# Anthropic disturbance to seabed habitats in the Punta Campanella Marine Protected Area, southern Italy

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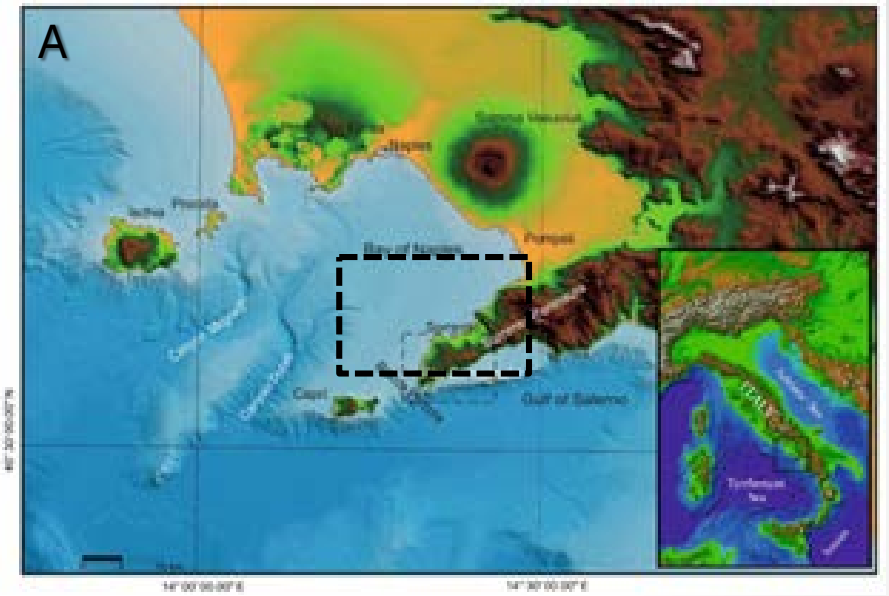
# LOCATION OF THE STUDY AREA AND MAIN GOAL OF THIS WORK

The study area is located at the western end of the Sorrento Peninsula southern Italy (dashed box in A).


It is a sketch o high rocky coast mostly composed of limestones (B) that border the bay of Naples to the south.

The main goal of this study is to investigate the anthropic influence on benthic habitats in the Punta Campanella Marine Protected Area (MPA). To this aim an environmental functional analysis (adapting the one proposed by Cendrero and Fisher in 1997) is going to be applied.

**ASSESSMENT OF ANTHROPIC DISTURBANCE**

**ENVIRONMENTAL STRESSORS DATA**

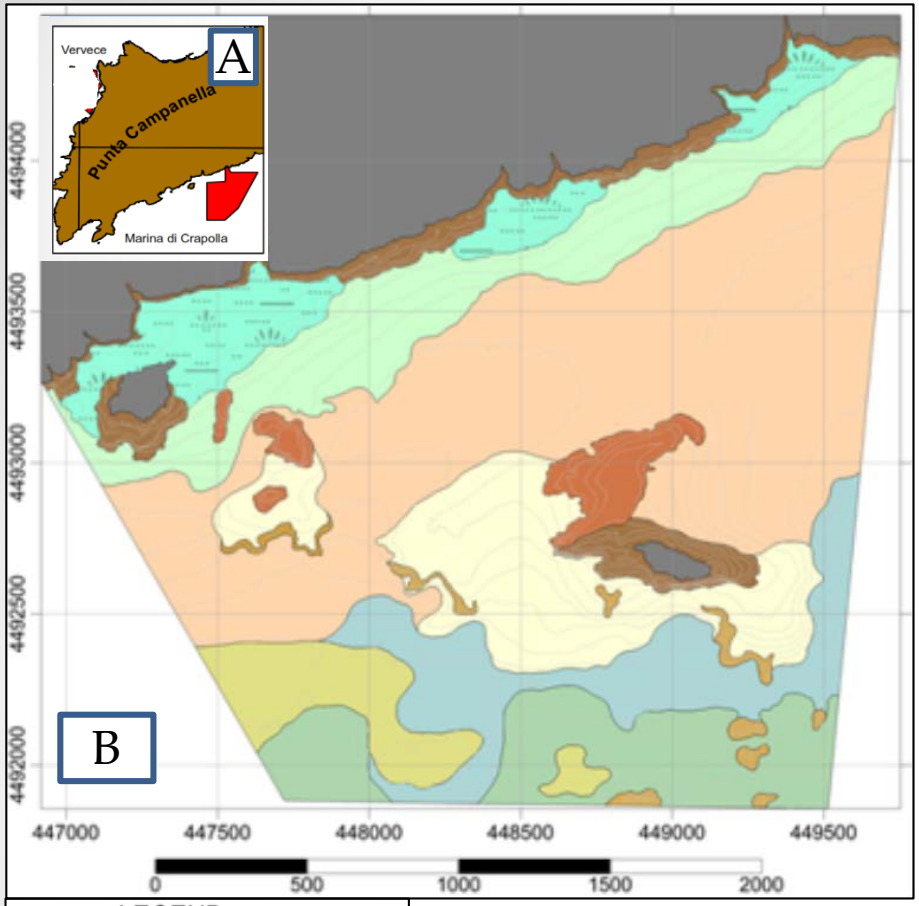
- **Other environmental components**
- **Socio-economic components**

