Conservation and Sustainable Use of Biodiversity at Lakes Prespa, Ohrid and Shkodra/Skadar (CSBL)

Assessement of macrozoobenthos in Prespa Lake (Albania)

Content

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Aim of the investigation

- ***Analyze the species composition and abundance of the macrozoobenthic community (benthic macroinvertebrates) in the Albanian part of Macro Prespa Lake.***
- ***Assess the ecological status of the lake, based on benthic macroinvertebrates as indicators.***

Methodology

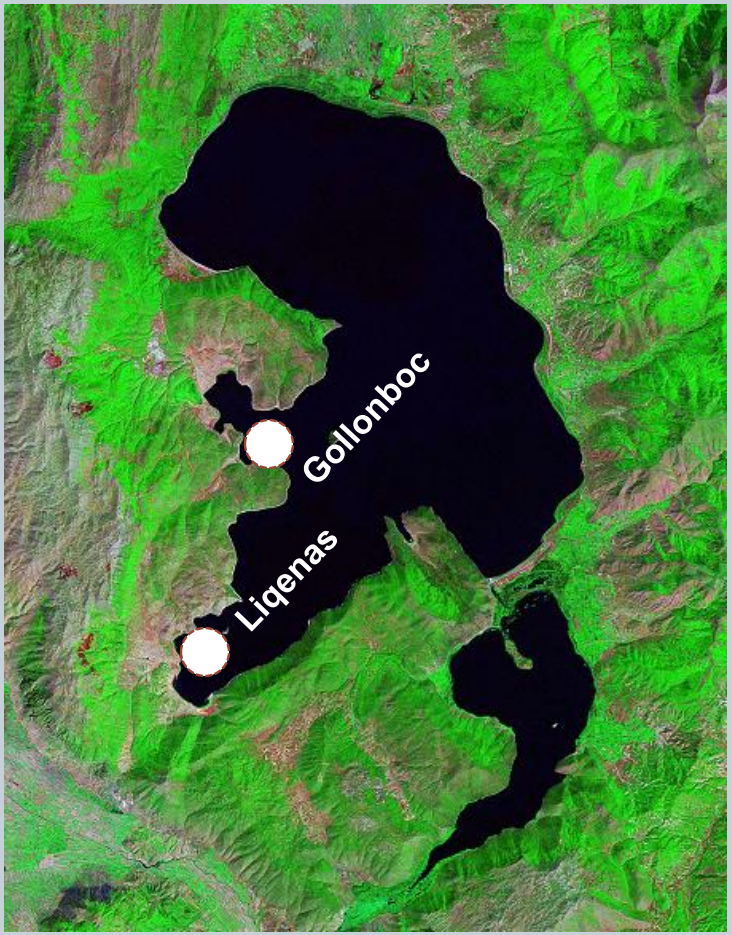
- **Sampling period: October 2013**
- **Sampling sites:**
  - **1. Gollonboç**
  - **2. Liqenas**
- **Sampling methodology:**

  - kick and swipe for the shallow part (in 0.5 m depth);

  - multihabitat transect method (in 2m, 4m, 6m, 10m depths)

  (ISO: EN 27828:1994)

  (Dowing & Rigler, 1984; Elliot, 1983; Lind, 1986; Rosenberg et al. 1997).

