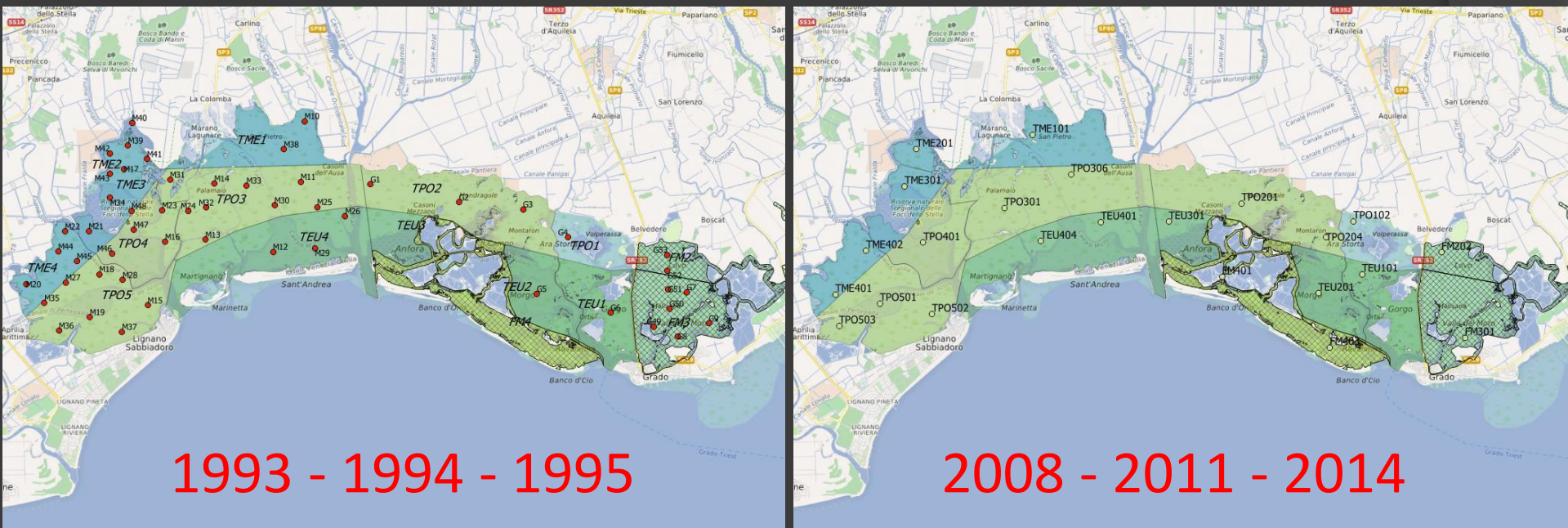


Three water types according to WFD/2000/60/CE and Italian Decree 131/08:

- ✓ Euhaline 30-40
- ✓ Polyhaline 20-30
- ✓ Mesohaline 5-20

Sampling methods/1

- 53 sampling stations in the past three year study
- 23 sampling stations for WFD monitoring program (every three years)



Sampling methods/2

Samples collected using a Van Veen grab
with a sampling area of 0.047m^2



Samples washed on a sieve with a mesh
size of 1 mm and preserved in a solution
of formaldehyde 4% buffered with sea water
and Rose Bengal stain



