Soft-bottom macrobenthos monitoring in the framework on the STARE-CAPMED program

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Introduction

STARE-CAPMED (STAtion of Reference and rEsearch on Change of local and global Anthropogenic Pressures on Mediterranean Ecosystems Drifts) is a long term monitoring program which notably studies soft-bottom macrobenthos. It aims to 1) differentiate local from global anthropogenic influences (eg. climate changes) and 2) improve the understanding of anthropogenic influences on the functioning of the Calvi bay coastal ecosystems.

We used soft-bottom macrobenthos as bioindicator of environmental quality. Taxonomic sufficiency was tested to facilitate analyses.

Material and methods

In Calvi Bay, samples were taken on 12 places following 4 gradients of potential anthropogenic pressures (Fig. 1). Sediment was taken for macrobenthic and sediment analyses. Samples characteristics (S, H', J'), similarity were calculated. Common indexes (AMBI, M-AMBI, W-statistic index) were also computed to qualify the macrobenthic assemblage and indirectly identify the ecological quality of station.
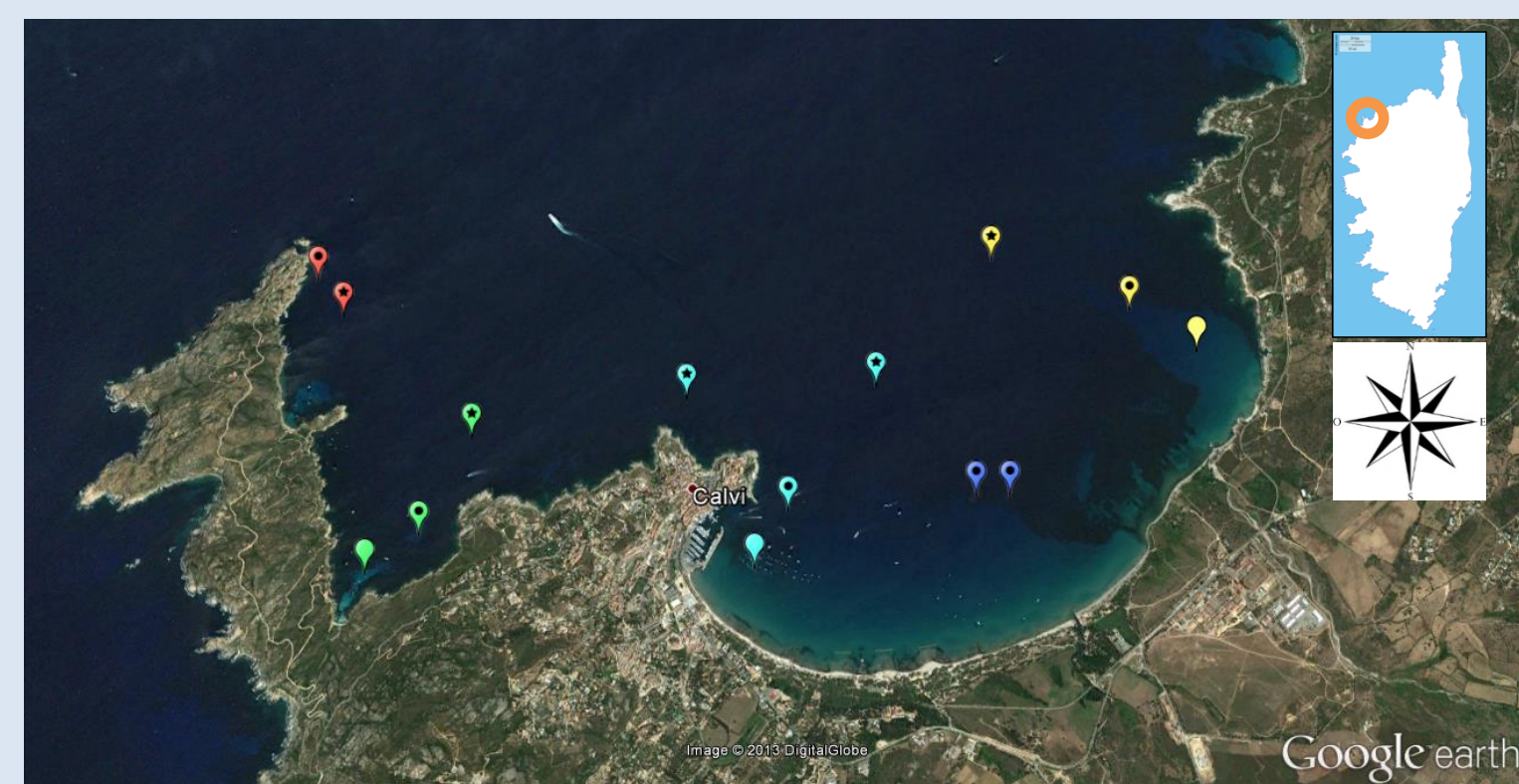

