

ROTIFERS IN DEEP *VS.* SHALLOW LAKES: FUNCTIONAL TRAITS AND FOOD WEBS

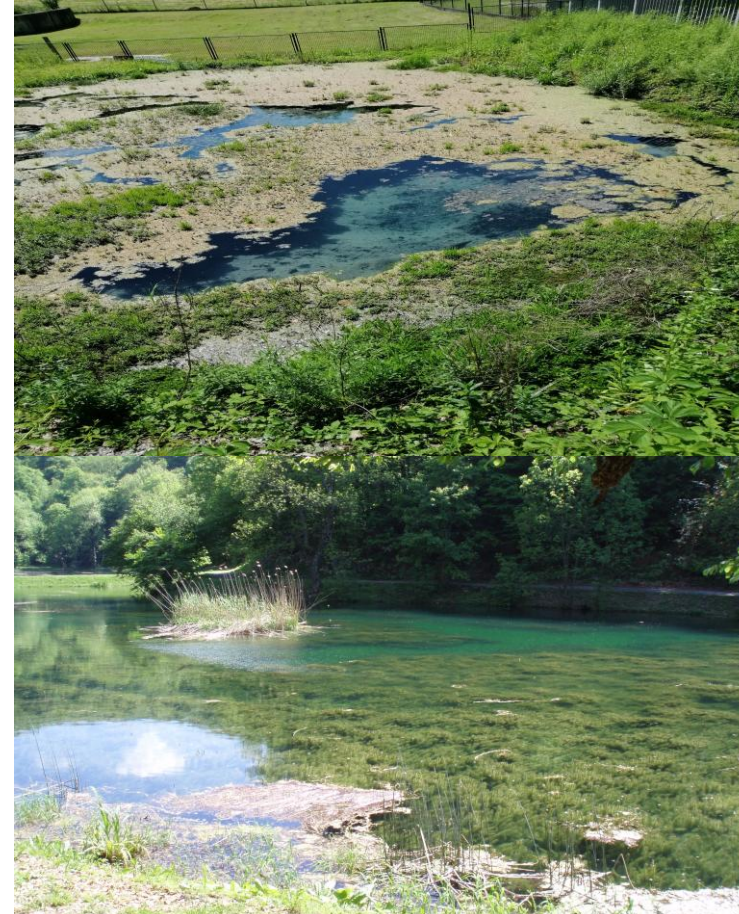
Ecosystem functioning assessment including Rotifera:

- traits within zooplankton, meiofauna, periphyton
- functional feeding and habitat traits
- interactions with predators (macrzoobenthos, fish)
- interactions in food webs

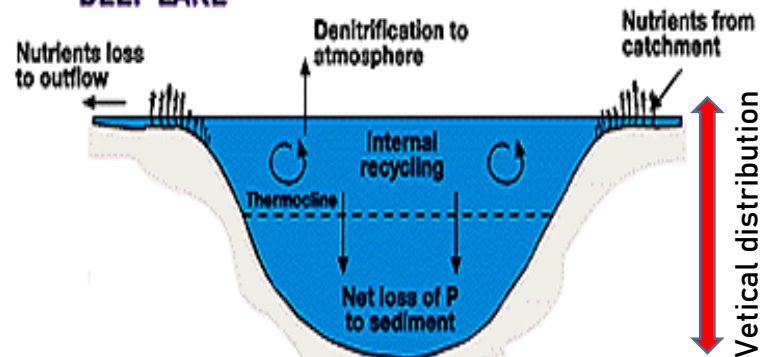
Deep

vs.
Lakes

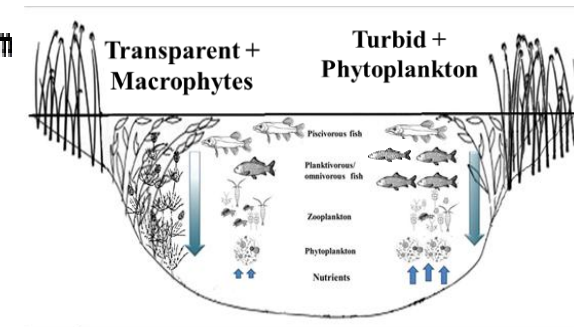
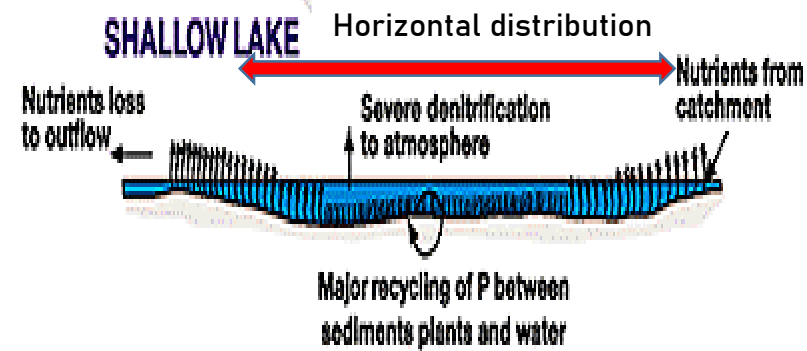
Shallow



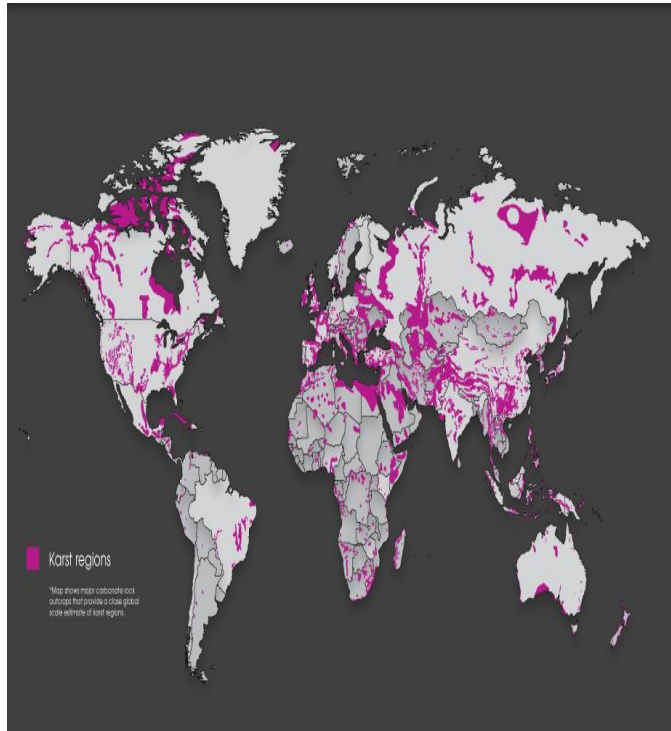
DEEP LAKE



SHALLOW LAKE



Karst (limestone, dolomite, gypsum)

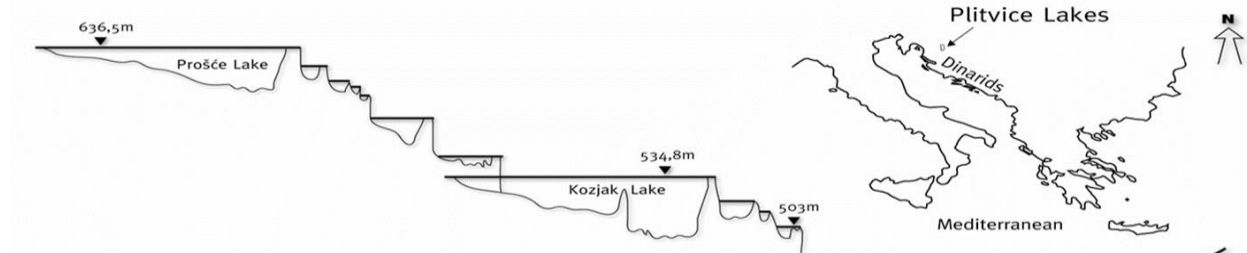
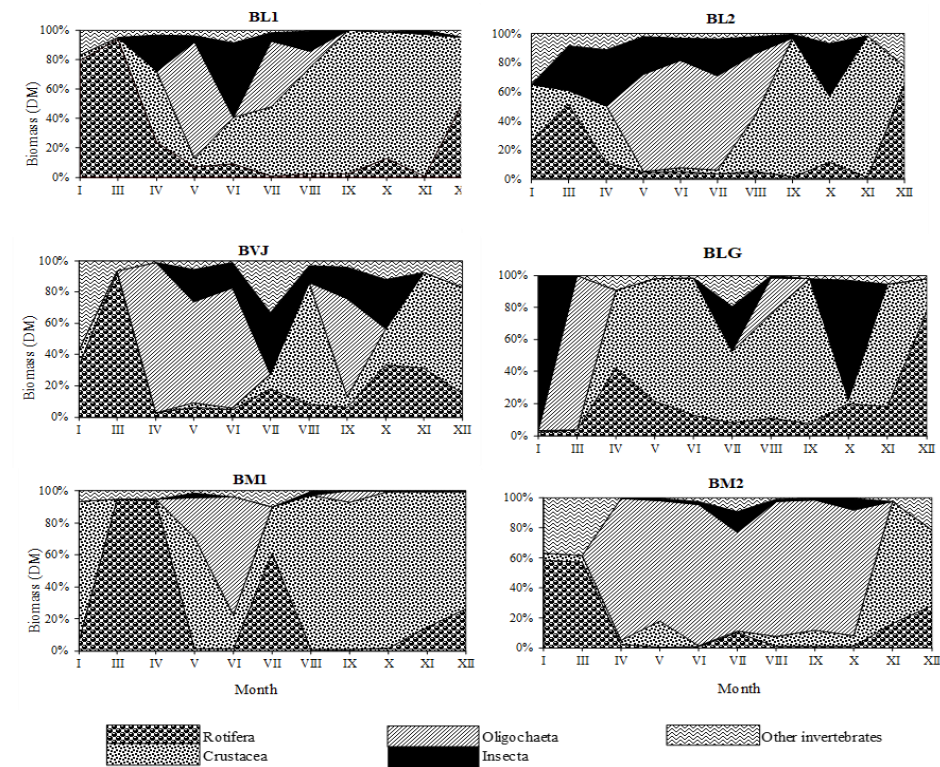
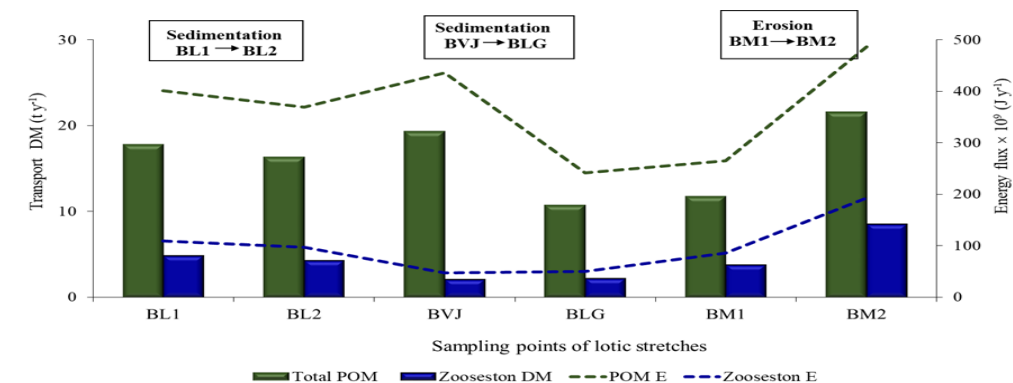


