National Council of Research
Institute of **Ecosystem Study**

INHABIT Project: lake hydromorphology and BQE variability

DETERMINING THE DEGREE OF MODIFICATION OF LAKE HYDROMORPHOLOGY: THIRD WORKSHOP ON DEVELOPING A CEN GUIDANCE STANDARD

Natural England, Peterborough, UK
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LIFE08 ENV/IT/000413 INHABIT

The project aims at integrating information on local hydro-morphological features into practical measures to improve the reliability of implementation of WFD River Basin Management Plans (RBMPs) in South Europe.

The focus of this presentation is on lakes located in the Alpine and the Mediterranean Ecoregions, covering a wide range of environmental features and water body types.

Relation between hydromorphology and BQE

We investigated the relationships between macrophytes, macroinvertebrates, fishes and hydromorphology considering:

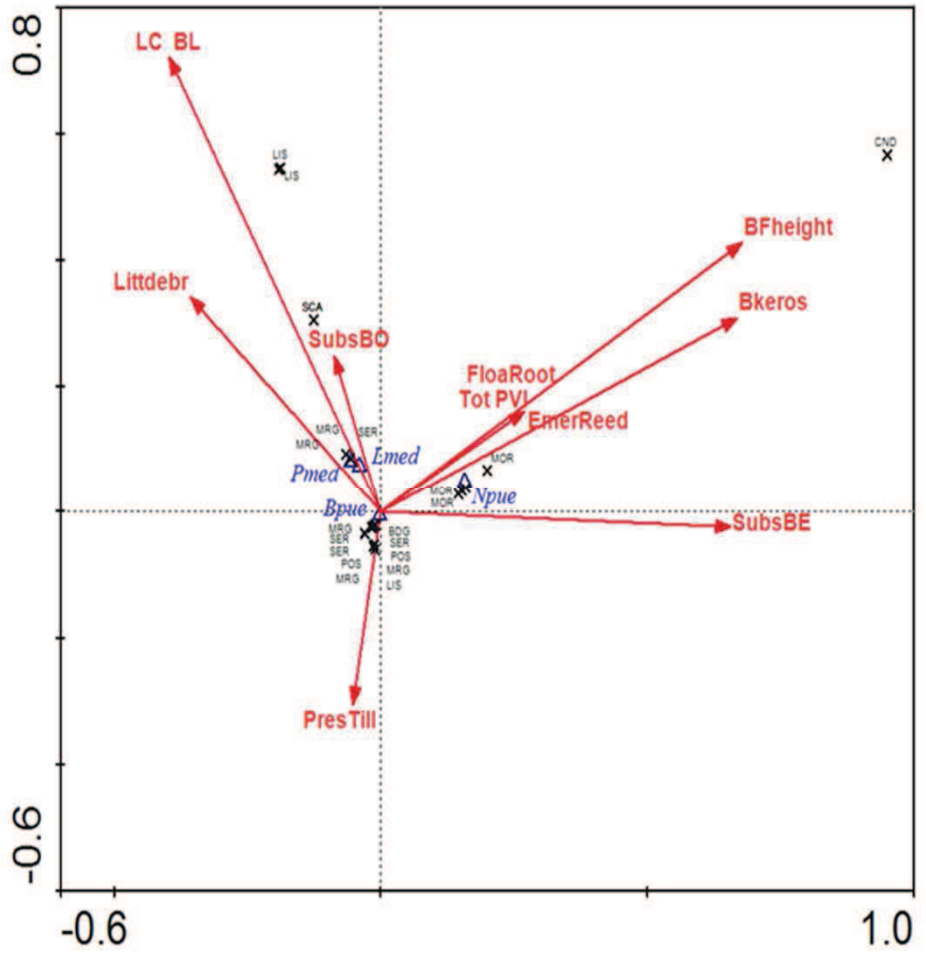
- the characteristics of the littoral and sub-littoral substrata;
- the bank characteristics with or without artificial elements;
- the fluctuation level;
- the lake and riparian human activities as camping and water sports.

Fish fauna

- Up to date are available data relative to 8 lakes/reservoirs
- The analysis was performed choosing electrofishing points or nets located close to the hab-plots where hydromorphological characteristics of the riparian zone were estimated.
- We investigated the relationship between hydromorphological parameters and:
  - (1) number of species caught with nets;
  - (2) number of species caught with electrofishing;
  - (3) species abundances;
  - (4) fish weight;
  - (5) fish length.