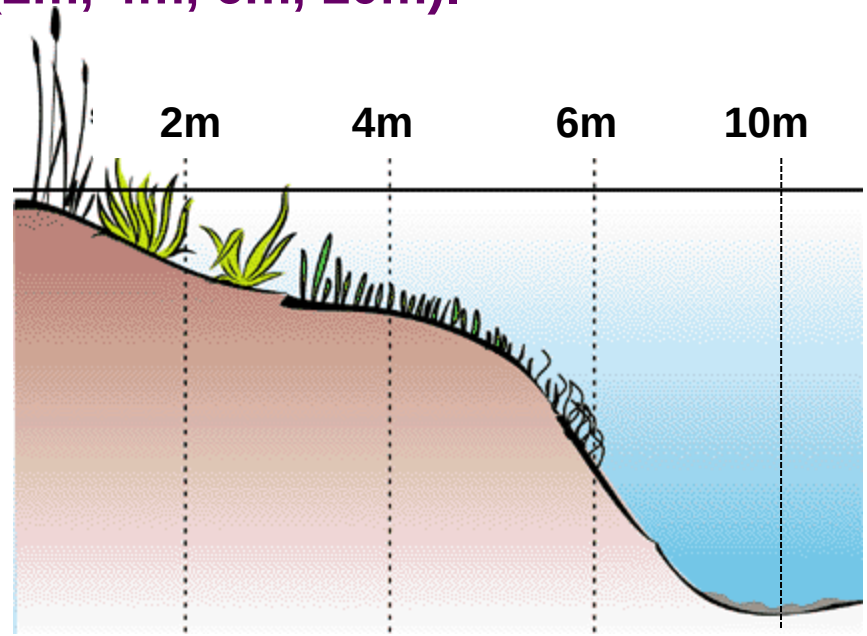


Kick and swipe sampling in 0.5 m depth (2 samples taken in each site).

Sampling in Liqenas

Sampling in Gollonboc

Multihabitat transect method, sampling with an Ekman grab (sip. 225 cm^2); 2 samples taken in each depth (2m, 4m, 6m, 10m).



Type of facies sampled:
- sandy-muddy with detritus and low density of macrovegetation;
- muddy-sandy with high density of macrovegetation;
- muddy (covered by shells of dead molluscs).

Laboratory analysis and assessments

- sorting;
- taxonomic identifications;
- abundance of each taxa in each sample (total and average);
- taxa frequency in a sample;

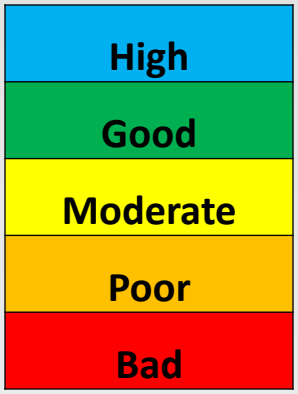
- Coefficient of species similarity between two sites:
  Sokal & Sneath: $i = a/a+2*(b+c)$.

-Indices of diversity:
  Shannon & Weaver: $H' = \Sigma\ p_i \ln (p_i)$
  Pielou: $J = H'/\ln_{max}$
  Margalef: $M = S-1/ \ln N$
  Simpson: $D = \Sigma\ n(n-1)/N(N-1)$

Environmental indices, specific to benthic macroinvertebrates

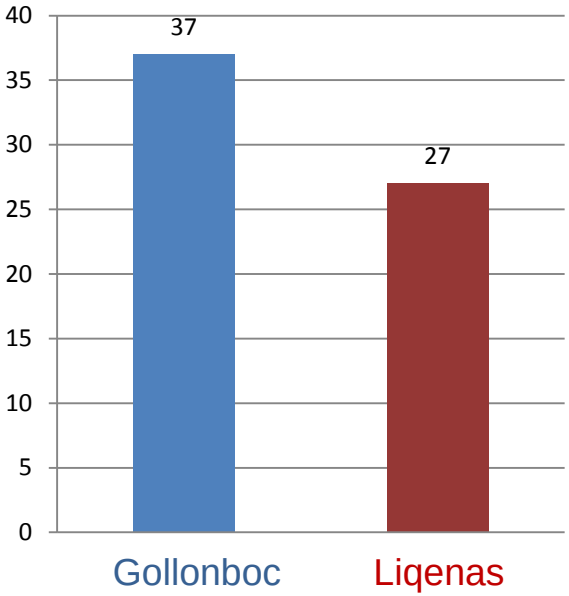
- MBI (Macroinvertebrate Biotic Index)
- BMWP (Biological Monitoring Working Party)
- ASPT (Average Score per Taxon)