Vulnerability of karst regions and water

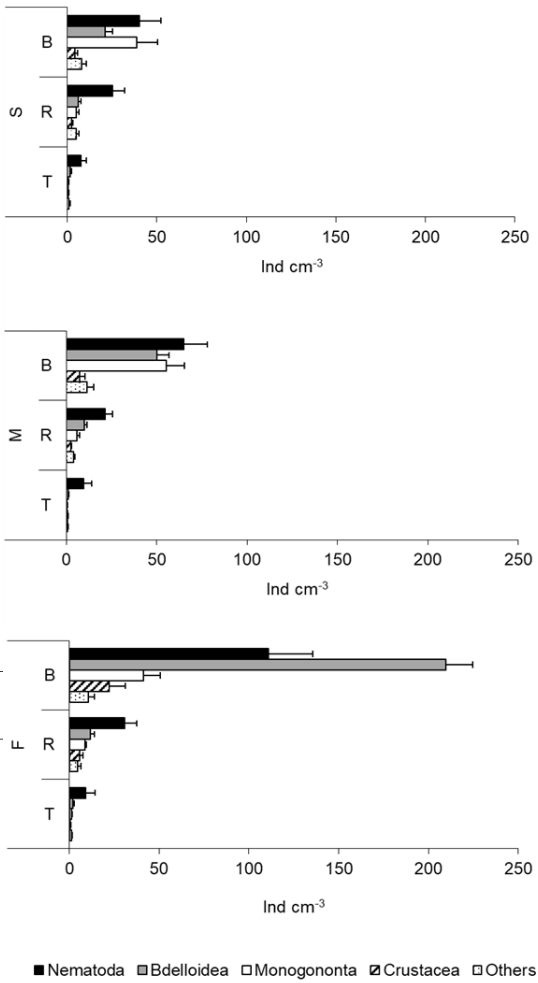
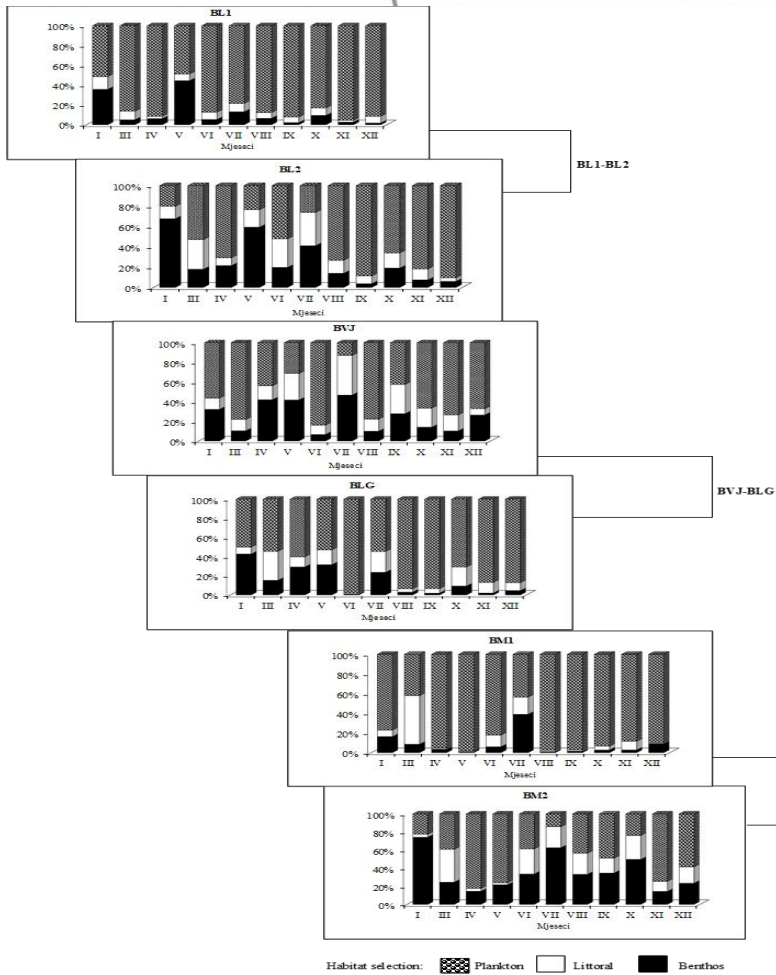
- water pollution;
 - waste dumps and sewage;
 - roads and pipelines construction;
 - uncontrolled water extraction;
 - construction of numerous hydropower plants
- 25% of the human population uses drinking water from karst areas

Case study: Plitvice Lakes

100 rotifer species up to date



Rotifers within meiofauna



Habitat ecological type

Deep karst lakes of Balkan Peninsula



$a = 7.5 \text{ km}^2$
 $z_{\text{max}} = 55 \text{ m}$



$a = 358.2 \text{ km}^2$
 $z_{\text{max}} = 288.7 \text{ m}$



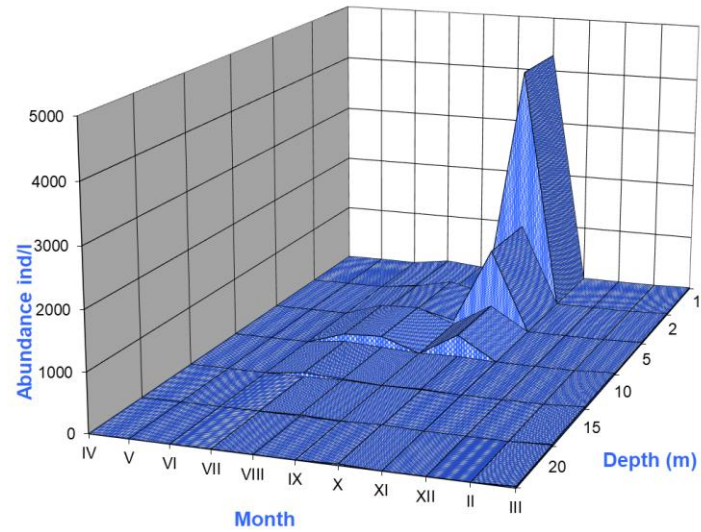
Skadar/Shkodra Lake



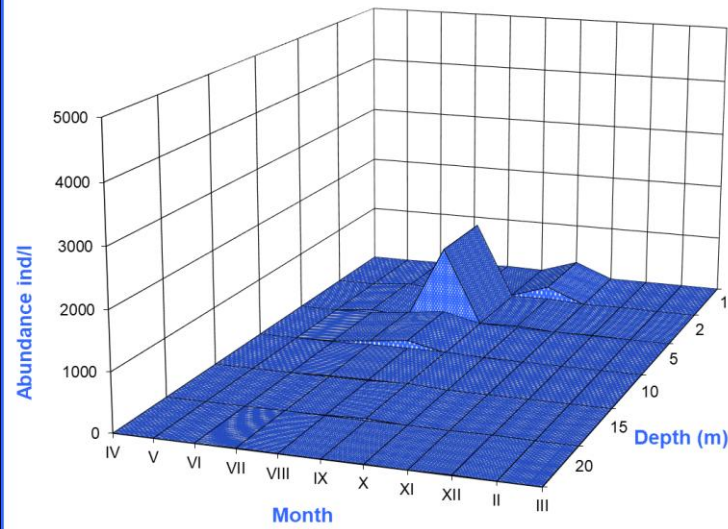
$a = 360 \text{ km}^2$
 $z_{\text{max}} = 60 \text{ m}$