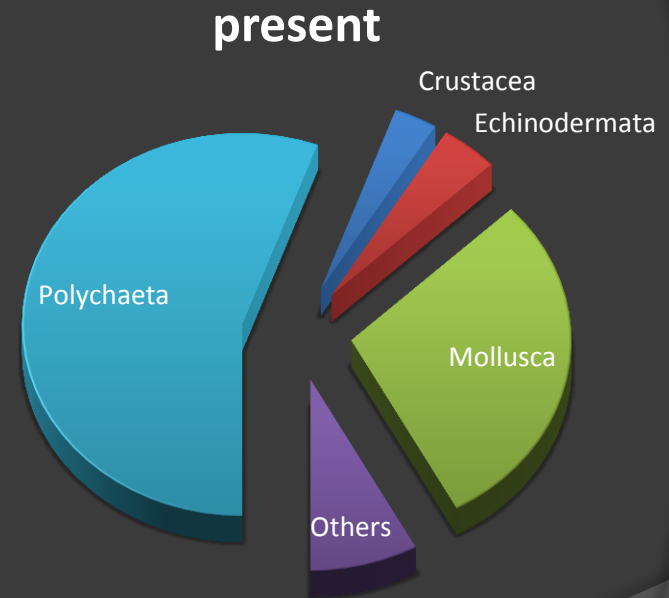
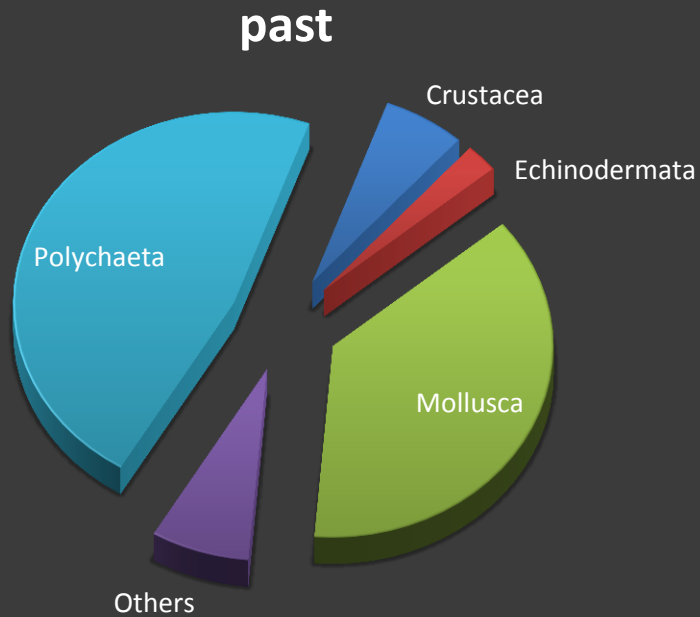
- Sorting - to separate living organisms from detritus
- Identification - to the lowest possible taxonomic level
- EcoQS sensu WFD - for each WB average species richness (S), Shannon-Wiener diversity (H') and the proportion of sensitive/tolerant species (AMBI) were used to calculate M-AMBI (Muxika et al., 2006)