- Seabed habitats and their distribution
- Benthic foraminiferal assemblages (bio-indicators)
- Inorganic pollutants (heavy metals)

It is a work in progress. At present we have characterized the seabed habitats, analysed the foraminiferal assemblages and analysed the inorganic pollutants, mostly heavy metals

# THE SEABED AREAS

Benthic habitats that characterize a selected area of the MPA of ~15 kmq (A) were characterized and mapped (B) on the base of geomorphological features and seabed composition.





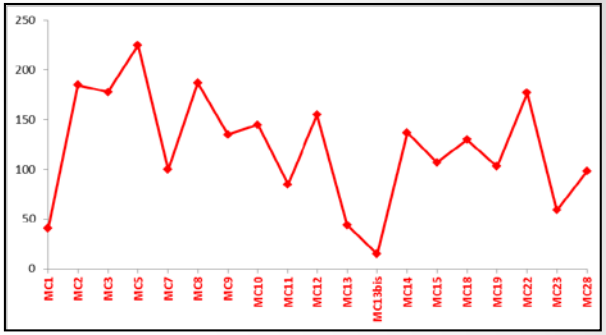
Carbonate buildups on hard substrate (ph Guido Villani)

The investigated seabed show an high morphologic complexity and is dominated by biogenic sediments mostly produced by coralligenous formations that occur as carbonate buildups both on hard (C) and soft substrate as well as carbonate encrustation on near vertical scarps.

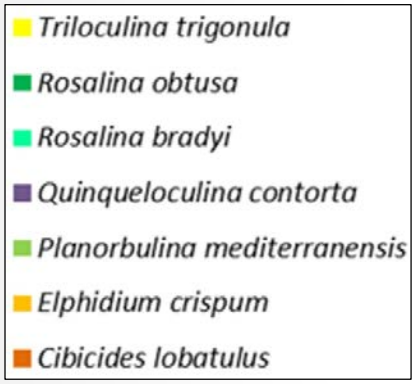
Despites the small areal extension of the selected area, the investigated seafloor shows an high diversity of benthic habitats.

# BENTHIC FORAMINIFERAL ASSEMBLAGES

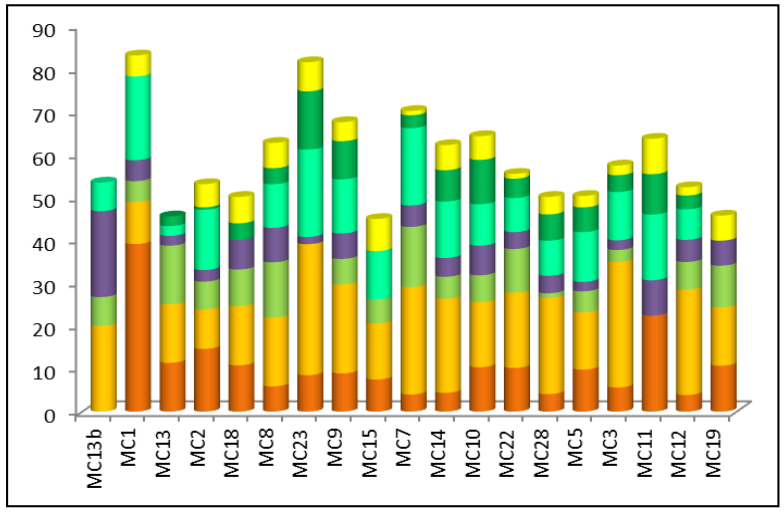
Benthic foraminifera have been used as environmental stress indicators. No living specimens have been found and both the **number of specimens (A)** and the **diversity index (B)** show relatively low values. These data along with the occurrence of a number of **deformed specimens** indicate an environmental stress that well correlates with contaminants concentration.