Quality categorization after the standards of the WFD (2000/60/EC)

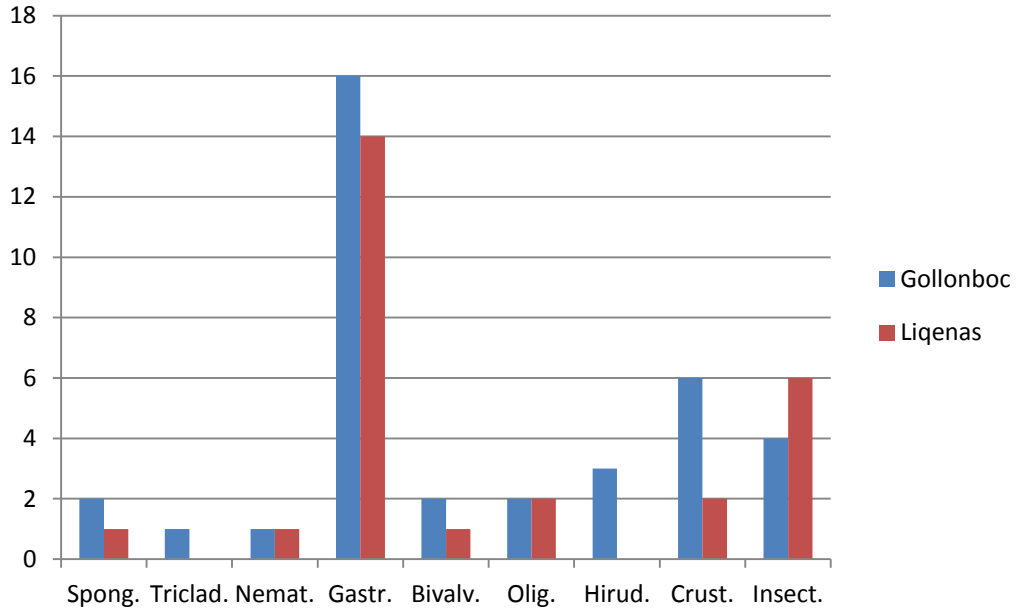


Results and Discussion

Species composition of macrozoobenthic community



Number of taxa in each site



Number of taxa for each group

Total: 43 taxa
Gollonboc: 37 taxa
Liqenas: 27 taxa

Similary coefficient (Sokal & Sneath):
i = 0.32
[i = a/a+2*(b+c)]

A relatively low number of taxa (for molluscs, compared to Dhora & Welter-Schultes, 1996; Dhora 2002; Feher et al. 2009)

Species of special importance / concern

Endemic species

Spongia
Spongilla prespensis

Gastropoda
Parabythinella macedonica
Prespolitorea valvataeformis
Prespolitorea malaprespensis
Prespopyrgula prespensis
Planorbis presbensis
Gyraulus presbensis

Crustacea
Niphargus stankoi
Gammarus triacanthus

Other expected endemic species from: Valvata, Bythinia, Radix, Gyraulus, Pisidium,Dendrocoelum, Potamothrix, Candona)

Globally threatened species (IUCN Red List)

Gastropoda

Parabythinella macedonica	EN
Prespolitorea valvataeformis	CR
Prespolitorea malaprespensis	CR
Prespopyrgula prespensis	CR
Segmentina complanata	LC
Radix (Lymnaea) peregra	LC
Radix auricularia	LC
Valvata piscinalis	LC
Bithynia leachii	LC
Viviparus viviparus	LC