Biocenosis - sensu Pérès & Picard method

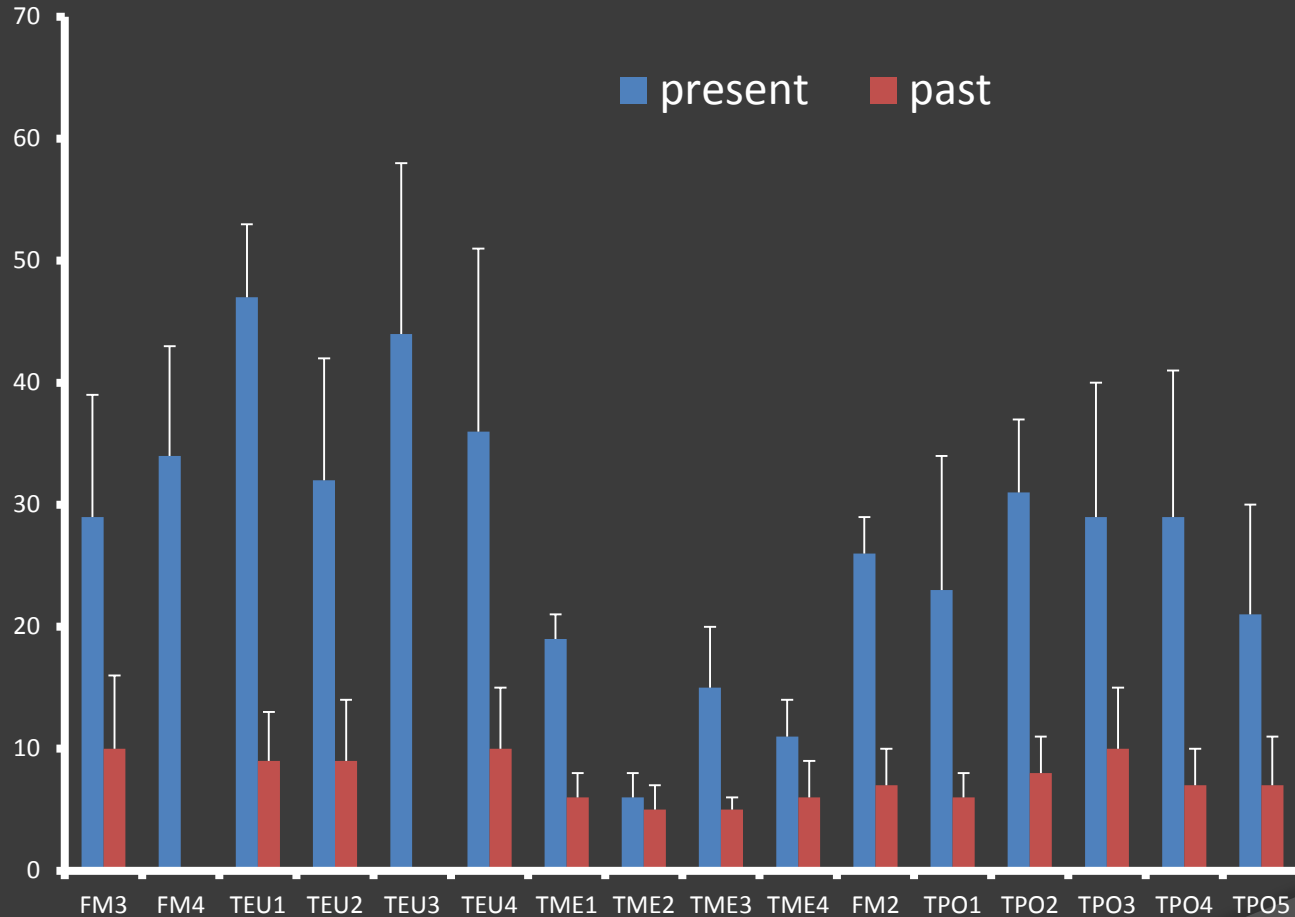
Taxa

Past: 88 taxa in 159 samples

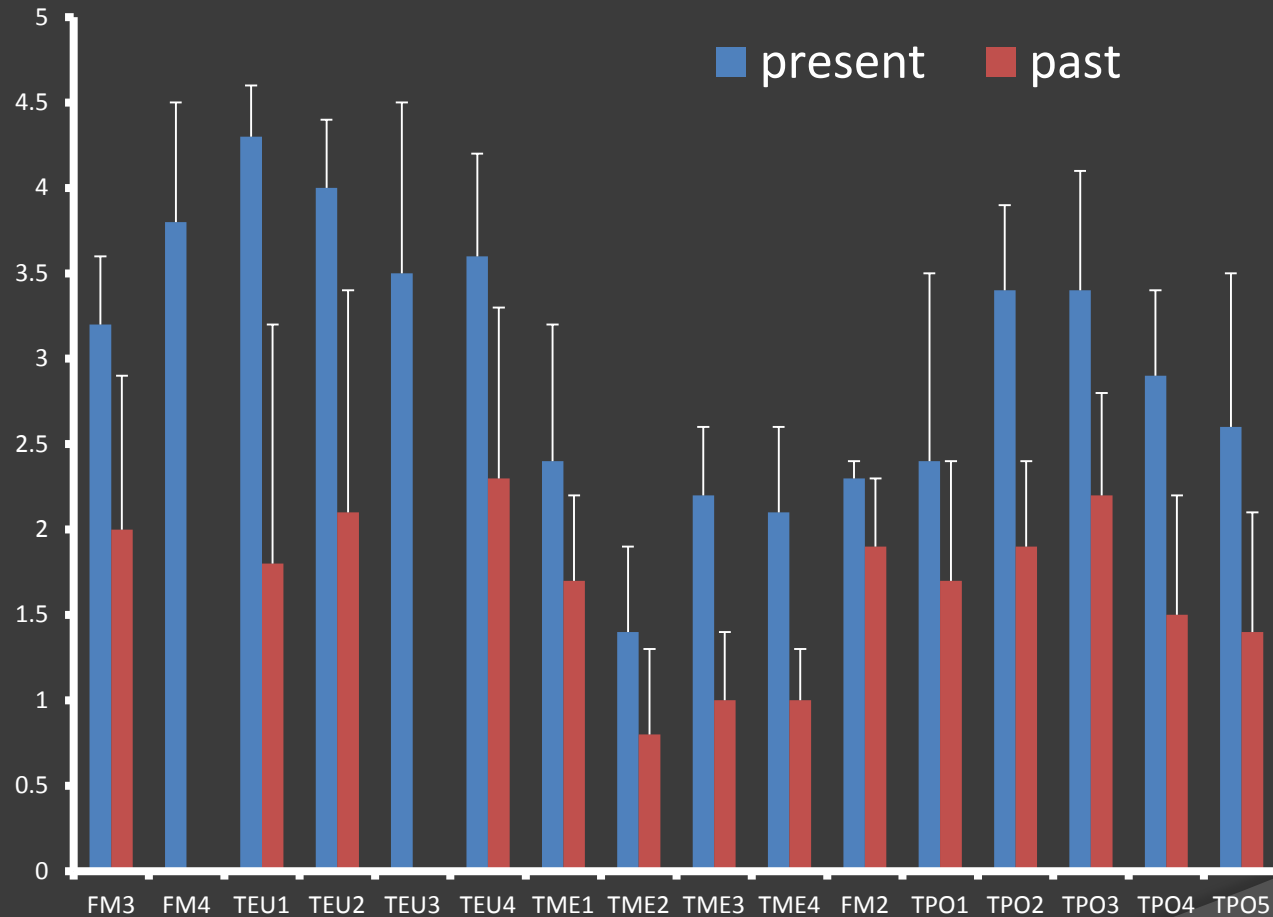
Present: 231 taxa in 65 samples



Number of taxa (S) in WBs



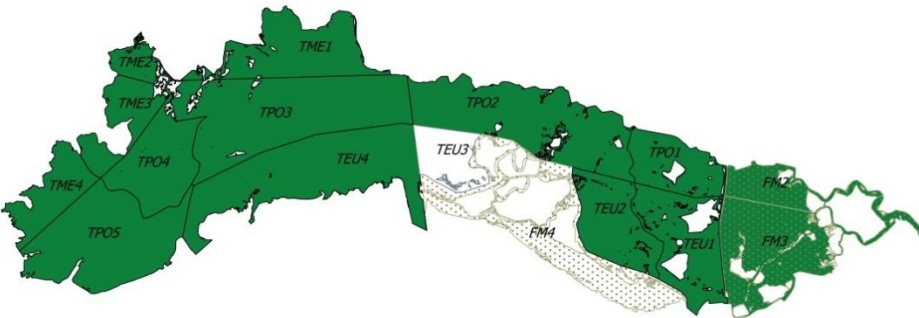
Shannon-Wiener Index (H') in WBs



Proportion of disturbance-sensitive taxa (AMBI index)