Ohrid Lake

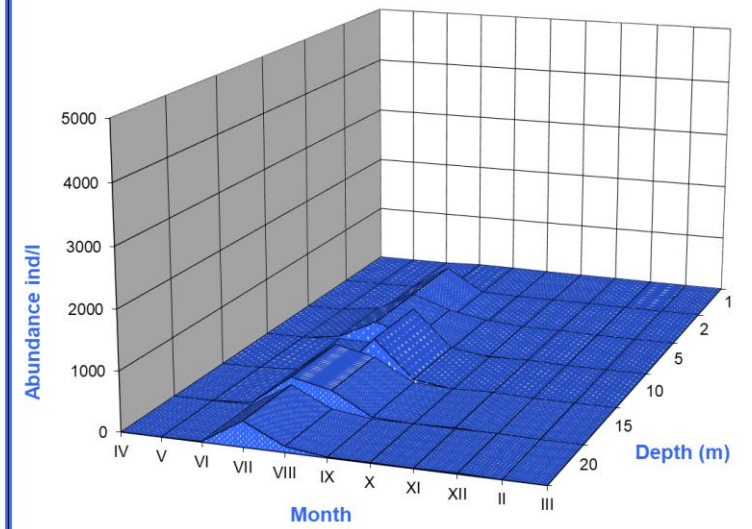
Case study: Visovac Lake



Syncaeta

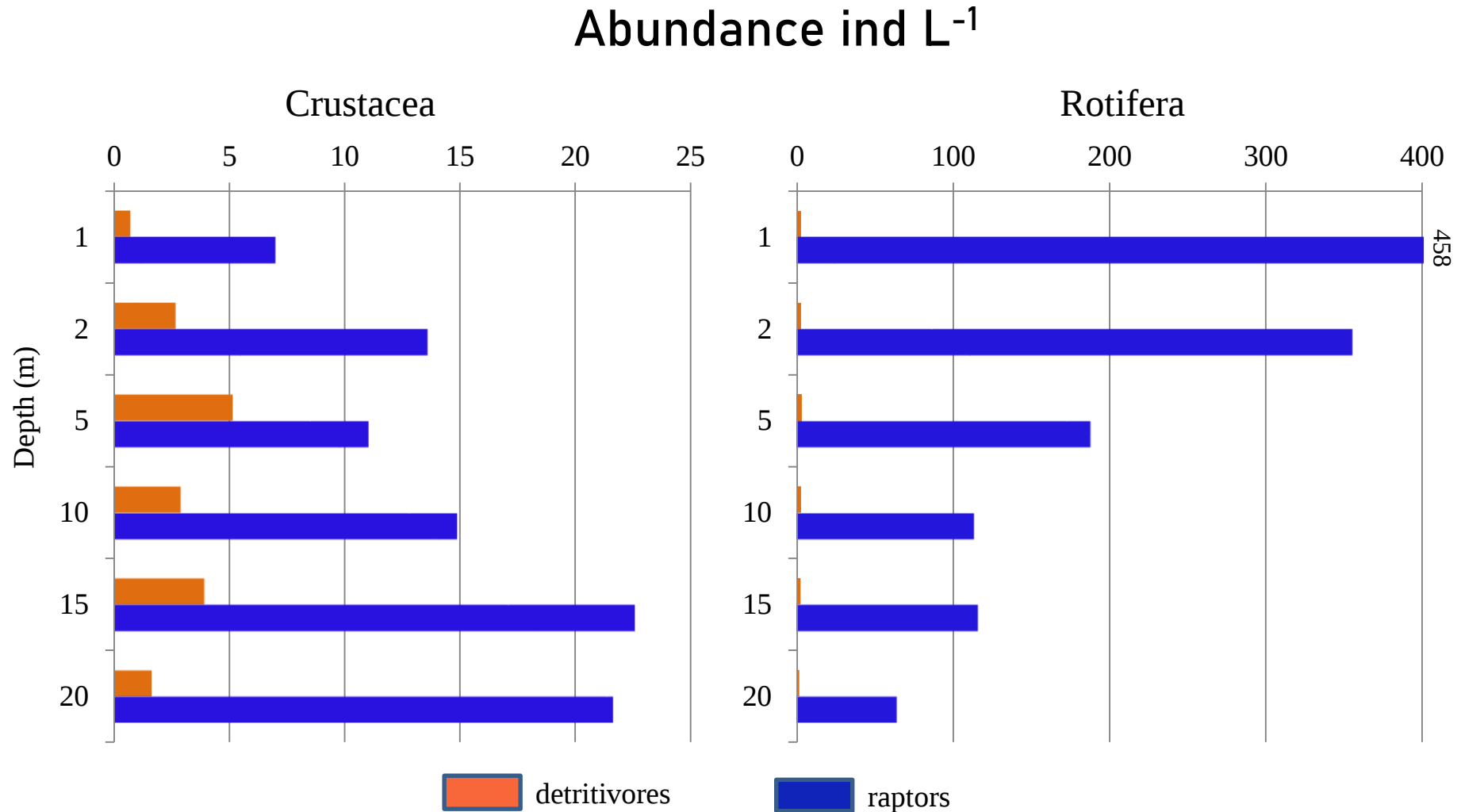


Gastropus



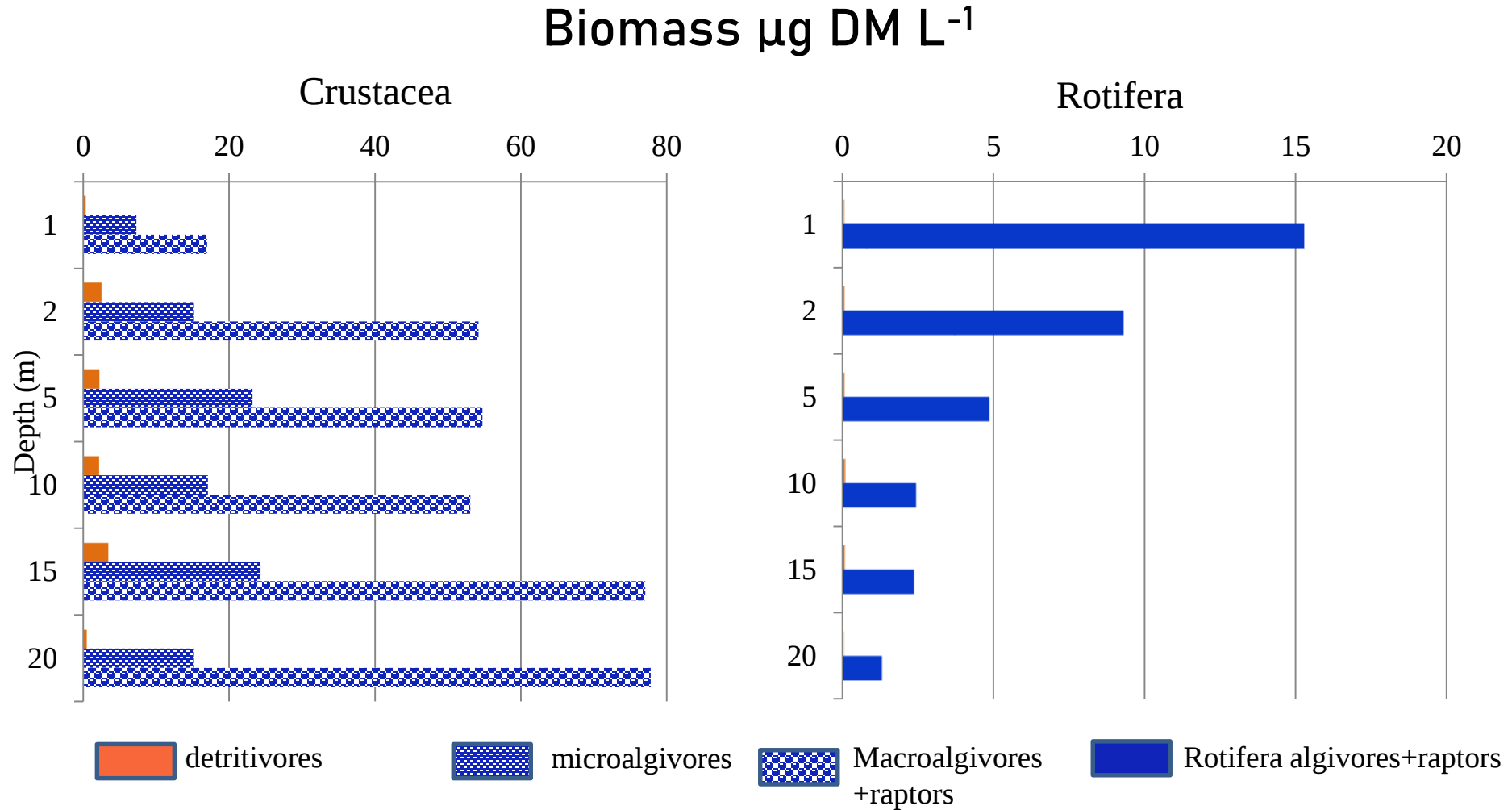
Trichocerca

Case study: Visovac Lake



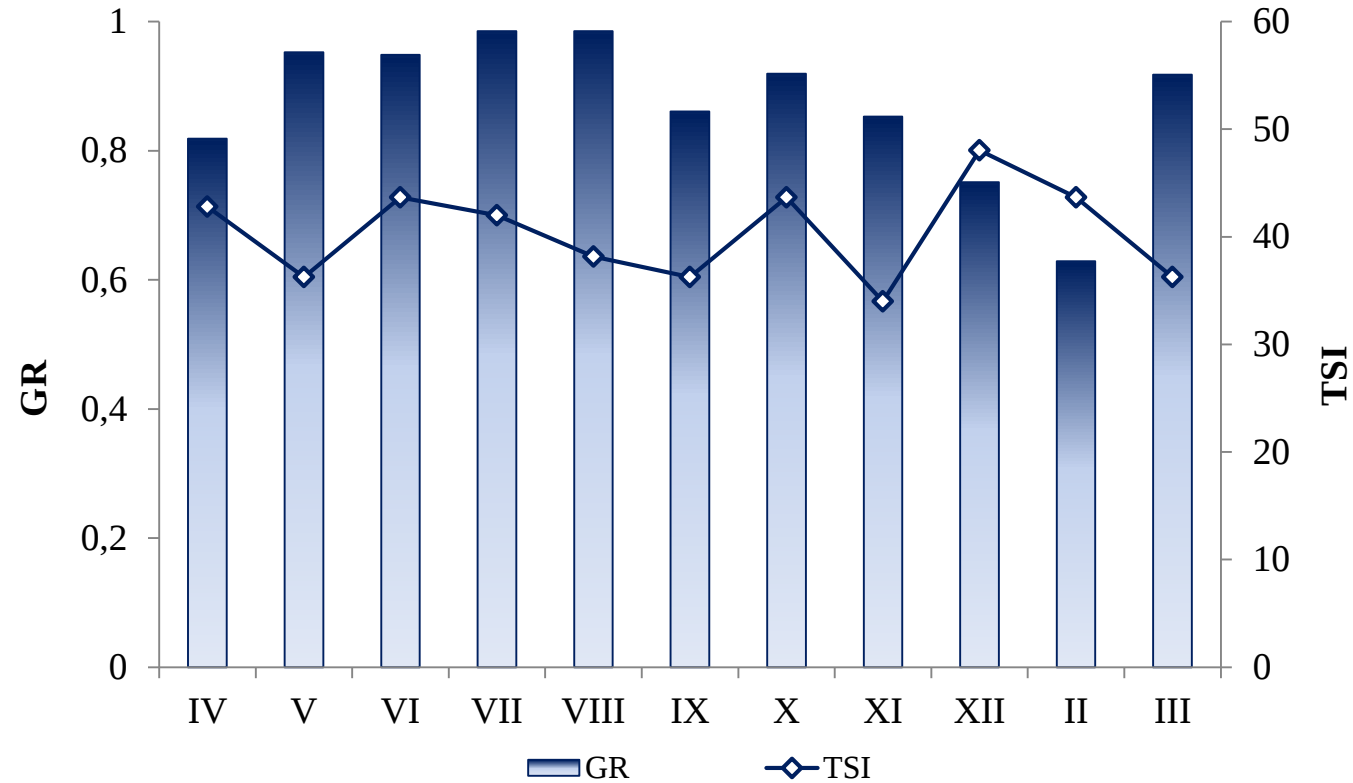
Vertical distribution of zooplankton trophic groups