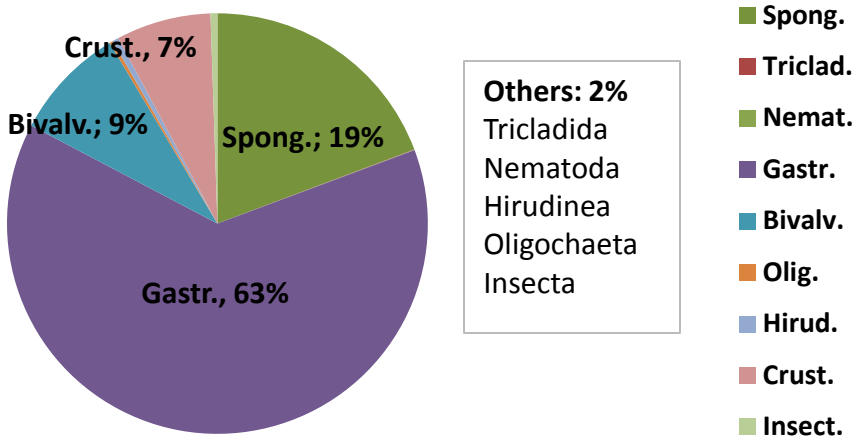
Bivalvia

Dreissena presbensis	NT

Crustacea

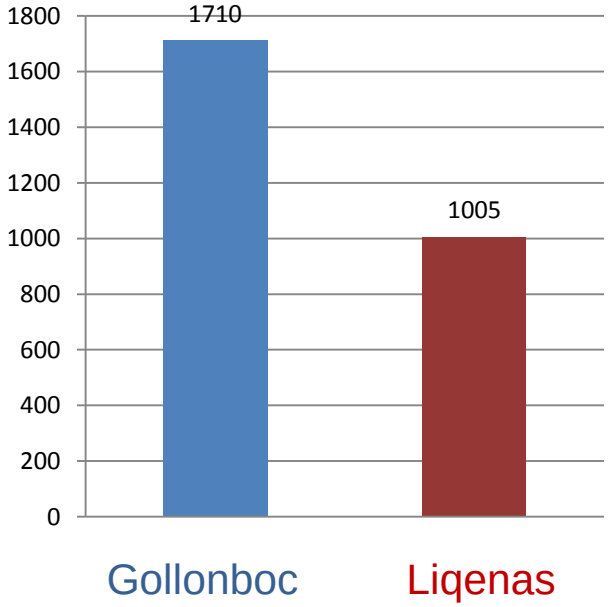
Atyaephyra stankoi	LC

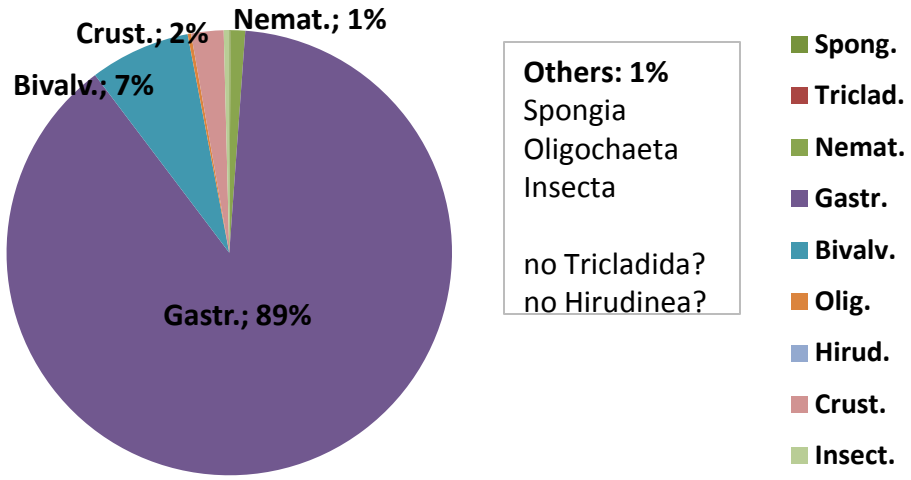
Abundance structure of macrozoobenthic community (based on the average abundance)