Fig. 1: Study area, Calvi Bay with sampled places along gradients. Yellow: River Mouth; Blue: Fish farm; Turquoise: Urban area; Light green: Free boat anchoring; Red: Unimpacted

Results

In May 2011, a total of 5852 individuals, belonging to 367 taxa were identified. In September 2012, a total of 4622 individuals, belonging to 342 taxa were identified. Polychaeta were the main taxa (67% in 2011 and 69% in 2012).
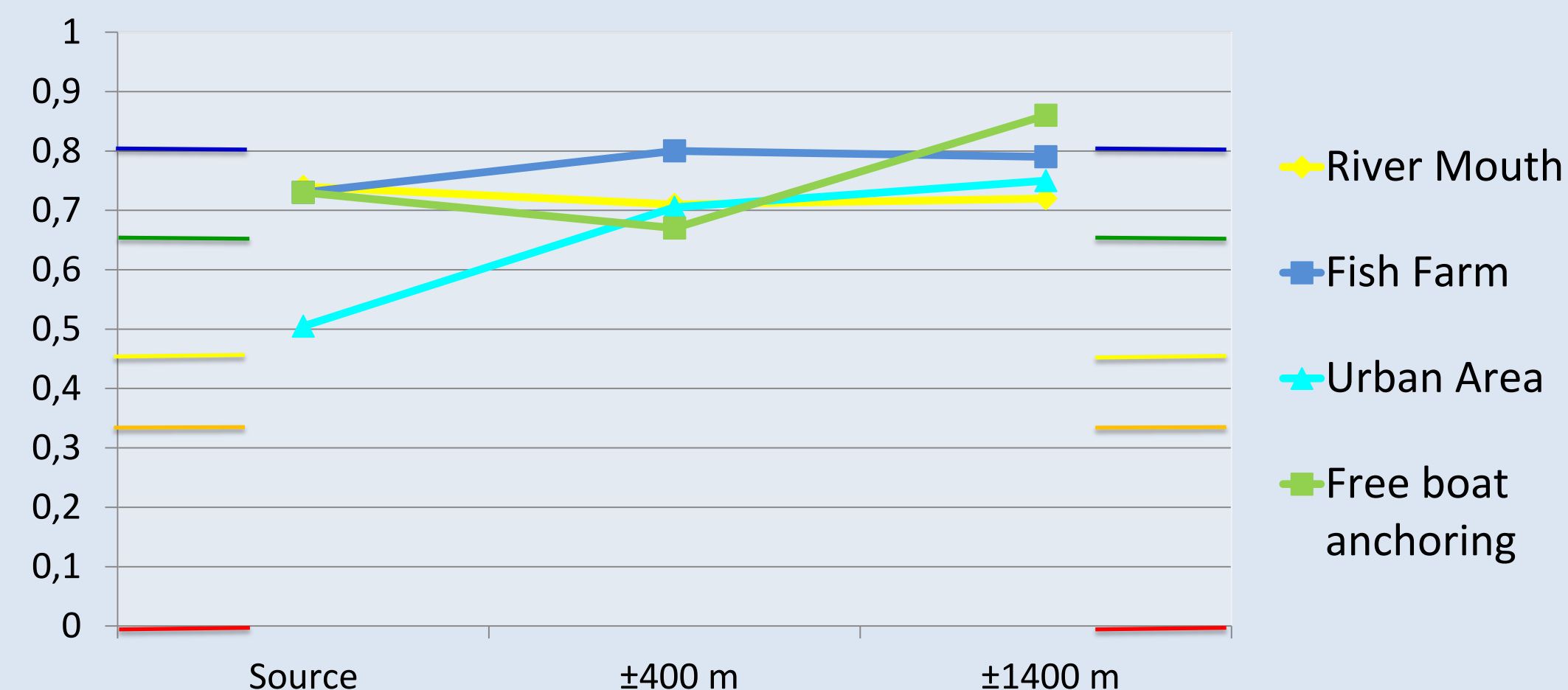