Case study: Visovac Lake



Vertical distribution of zooplankton trophic groups

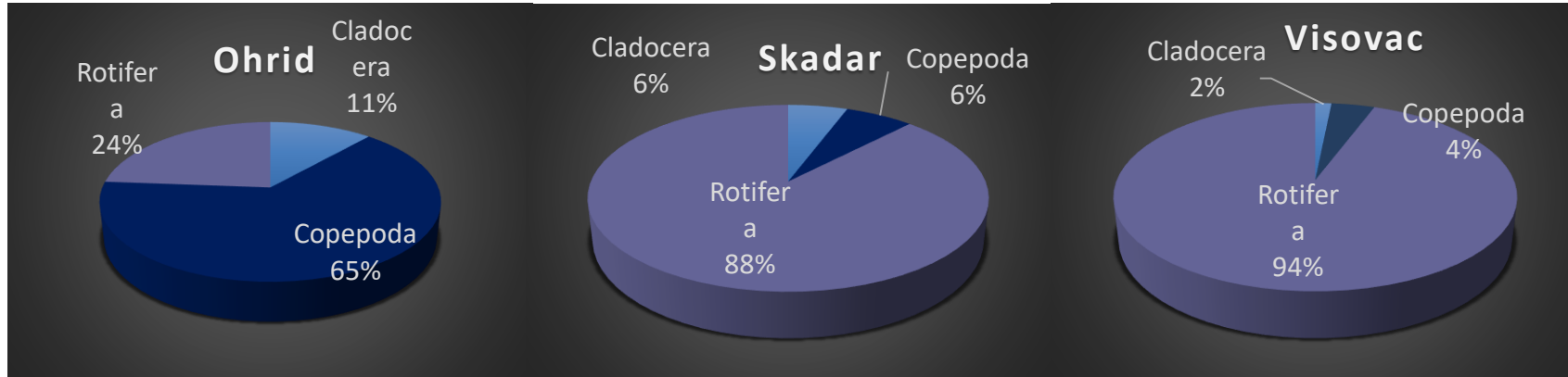
Case study: Visovac Lake



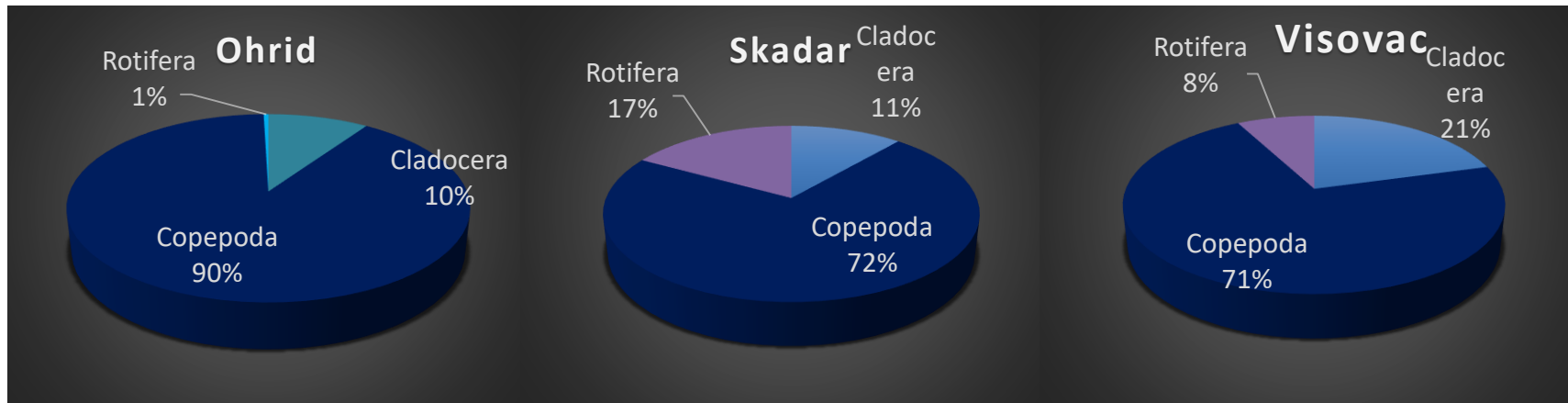
Relationships between Guild ratio (GR) and trophic state index (TSI) in deep lake

Rotifera:Cladocera:Copepoda abundance vs. biomass in deep lakes

Abundance

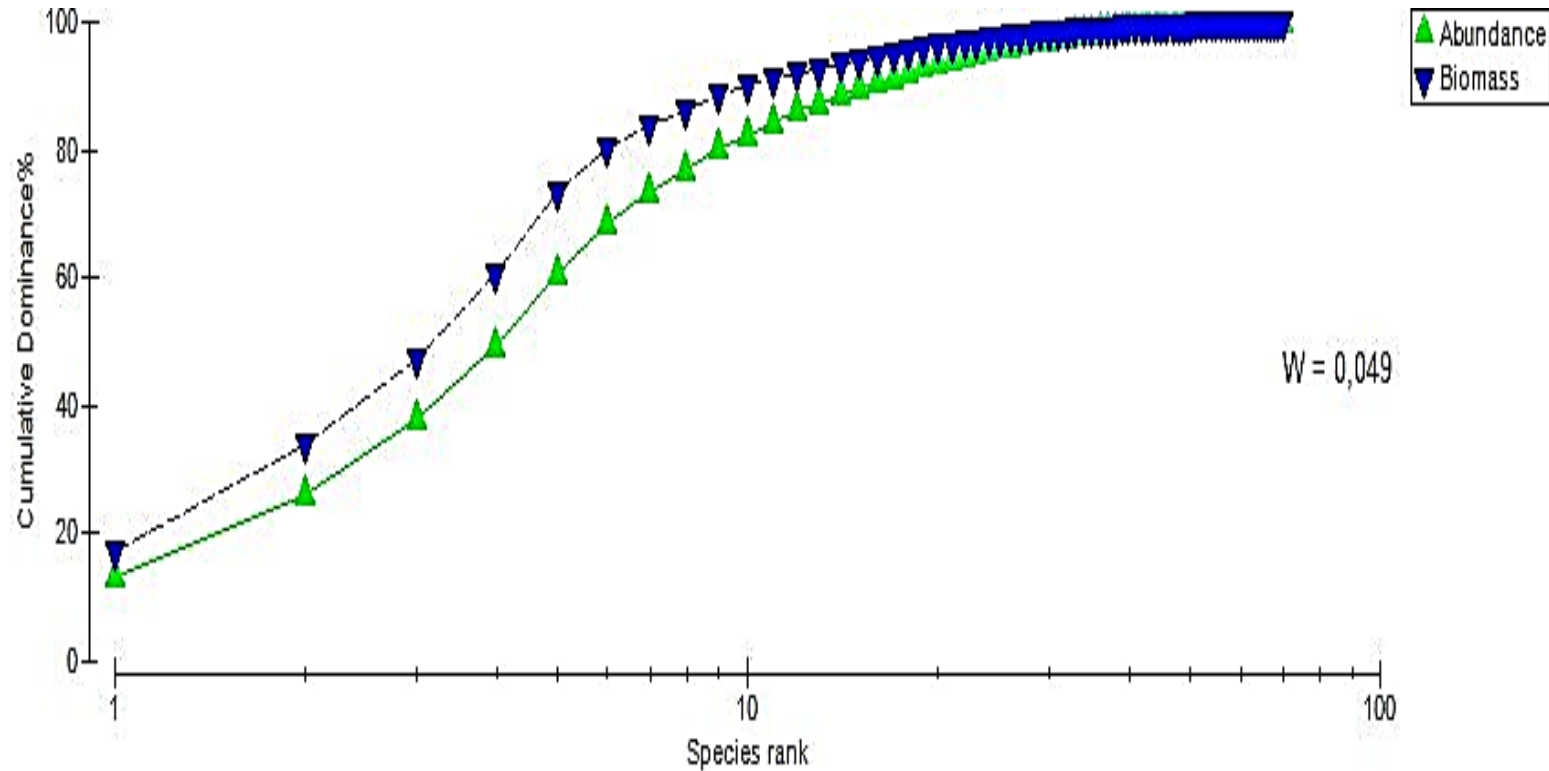


Biomass



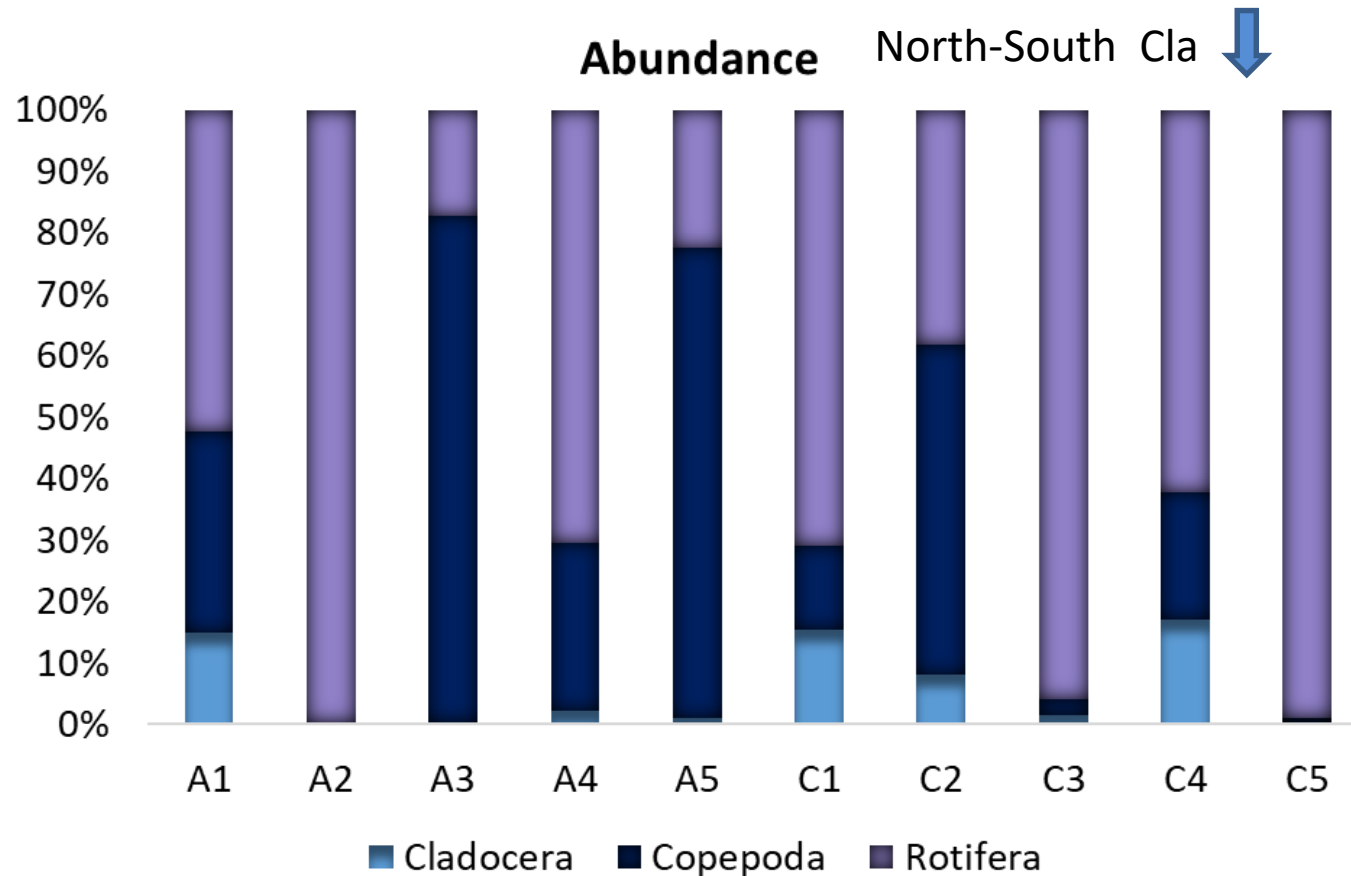
Zooplankton assemblage in deep karst lakes