Past

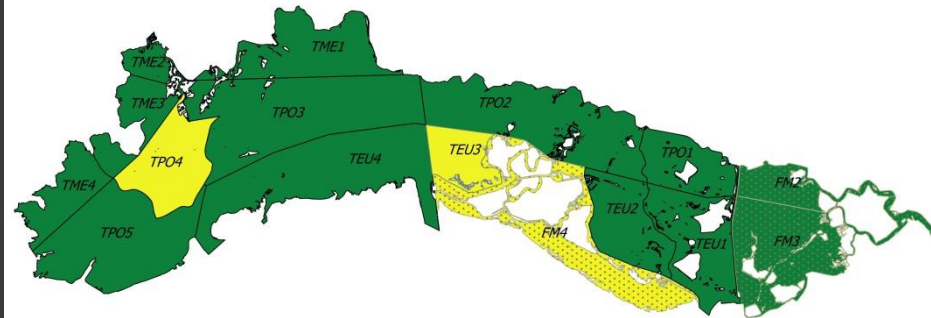
Present



Legenda

- Slightly disturbed
- Moderately disturbed

0 2.5 5 km



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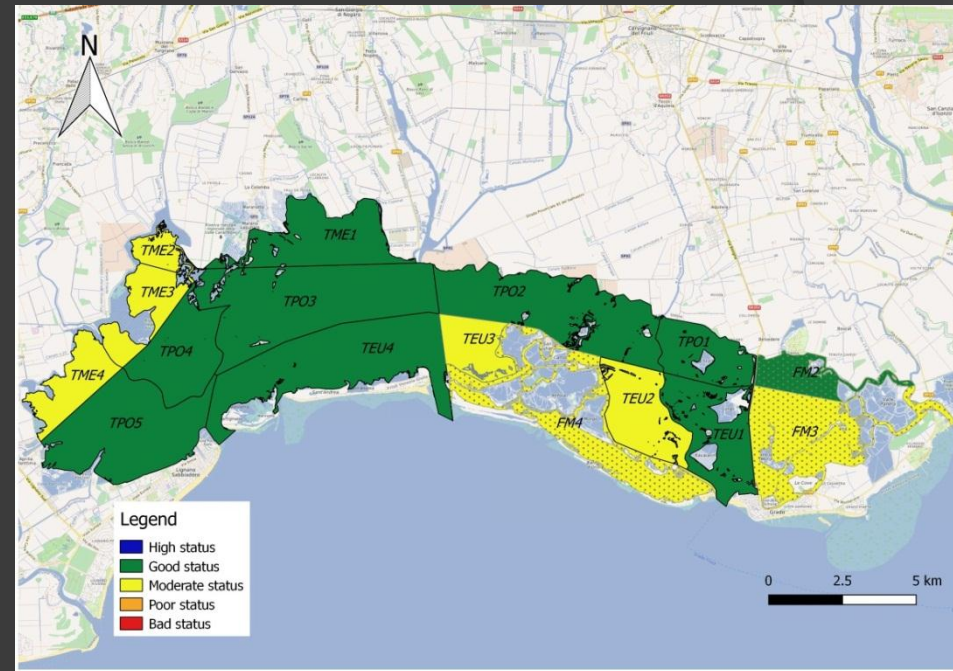
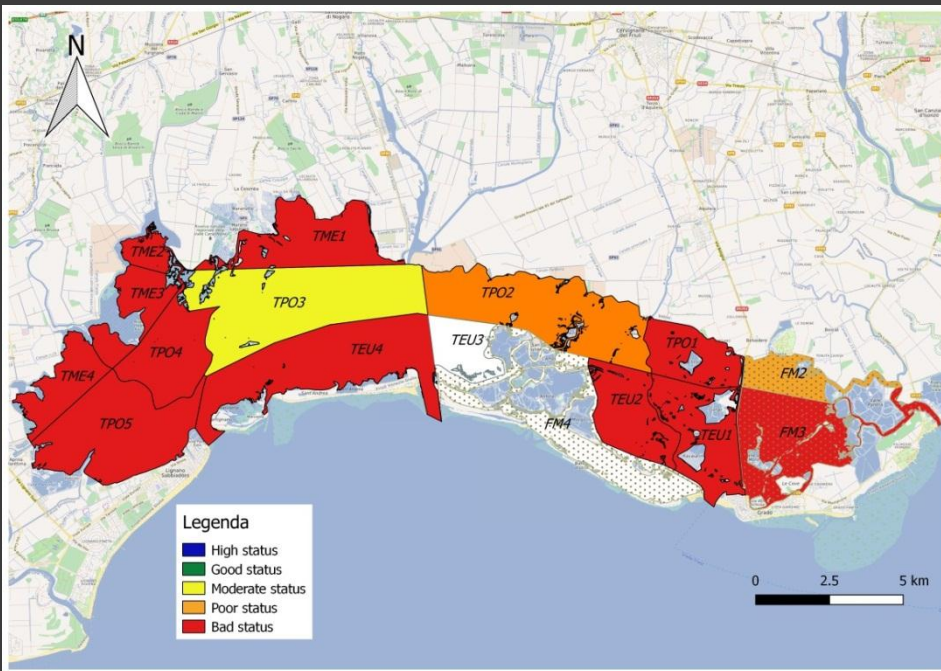
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EcoQS *sensu* WFD