Fig. 2: mean M-AMBI value at different distances from the source of anthropogenic influence. It was calculated using Corsican references for type of habitat in AMBI, S, H'.

Graphic sides color scales represent levels of environmental quality: Red: Bad; Orange: Poor; Yellow: Moderate; Green: Good; Blue: Excellent

In Calvi Bay, humans activities have different influences on macrobenthic assemblages and on the ecological quality (Fig. 2):

- no influence of the river mouth,
- increase of the ecological quality with increasing distance from the fish farm and from the urban area,
- for the free boat anchoring gradient, the perturbation is the highest at the intermediate distance where largest boats anchor.
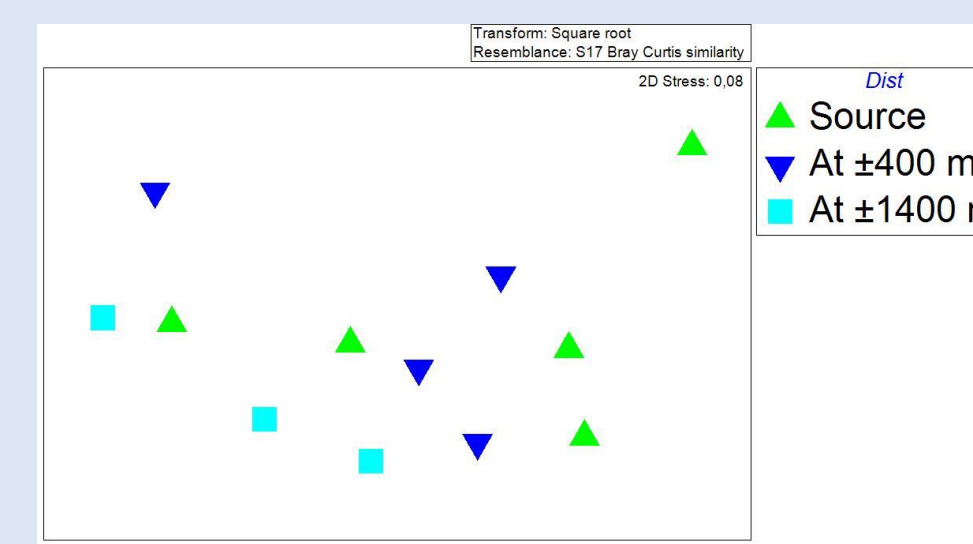