Zooplankton indicator of stressors



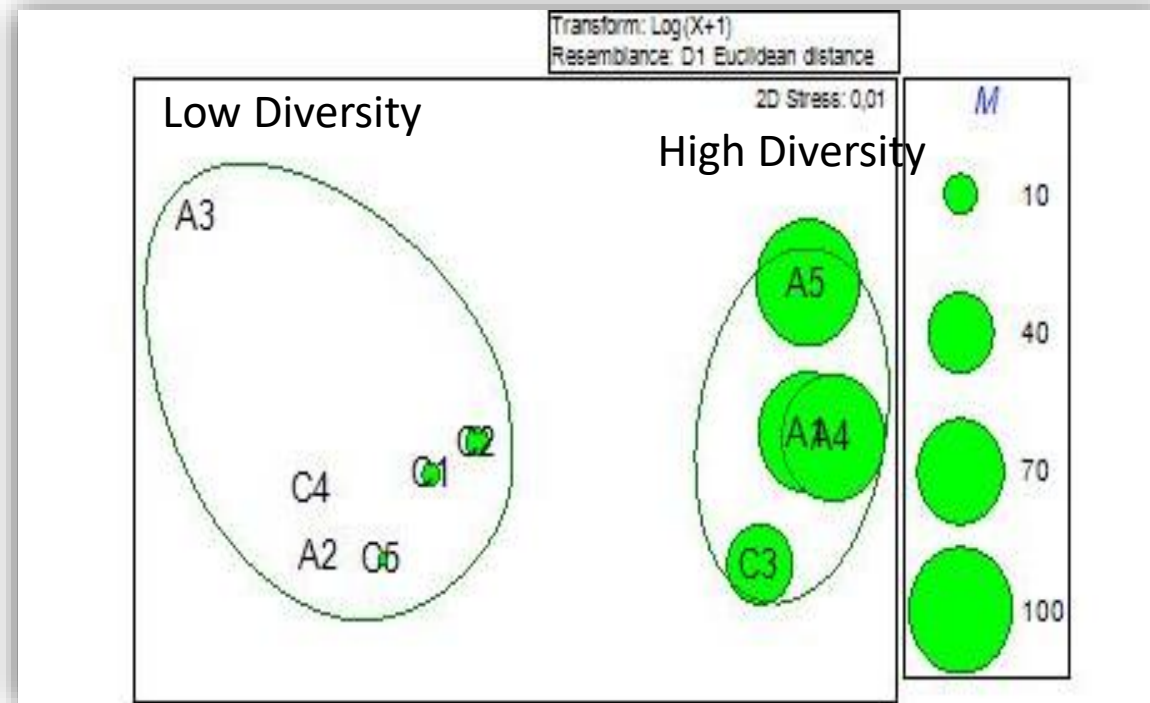
W +1 to -1, indicates slight deterioration in deep karst lakes

Rotifera:Cladocera:Copepoda in shallow waterbodies



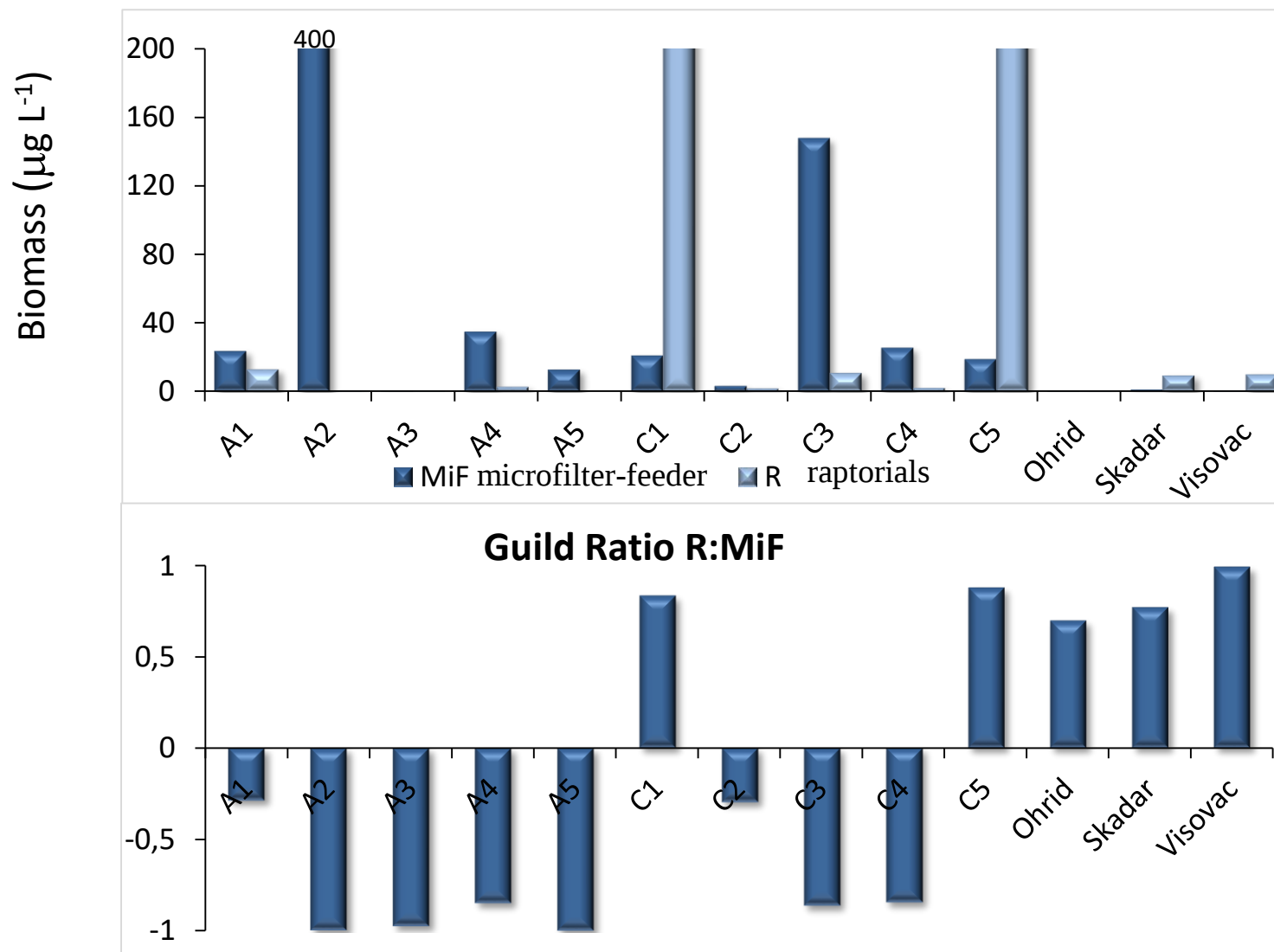
Relative zooplankton abundance in shallow
Mediterranean (A) vs. temperate (C) waterbodies

Diversity vs. macrophyte coverage in shallow waterbodies

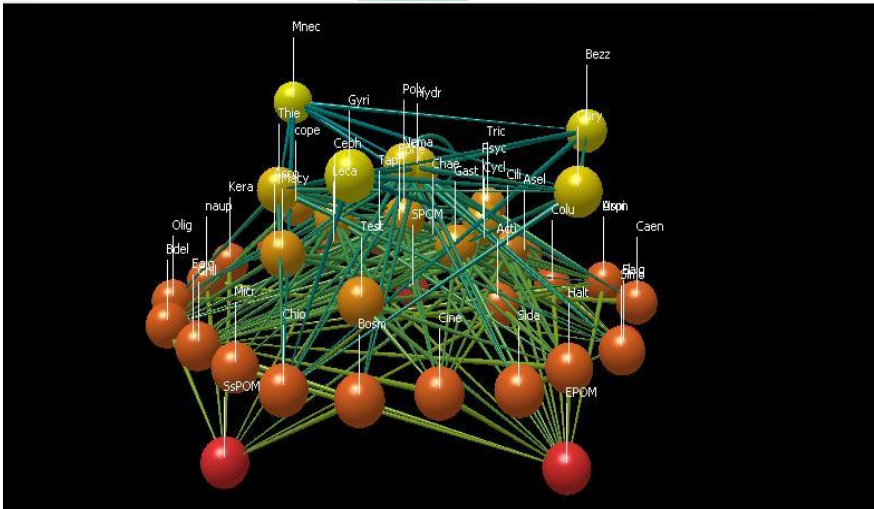
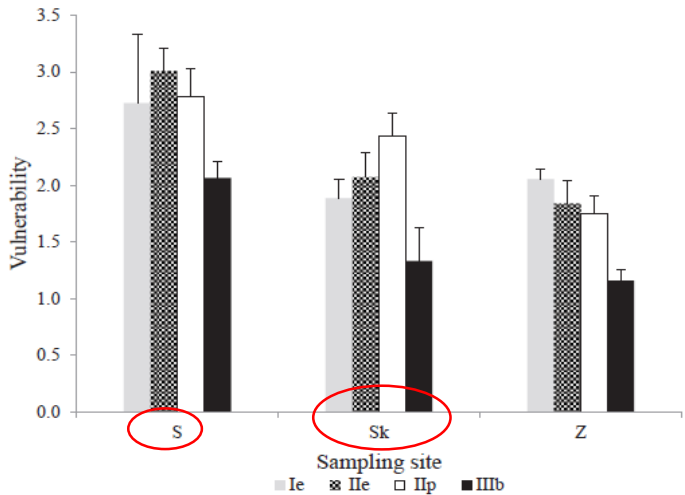
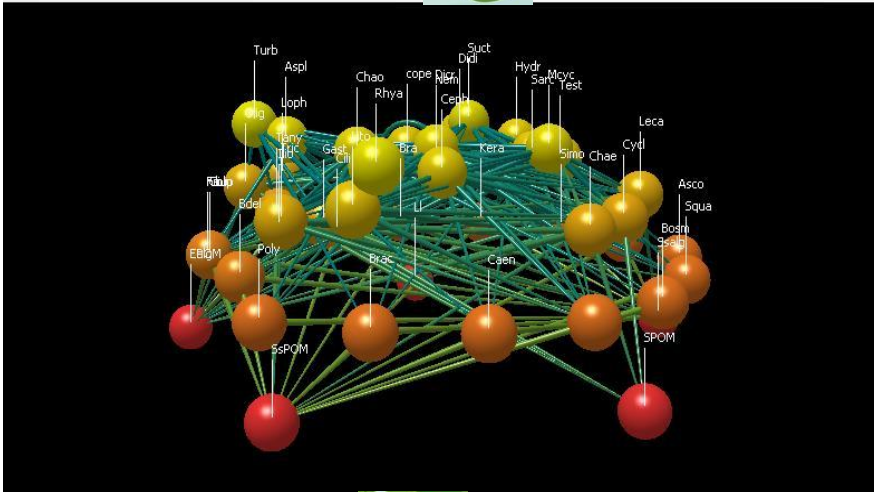
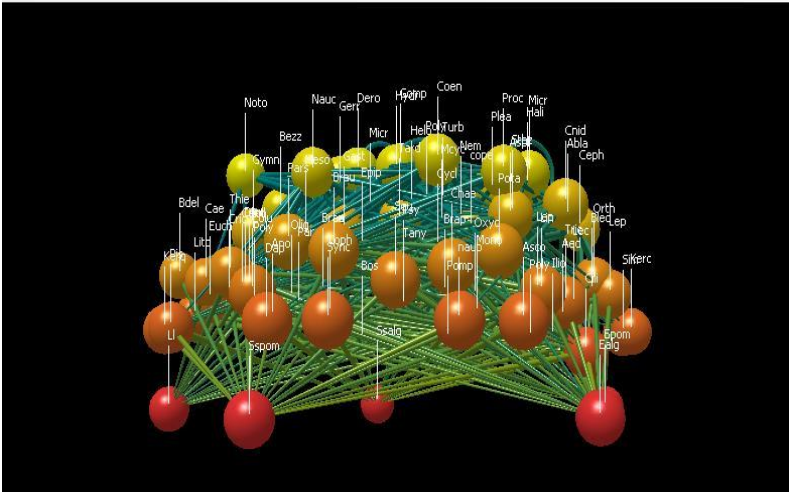