M-AMBI Index

Past

Present



Biocenosis Pérès & Picard

LEE: Euryhaline and Eurythermal Lagoon

MARINE INFRA-LITTORAL BIO-CENOSIS

SFBC: Fine Well-Sorted Sand

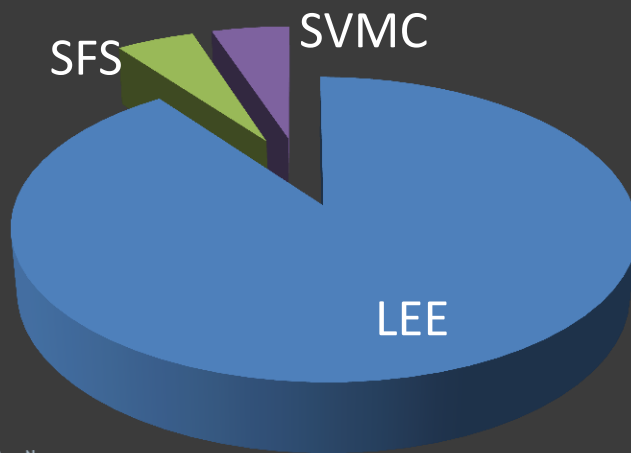
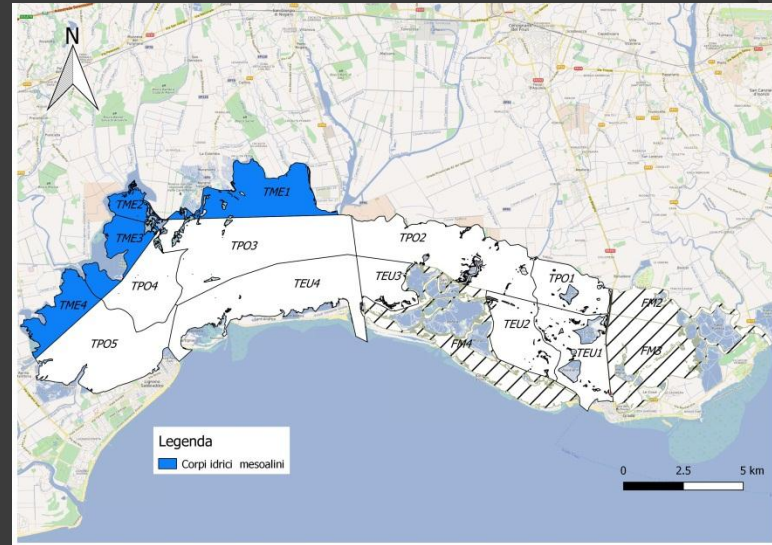
SFS: Fine Surficial Sand