Abundance structure in Gollonboc

Average abundance in each site



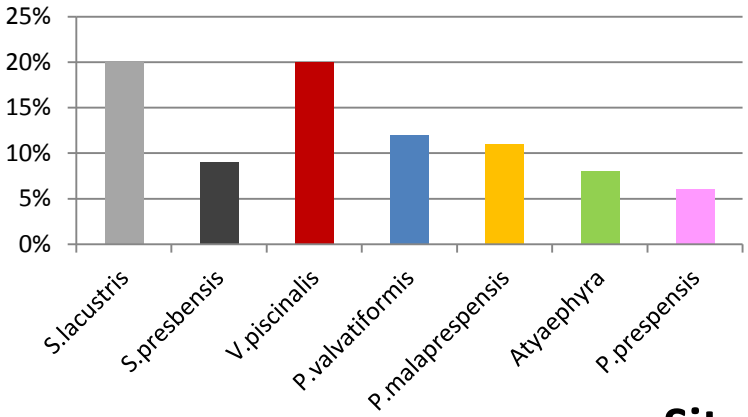


Abundance structure in Liqenas

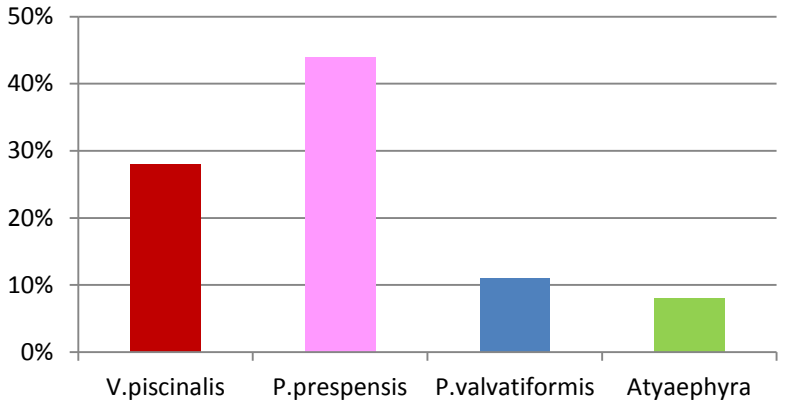
Frequency of the most abundant species in each site