Differences in diversity based on the macrophyte coverage (M%)

Zooplankton functional feeding groups

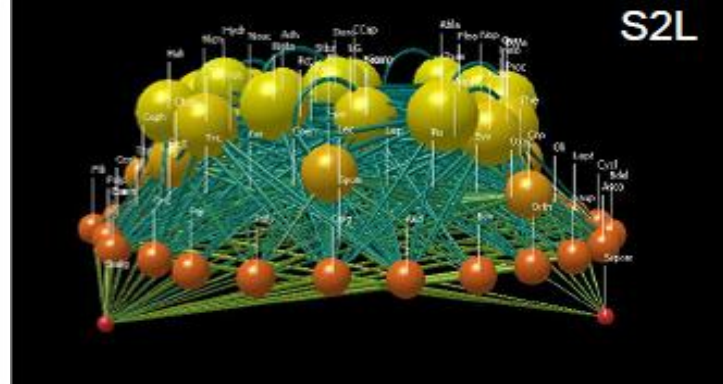
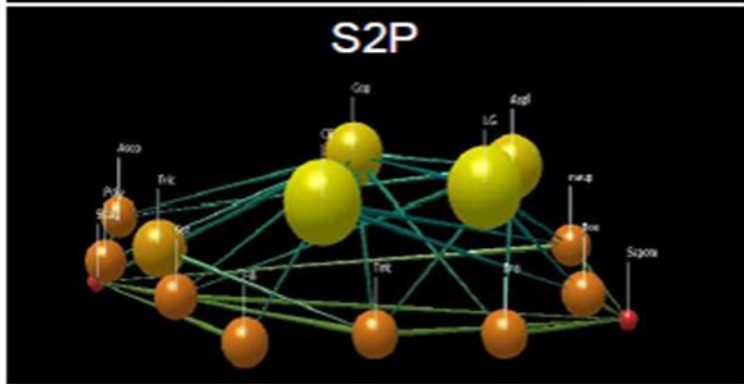
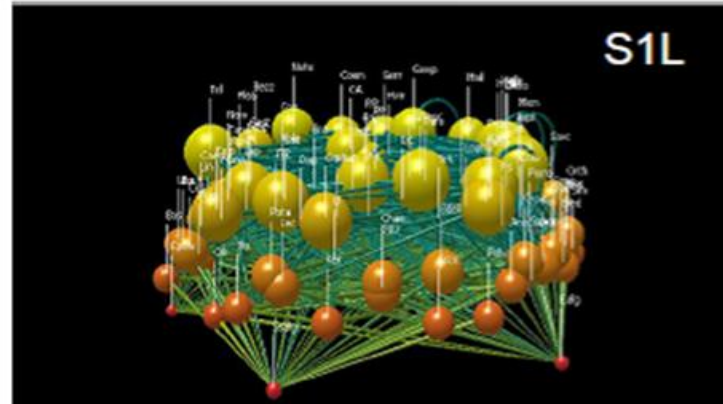
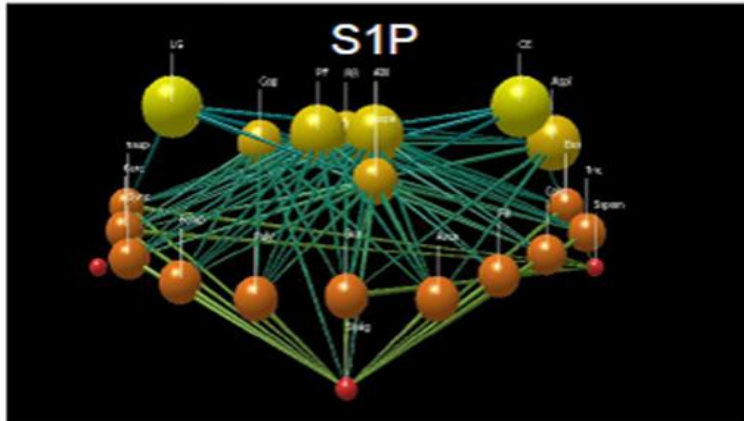


Shallow lakes Food webs



Littoral food webs Zooplankton + Macrozoobenthos

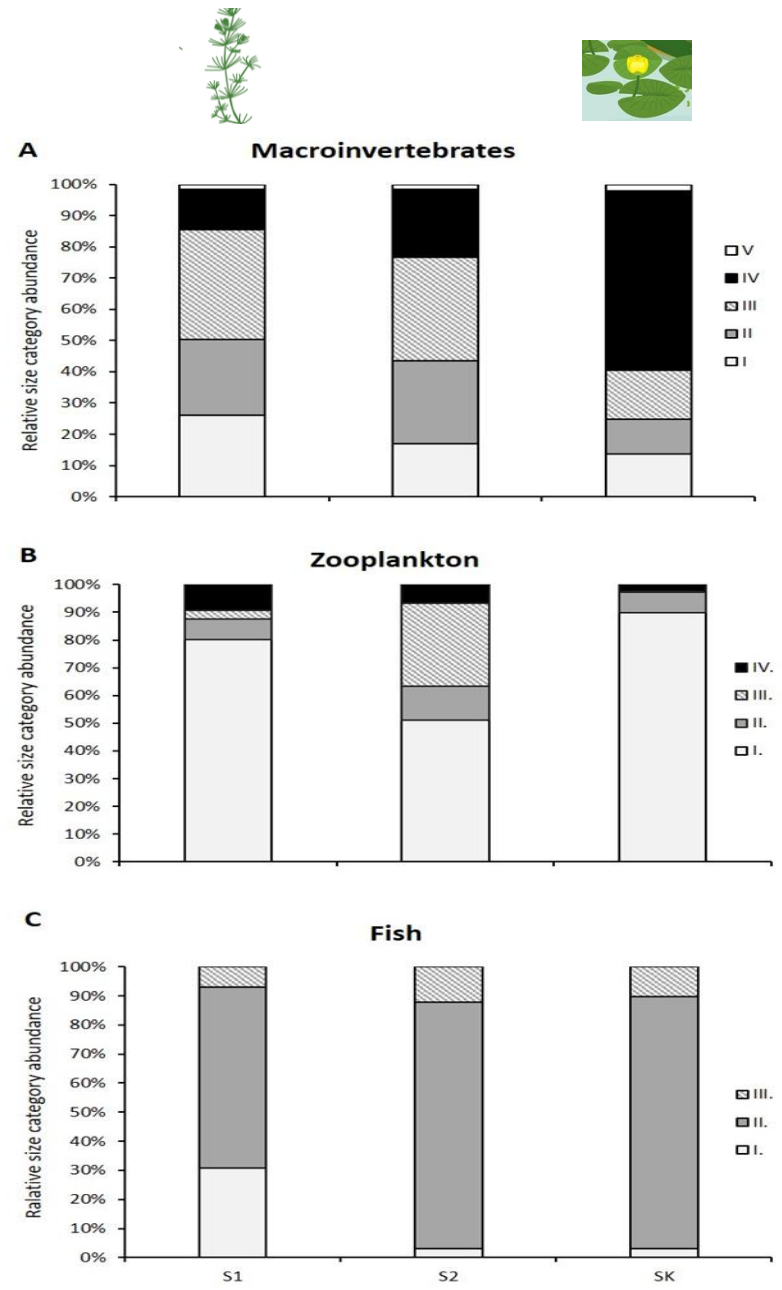
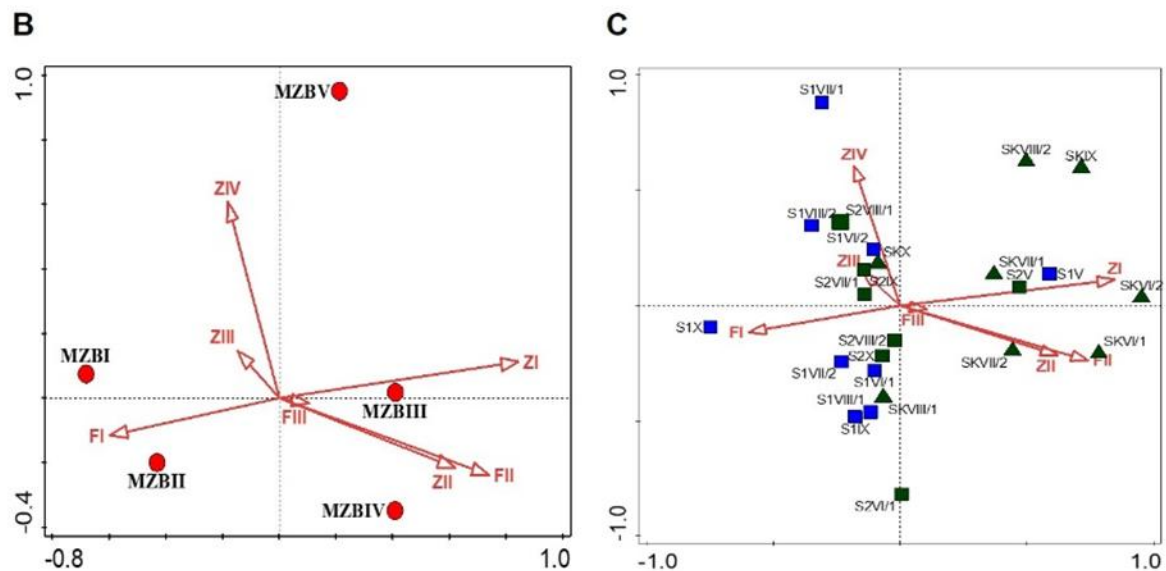
Shallow lakes Food webs