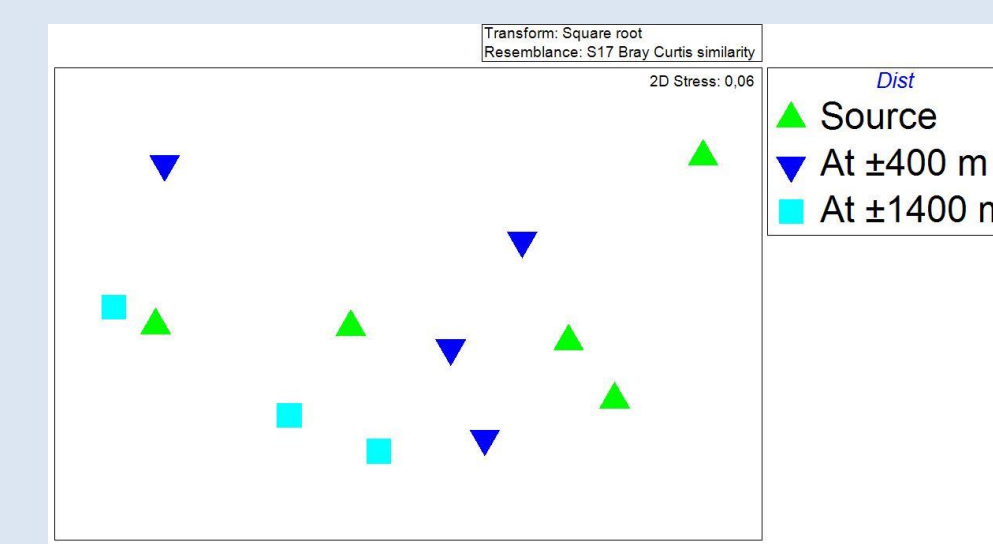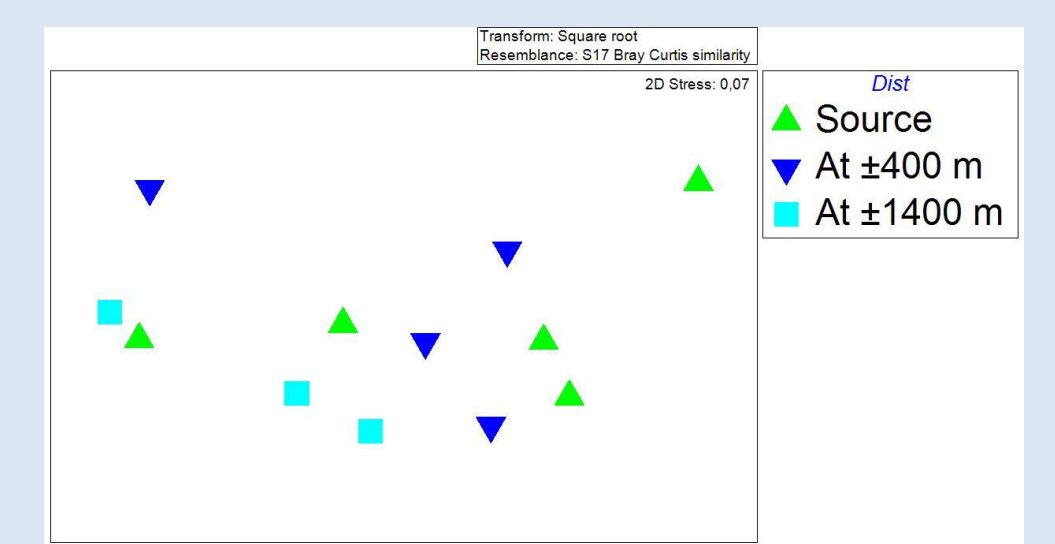Fig. 3: MDS at species level

Fig. 4: MDS at genus level

Fig. 5: MDS at family level

MDS realized at different taxonomic levels (Fig. 3, 4, 5) show the same patterns of assemblage. Now, for the Calvi bay, it will be interesting to adapt commonly used indexes for an utilization at higher taxonomical level.

Conclusion

In Calvi bay, ecological quality is moderate to excellent. Despite of variations of origins of human influences, the bay is recognized as lowly anthropized. Nevertheless, modifications on macrobenthic assemblages are highlighted.

In the case of low anthropization, family level identification seems promising. Adaptation of common indexes by using this higher taxonomic level will reduce analyses time and allow this technique to be used by less specialized people.