Site 1: depth 0.5 m

Gollonboc

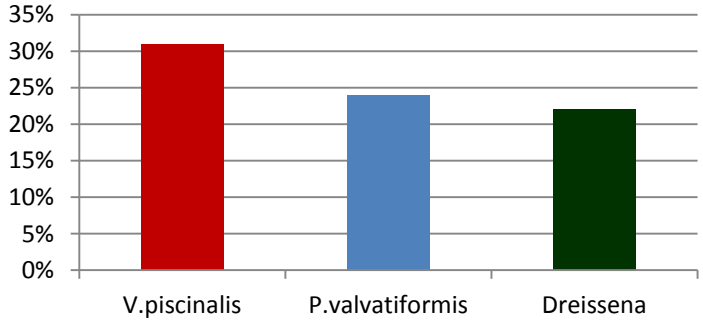


Liqenas

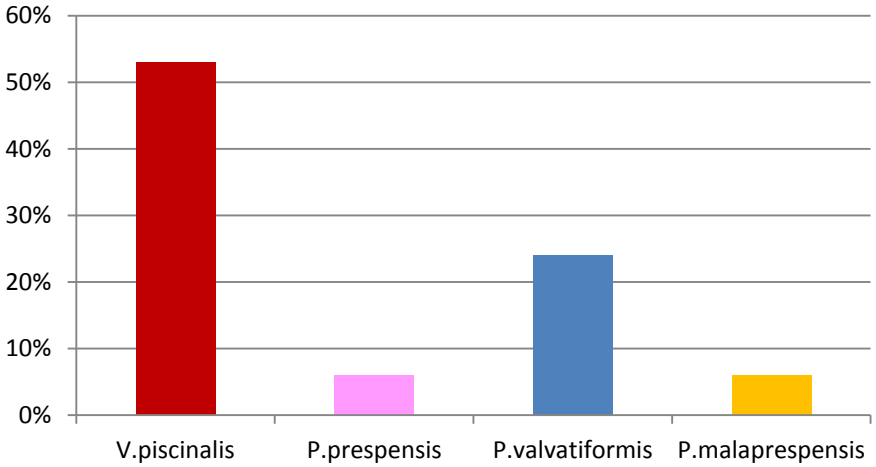


Site 2: depth 2 m

Gollonboc



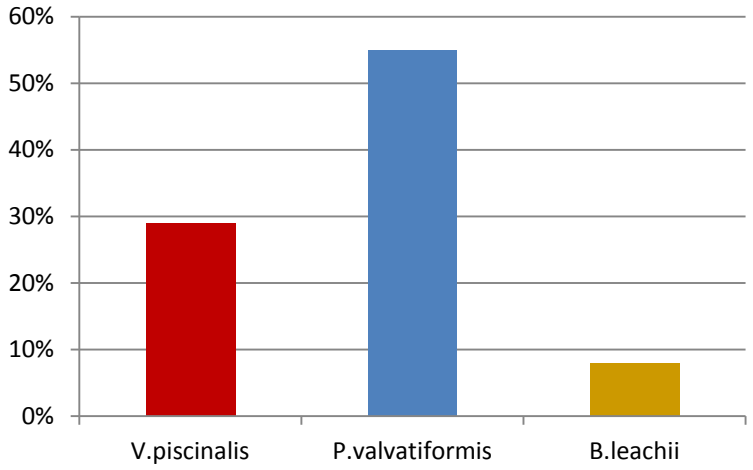
Liqenas



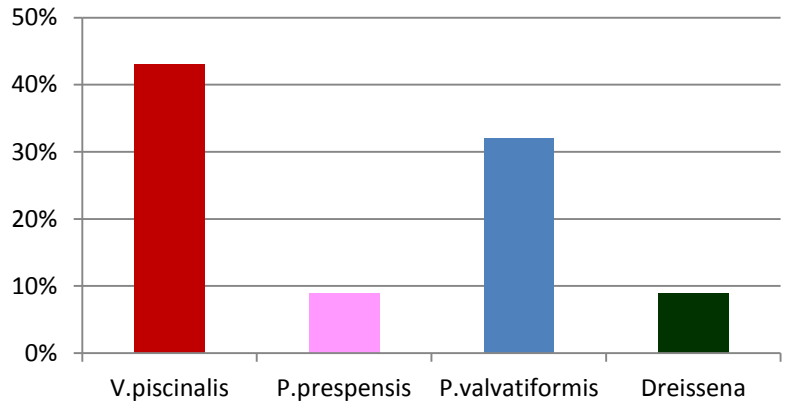
Frequency of the most abundant species in each site