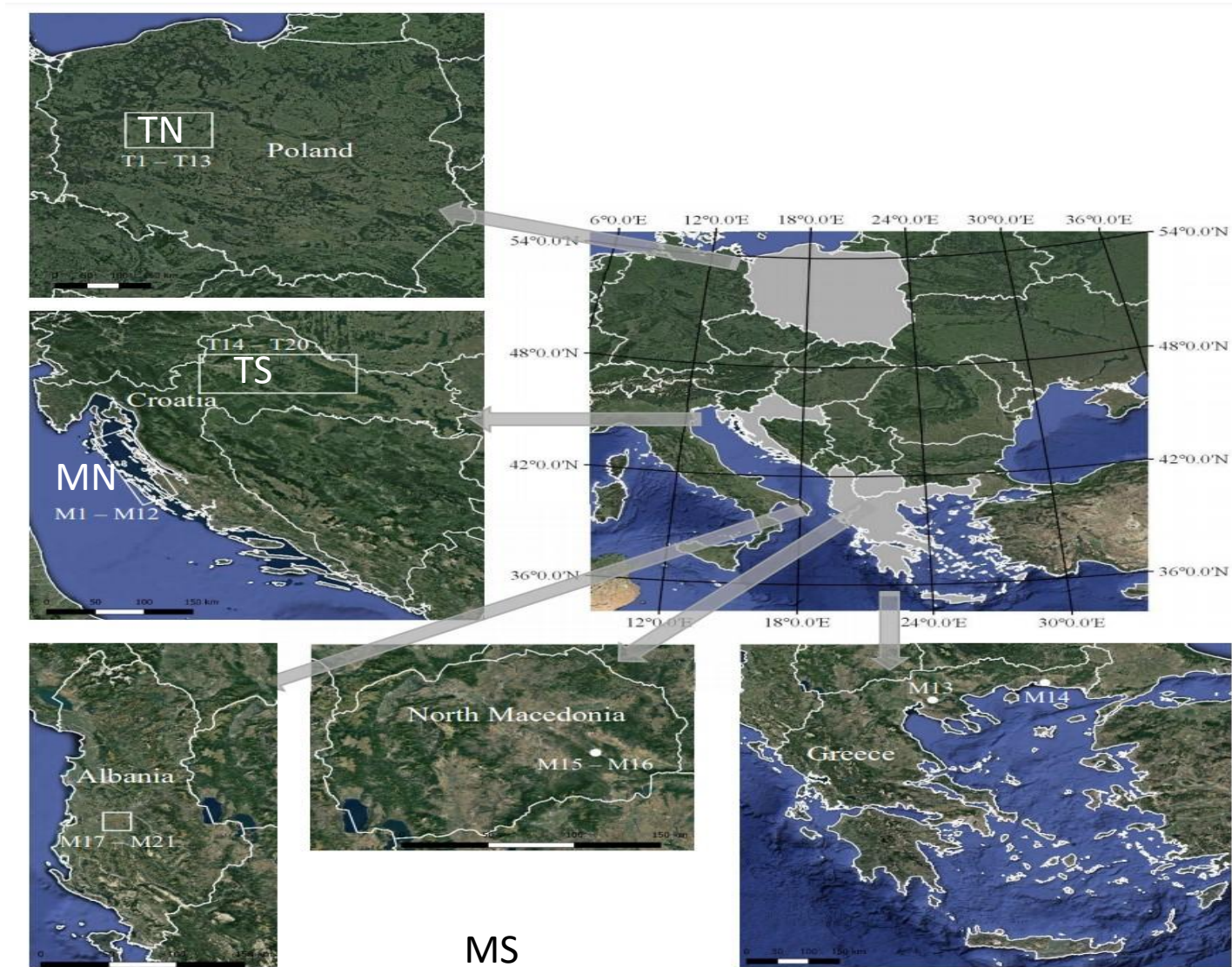
Pelagic vs. Littoral food webs

Zooplankton + macrozoobenthos + Fish; 80% zooplankters vs . 2 predators

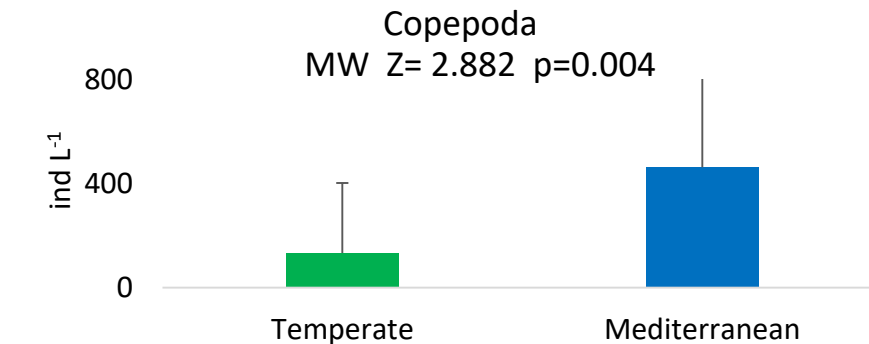
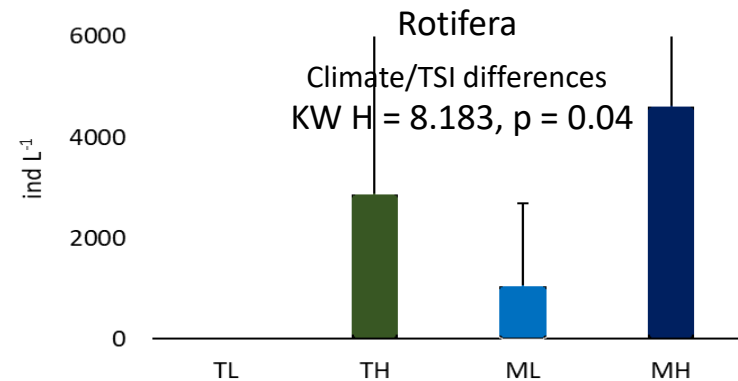
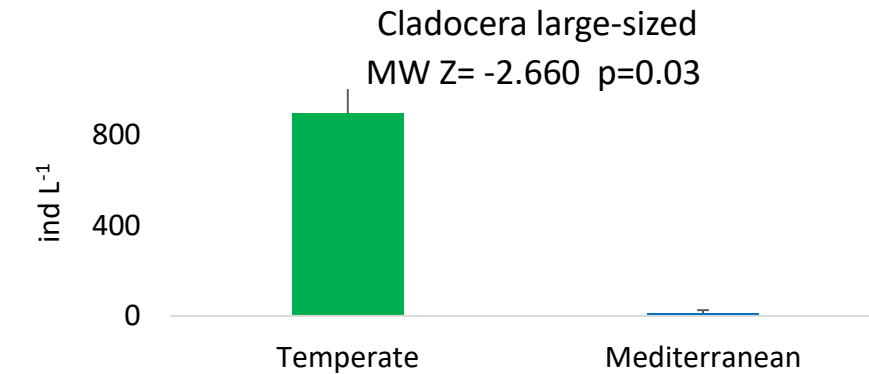
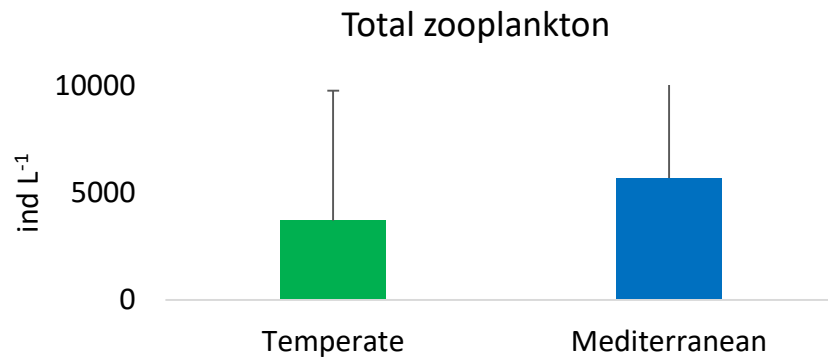
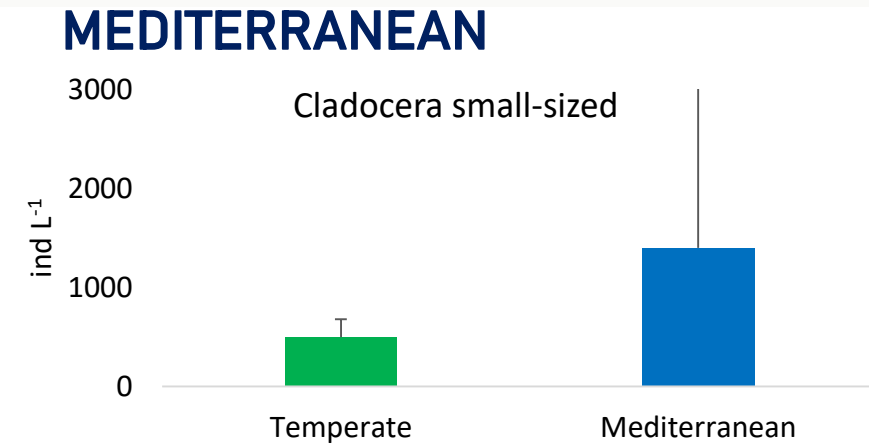
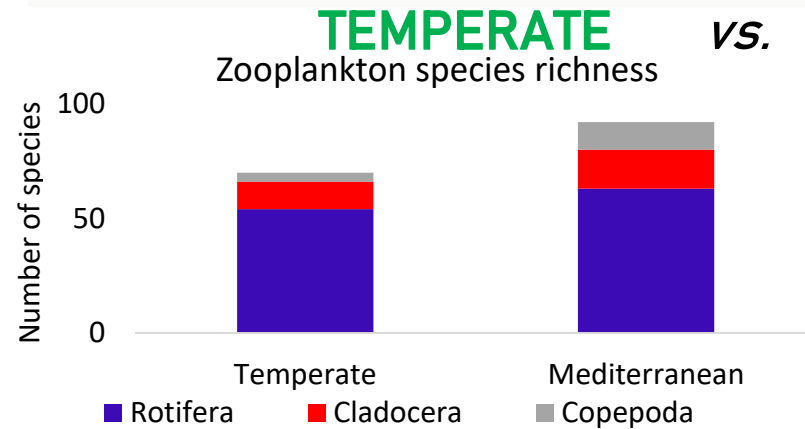
Shallow lakes Food webs & size categories