Fish fauna

- The number of collected fishes was more representative of hydromorphological condition than others parameters.
- With this limited dataset the relationships between fish fauna and chemical and physical variables seems stronger than the relationships with hydromorphological features.
- A mild correlation exists among total abundance *vs* type of substratum, erosion, height of the bank, and submerged vegetation (evaluated as Total PVI).
- At present, for lakes classification that consider hydromophological parameters, number of fishes (Npue) it seems more reliable parameters.



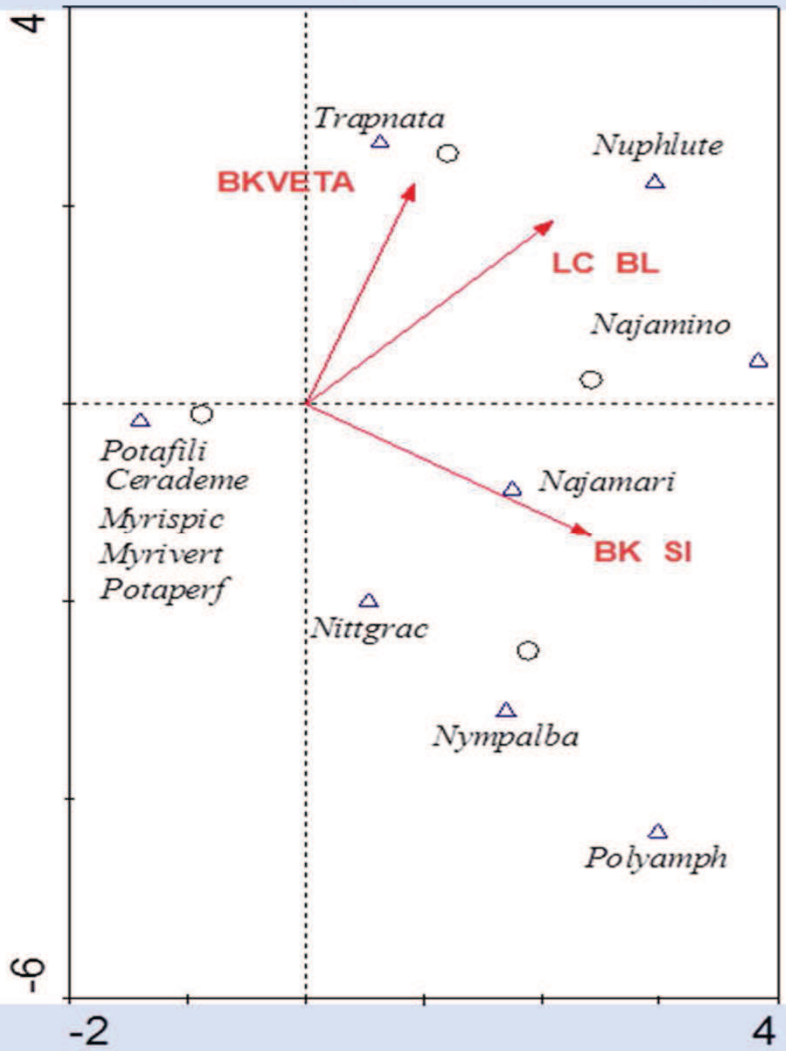
Macrophytes

- Numerical analysis was based on data collected only on natural lakes in Piedmont (5) where macrophytes were present.
- Macrophytes were sampled along transects close to LHS habplots, using a geographical information system, and considering the extension of the macrophyte sampling sites.
- The relationships between the hydromorphological parameters and the macrophyte assemblages was investigated using CCA multivariate analysis, and macrophytes relative abundances.

Macrophytes

- The macrophyte community was influenced by type of substrata, and land use on the shore and the surrounding areas.
- The first and the second axis explain 26.8% of the total variance with
  - presence of trees (broad leaved) on the shore (LCBL);
  - Vegetated (BKVETA);
  - and silty bank (BKSI)

  as significative variables.
- In conclusion, hydromorphology do not influence lake classification, but a large number of transects it's necessary.



Macroinvertebrates

- Analyses were based only on Lake Viverone where three transects were placed in correspondence with LHS habplots and sampling was performed twice per year.
- The analyses were run through Canonical Correspondence Analysis (CCA) considering macroinvertebrates relative abundances, LHS characteristics, and the Benthic Quality Index to evaluate if the anthropogenic pressures may have an influence on the benthic community.

Macroinvertebrates

- Results showed that natural stations are well separated from modified ones, significantly affected by anthropogenic impact.
- One of the critical point is that a more detailed sampling of the littoral is necessary to better evaluate the lake quality, avoiding stations close to inflows because of their contribution to lake biodiversity.

Strong littoral modification