Site 3: depth 4 m

Gollonboc

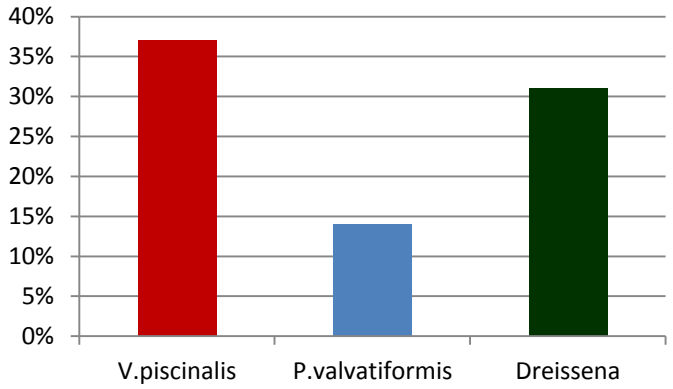


Liqenas

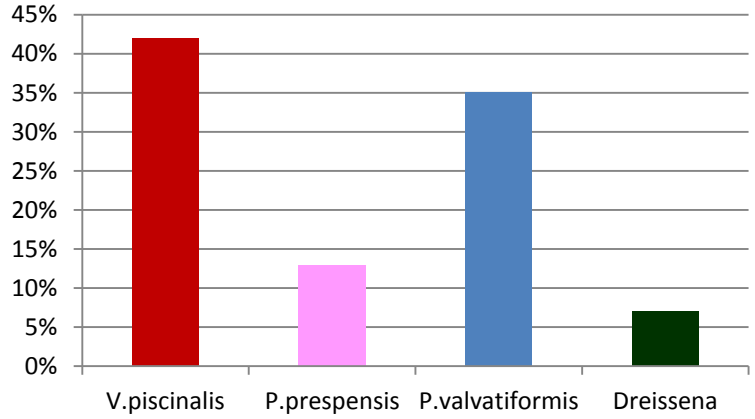


Site 4: depth 6 m

Gollonboc



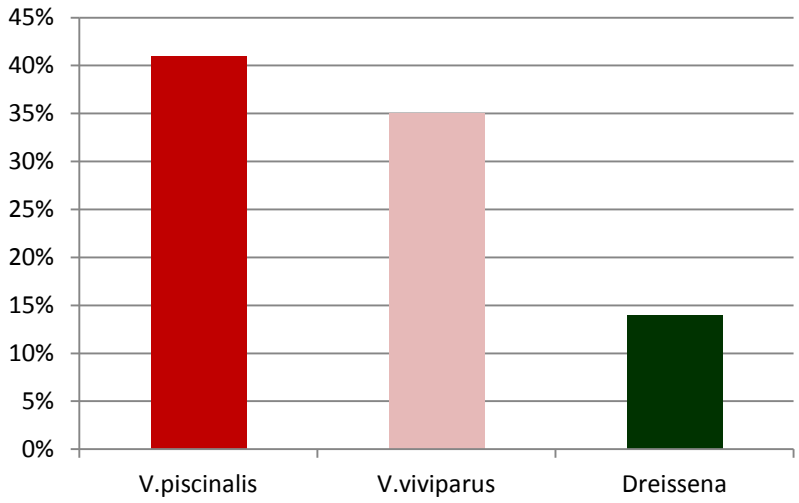
Liqenas



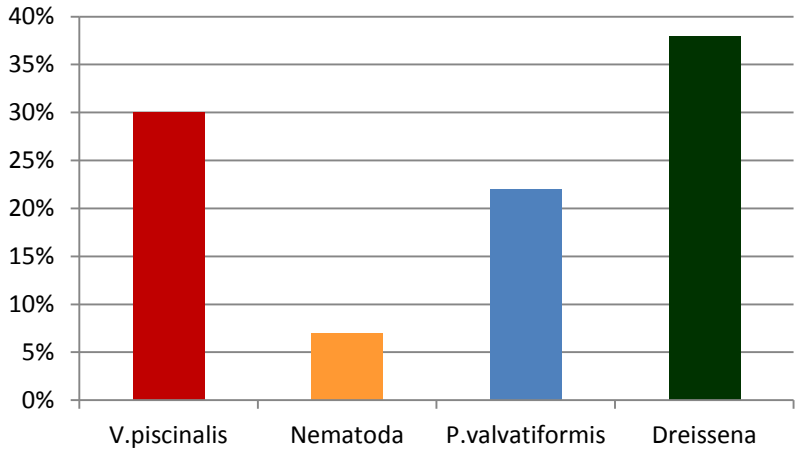
Frequency of the most abundant species in each site

Site 5: depth 10 m

Gollonboc



Liqenas



Notes on species composition and abundance of macrozoobenthic community

- A degraded structure of macrozoobenthic community in most of the sampling depths.
- Low number of species.
- Low abundance.
- High presence of characteristic taxa of mesotrophic and eutrophic habitats.
- Very low presence (almost missing) of pollution sensitive taxa.
- Very low presence of insects (even in 0,5 m); (the EPT insects almost missing).
- Quick decrease of benthic macrofauna below the 5m depth (corresponding to the lack of macrophytes).
- High difference in abundance between bottoms with and without macrovegetation (in the same depth), especially evident in Gollonboc.