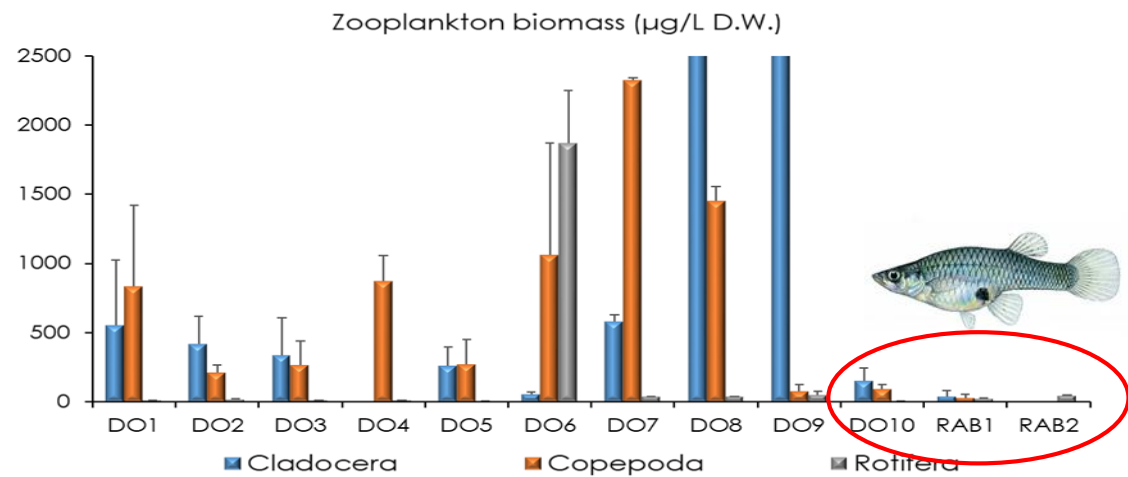
Latitudinal Shallow Lakes study



Zooplankton features

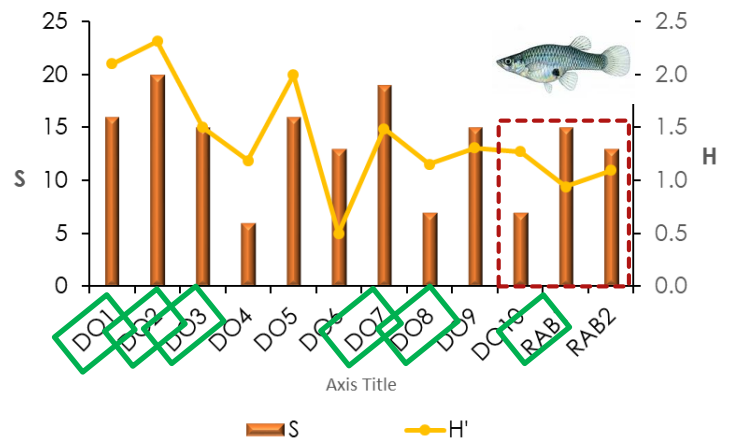


Case study: Adriatic ponds Dugi otok Island



Monte Carlo Permutation Test

	%	P
Macroph.	16.8	0.002
Chl a	15.8	0.004
Fish	13.9	0.042

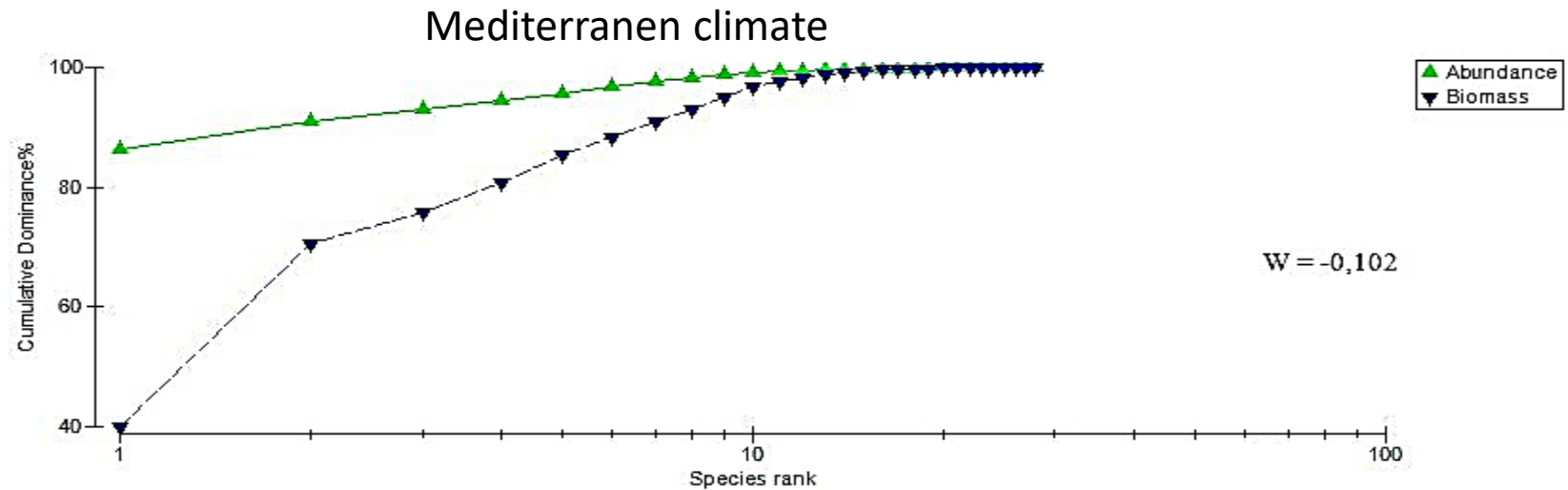
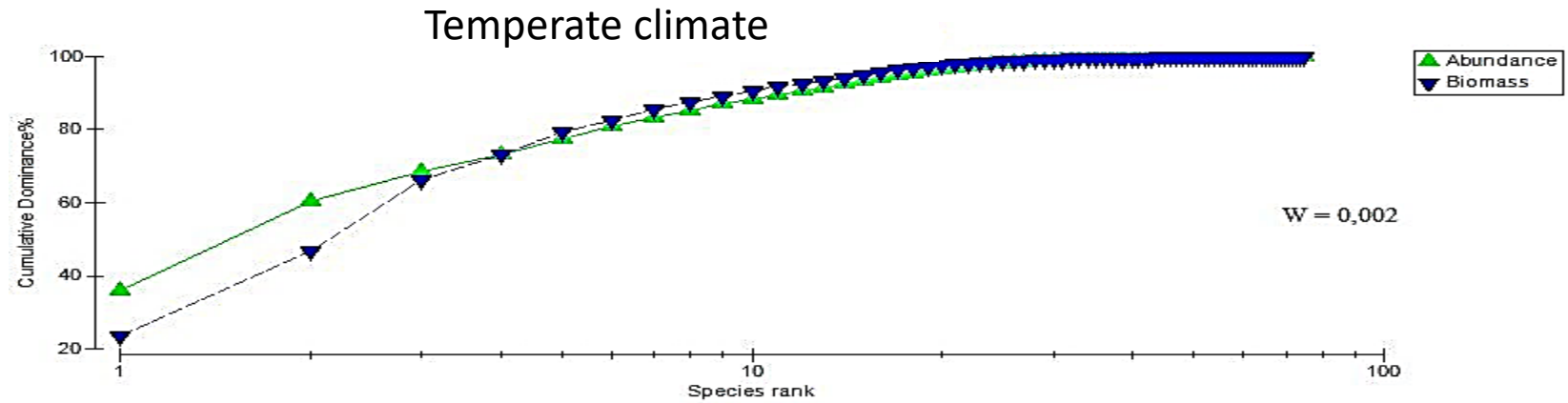


Spearman Correlations ($p < 0.05$)

	Salinity	Macrophytes
H'	- 0,366	
S		0,362

 % macrophyte coverage

Zooplankton Abundance:Biomass ratio



Springer Water

Vladimir Pešić
Djuradj Milošević
Marko Miliša *Editors*

Small Water Bodies of the Western Balkans

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Chapter 2 Small Standing-Water Ecosystems in the Transitional Temperate Climate of the Western Balkans



Maria Špoljar, Spase Shumka, Orhideja Tasevska, Tea Tomljanović,
Aleksandar Ostojić, Anita Galir Balkić, Jasna Lajtner, Bledar Pepa,
Tvrko Dražina, and Ivančica Ternje

Abstract Small standing-water ecosystems (SWE, i.e. ponds, lakes, reservoirs), natural or anthropogenic origin, dominate in the global landscape, contributing to the high diversity of habitats and species as well as environmental heterogeneity. Water chemistry, morphometry, climate and the level of human activities are extremely

Chapter 5 Temporary Ponds in Mediterranean Islands: Oases of Biodiversity



Tvrko Dražina, Maria Špoljar, and Marko Miliša

Abstract The development of tourism in the Mediterranean and the abandonment of traditional extensive agriculture lead to the succession of several different habitat types. One of the most endangered habitats in Mediterranean region are temporary ponds. Despite small size, these ephemeral waterbodies are recognized as reservoirs of biodiversity. Shallow ponds are often only freshwater habitats on islands. In this chapter we will mainly focus on biotic interactions among macrophytes, zooplankton, macrozoobenthos and fish. With this approach we will try to give guidelines for conservation and restoration in order to prevent succession and devastation of ponds.

Keywords Pond ecology • Macrophytes • Zooplankton • Macrozoobenthos • Fish • Conservation

5.1 Introduction

155 zooplankton species/120 species of rotifers in 28 shallow waterbodies