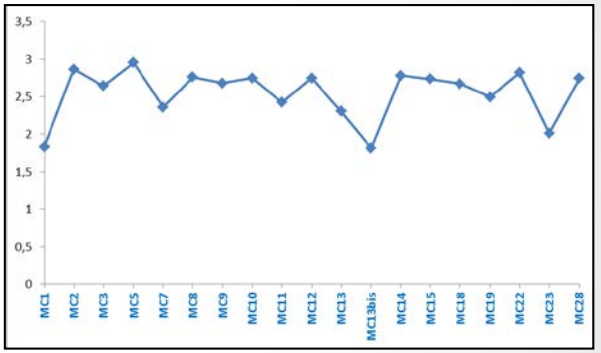



A- Number of specimens



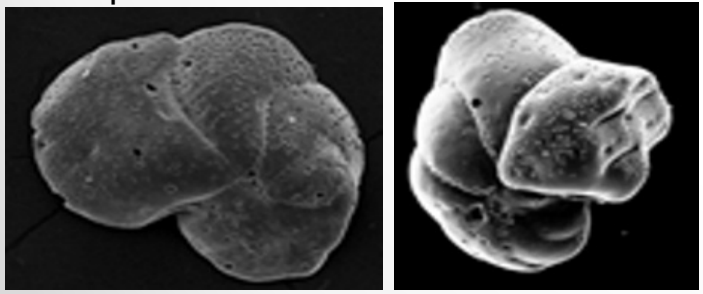

**Foraminifera species**




B - Diversity index

Example of normal vs deformed test



Normal Deformed

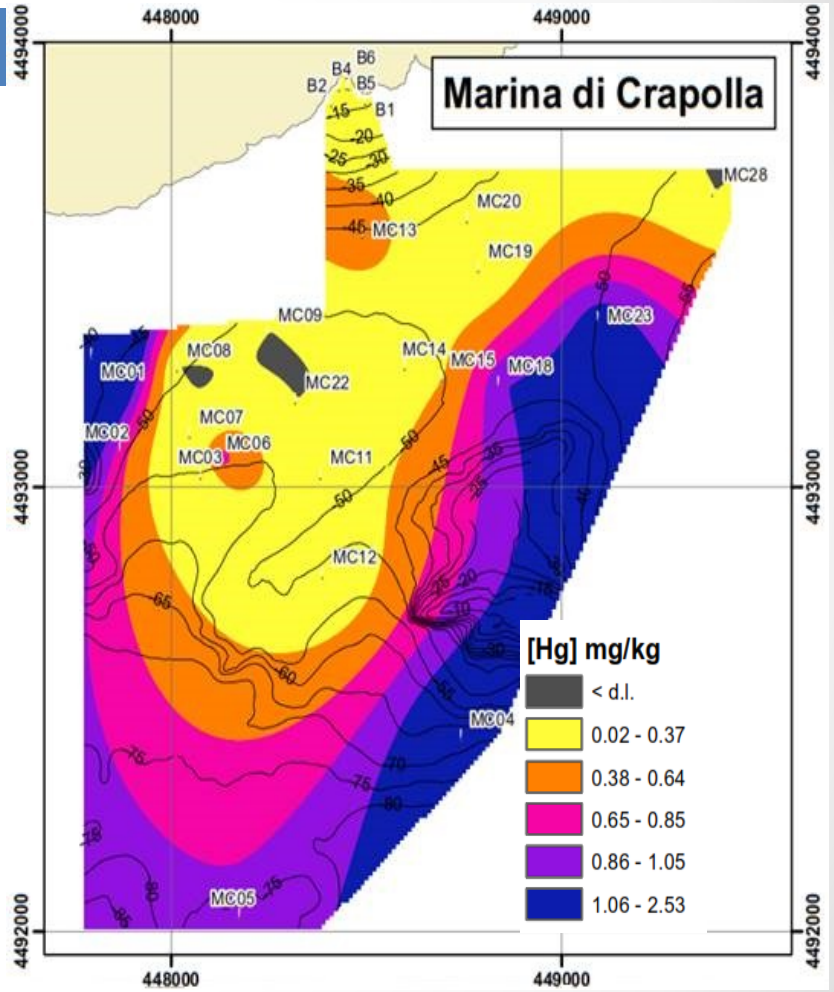
## ENVIRONMENTAL STRESS

- LOW NUMBER OF SPECIMENS
- LOW DIVERSITY
- NO LIVING SPECIMENS
- DEFORMED SPECIMENS

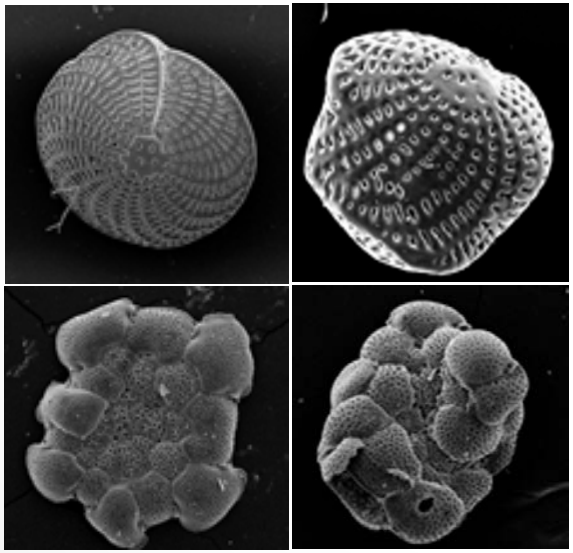
# HEAVY METALS CONCENTRATION

The map shows the distribution at seafloor of the **mercury at Marina di Crapolla marine study area (A)**. Max values are reported in blue and correspond to the seafloor areas characterized by the occurrence of **deformed foraminifera (B).**