Environmental quality assessment, based on the benthic macroinvertebrates as indicators

Gollonboc

Site/depth	MBI	Quality	BMWP	Quality	ASPT	Quality
1 (0.5m)	6	Poor	36	Poor	3.6	Bad
2 (2m)	6.06	Poor	30.4	Poor	3.8	Poor
3 (4m)	6.03	Poor	19.3	Poor	3.2	Bad
4 (6m)	6.03	Poor	25.6	Poor	3.2	Bad
5 (10m)	6	Poor	16.6	Poor	4.1	Poor

Liqenas

Site/depth	MBI	Quality	BMWP	Quality	ASPT	Quality
1 (0.5m)	6.02	Poor	29.3	Poor	4.1	Poor
2 (2m)	6.06	Poor	12.6	Bad	3.1	Bad
3 (4m)	6.13	Poor	16.1	Poor	3.2	Bad
4 (6m)	6	Poor	9.7	Bad	3.2	Bad
5 (10m)	6.12	Poor	13.9	Bad	3.4	Bad

Environmental quality assessment, based on the diversity indices (??)

Gollonboc

Nr taxa and abundance

St./depth	Taxa	Av. Abund	Total Abund
1 (0.5m)	25	1046	2093
2 (2m)	16	189.5	379
3 (4m)	13	215	430
4 (6m)	15	203	406
5 (10m)	5	56	112

Indices of diversity

St./depth	Shannon		Pielou		Margalef		Simpson (D)	
1 (0.5m)	2.245	Moderate	0.697	Good	3.453	Bad	0.135	High
2 (2m)	1.848	Poor	0.667	Good	2.862	Bad	0.217	Good
3 (4m)	1.187	Poor	0.463	Poor	2.234	Bad	0.406	Poor
4 (6m)	1.591	Poor	0.588	Moderate	2.647	Bad	0.276	Good
5 (10m)	1.159	Poor	0.720	Good	1.005	Bad	0.354	Moderate

Liqenas

Nr taxa and abundance

St./depth	Taxa	Av. Abund	Total Abund
1 (0.5m)	13	275.5	551
2 (2m)	16	352	704
3 (4m)	8	88	176
4 (6m)	7	174	348
5 (10m)	6	115.5	231

Indices of diversity

St./depth	Shannon		Pielou		Margalef		Simpson (D)	
1 (0.5m)	1.530	Poor	0.596	Moderate	2.136	Bad	0.292	Good
2 (2m)	1.457	Poor	0.525	Moderate	2.561	Bad	0.353	Moderate
3 (4m)	1.375	Poor	0.661	Good	1.574	Bad	0.321	Moderate
4 (6m)	1.274	Poor	0.655	Good	1.163	Bad	0.329	Moderate
5 (10m)	1.338	Poor	0.643	Good	1.474	Bad	0.297	Good

Community structure assessment, based on the diversity indices

Gollonboc

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Conclusions (preliminary)

• Macrozoobenthic community in the Albanian part of Macro Prespa Lake is characterized by a relatively:

- low species richness;
- low abundance;
- degradation of the population structure.

• However, the lake is (still) a shelter for many benthic macroinvertebrate species of international concern and of interest for conservation.

• The environmental quality of the lake is predominated by the “poor” to “bad” status (after the WFD categorization), which is more stressed in Liqenas.

• Indicator benthic macroinvertebrates reflect a tendency for eutrophication of the lake, enrichment in nutrients and increased organic pollution.

Recommendations

Further field work is needed, in order to have a better knowledge on the mcrozoobenthic community structure, ecological and environmental state of the lake:

- seasonal sampling;
- additional investigation sites (transects) in the lake;
- larger representation of microhabitats' diversity (geo-morphological, hydrographic and anthropogenic impacted and non-impacted areas);
- higher number of samples, for having more statistically reliable results.

Thank you!