SVMC: Surficial Muddy Sand in Sheltered Area

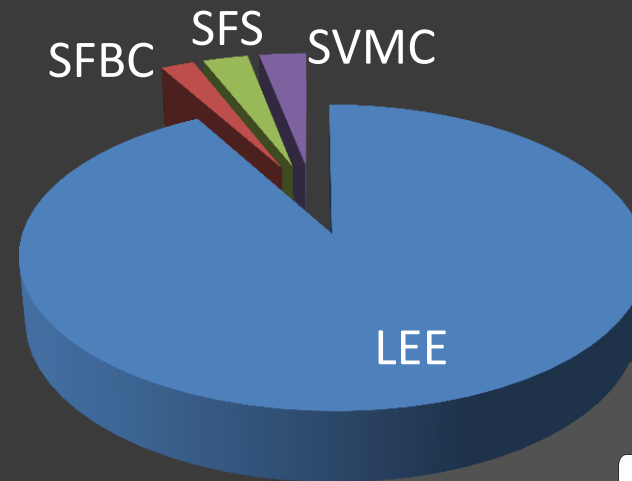
MARINE CIRCA-LITTORAL BIO-CENOSIS

DC: Coastal Detritic Bottom

VTC: Coastal Terrigenous Mud



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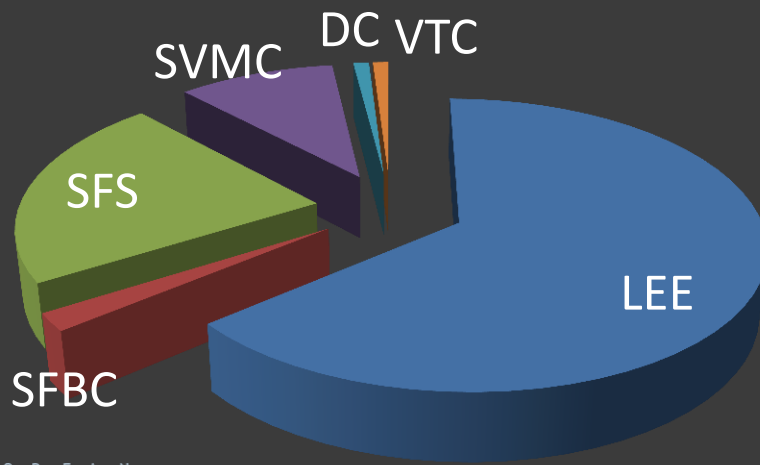
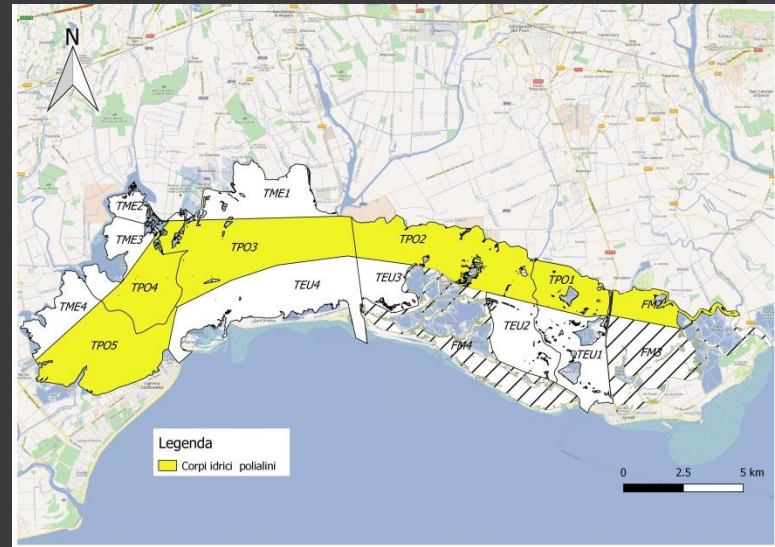
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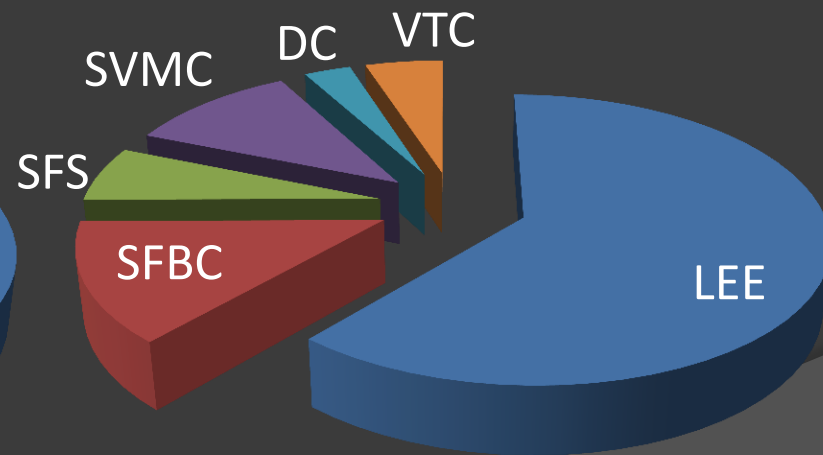
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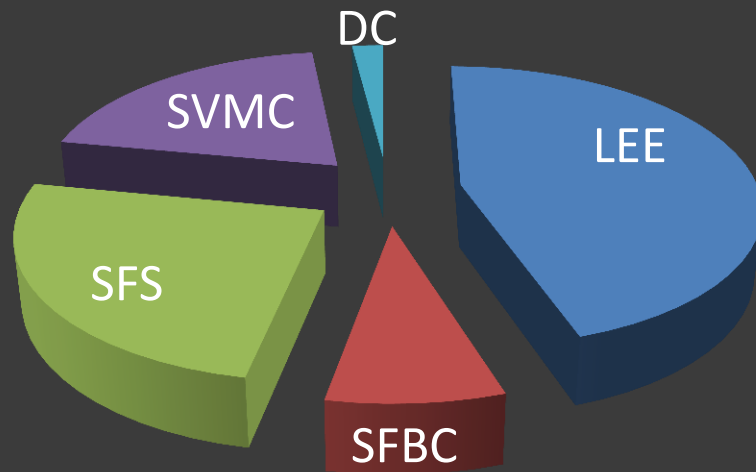
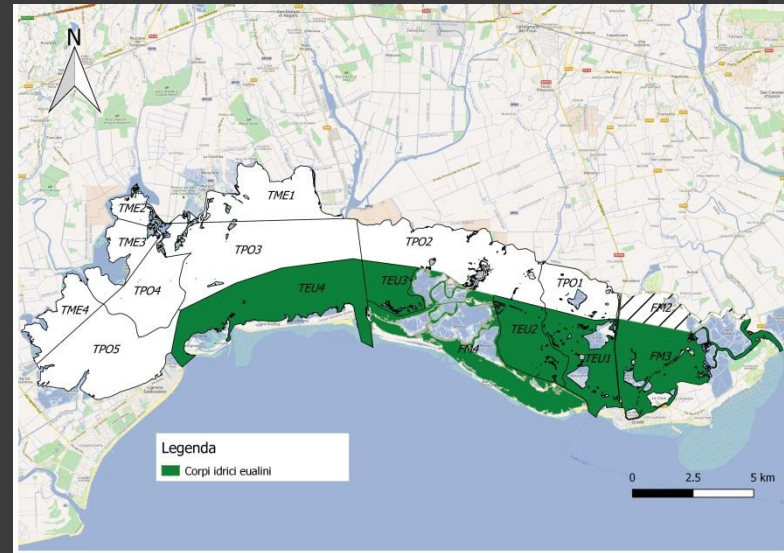
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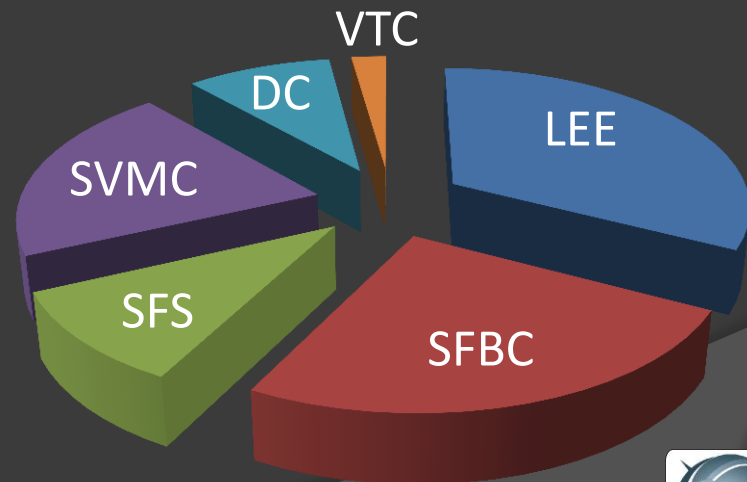
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Past



Present

Final considerations

During the last 20 years the biodiversity and EcoQS increased reaching values comparable to marine WBs, although disturbance degree did not changed substantially

The biocenosis in euhaline WBs seem to lose lagoon characteristics

It could be hypothesized that lagoon «marinization» is the main factor responsible of such modification

An acceleration of sea-level rise occurred during this period, increasing erosion and deepening of tidal flat in northern Adriatic lagoon.

The result is a morphological simplification, evolving the lagoon into marine embayments (Antonioli et al. 2017)

Antonioli et al. (2017) *Sea-level rise and potential drowning of the Italian coastal plains: Flooding risk scenarios for 2100*. Quaternary Science Reviews, 158, 29-43.

**HVALA ZA VAŠO
POZORNOST**

VENEZIA

TRIESTE

PIRAN

THANK YOU FOR THE ATTENTION