A




B



Normal Deformed

# FIRST RESULTS

1) Anomalous values of specific heavy metals (Ni, Hg) in the marine sediments
2) Presence of benthic foraminiferal assemblages distinctive of human-impacted environmental conditions
3) Occurrence of morphological deformities affecting some foraminiferal species.

# FUTURE WORK

As next step of this study, we are applying a methodology based on the **Environmental Functional Analysis (EFA)** in order to combine and analyze terrestrial and marine environmental components together with territorial data and selected socio-economic components of the coastal zone.

# MAIN INDICATORS SELECTED FOR THE STUDY AREA

In addiction to the previously discussed environmental indicators, several environmental components both marine and terrestrial will be analyzed in order to evaluate the anthropic influence on benthic habitats. Such environmental components include water column features, terrestrial biota, fresh water supply and quality, land use and natural hazard (table A). Moreover, a selection of a socio-economic indicators (table B) be analyzed following Cendrero and Fisher (1997).

A

| Environmental Indicators | |
|---|---|
| Coastal waters | Microbiological Pollution<br>Aesthetic Condition (flooting debris) |
| Marine and terrestrial biota | Biological diversity<br>Species of special interest<br>Vegetation cover |
| Geology | Contaminants<br>Lithological properties<br>Geomorphological units |
| Hazard | Slope instability<br>Flash flood |
| Habitat | Terrestrial Habitats<br>Uniqueness (Geosites)<br>Marine Habitats<br>Ecological value |

B

| Socio-economic Indicators |
|---|
| Land use |
| Population density |
| Cultural historic interest |
| Parking |
| Hotel and resturants |
| Accessibility |
| Perception of the environmental quality |
| Public recreation facilities |

# ENVIRONMENTAL FUNCTION ANALISYS (EFA)

The EFA methodology includes four main steps. First the identification of the boundaries of the study area mainly on geomorphological basis. Second the selection of indicators both environmental and socio-economic In the third step (scoring) it will be assigned a score (from 1 to 3) to both type of indicators and after a normalization a value between 0 and 1 will be obtained. In the last step the obtained values are used to define a matrix composed of three main fields in which the study area may fall: the conservation field with high potential for conservation, the development field with high development potential and in between in these two main fields a conflict field.

**#1 STUDY AREA BOUNDARIES**

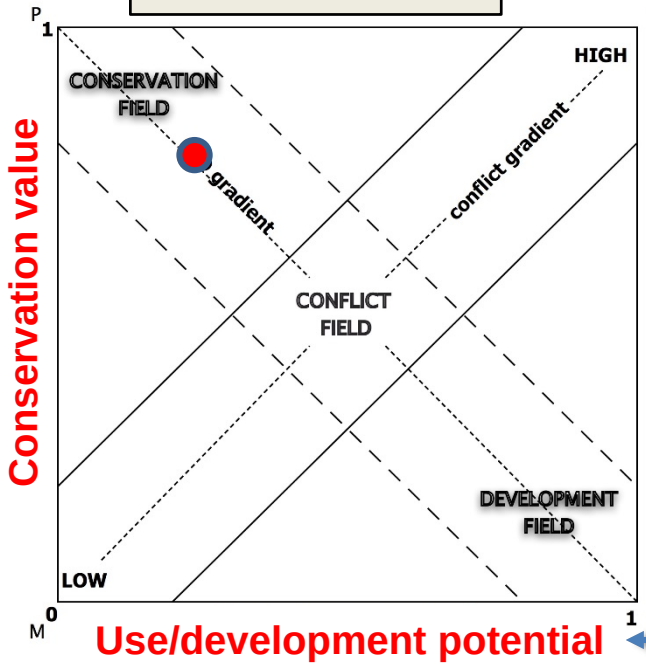
**#2 INDICATORS SELECTION**
(from literature and collected field data)

**Environmental Indicators**

**#3 SCORING**

NORMALIZATION *(0-1)*

**#4 EFA MATRIX**




The red dot shows a possible classification of the study area.

**Socio-economic Indicators**

**#3 SCORING**

NORMALIZATION *(0-1)*